Producing on Real Demand –
In a High Efficient Industry

- A Case Study at Tetra Pak Japan

Johanna Eckerwall
Andreas Johnsson

Department of Industrial Management and Logistics
Lund Institute of Technology, Lund University
Box 118
SE-22100 Lund
Sweden

Department of Business Administration
Lund School of Economics and Management, Lund University
Box 7080
SE-22007 Lund
Sweden

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Abstract

Title: Producing on Real Demand – In a High Efficient Industry

Authors: Johanna Eckerwall and Andreas Johnsson

Tutors: Jens Hultman -Assistant Professor, Department of Business Administration, Lund School of Economics and Management

Aki Matsuzaki-Business Control Manager, Supply Chain Division, Tetra Pak Japan

Bertil Nilsson-Adjunct Assistant Professor, Department of Industrial Management and Logistics, Lund Institute of Technology

Background: The production philosophy at Tetra Pak Japan is make-to-order. Although, in reality it is more make-to-stock due to the current pricing structure based on discounts for large volume orders. As a result, the inventory levels are high and the responsiveness towards customer demand is limited. Alongside, the marketplace is changing and the competition is increasing. This calls for a change in the supply chain structure. The question is whether it is possible to find a balance between bringing value to the customers and to Tetra Pak Japan.

Purpose: The purpose of this master's thesis is to explore the possibilities of combining cost efficiency with responsiveness towards customer demands. This balance will be investigated through co-printing on real demand.

Method: The process has involved continuous movement between the empirical world and the theoretical world. The systematic combining enabled the search for additional information when it was required for further development of hypothesises. The thesis is based on quantitative and qualitative data. The data has been collected using a triangular search of interviews, observations and secondary sources.

Conclusions: The thesis concludes that co-printing on real demand in combination with multicolour printing will lead to 34 % reduction in the minimum order size for customers and 61 % reduction of the finished goods inventories. The *Total Value Metrics* is used as a framework to identify the value that this solution will bring to the customer. The customers will benefit in terms of smaller order sizes, more colourful designs and a supply chain that responds quicker to changes on the marketplace. The proposal of changing the supply chain structure opens up for the desired balance between cost efficiency and responsiveness towards customer demands.

Key words: Supply chain, real demand, co-printing, multicolour printing, Tetra Pak, Japan, packaging material, agility, lean, total value metrics, cost efficiency, responsiveness, flexibility , process colour, spot colour

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Johanna Eckerwall & Andreas Johnsson

Glossary

Batch	One series of packages in production
Co-printing	Parallel printing of different designs
Design loop	The design proof going back and forth between Tetra Pak Japan and the customer
Design plate	The printer can do parallel printing of designs on one roll by using several design plates
Design proof	The final design that requires customer admittance before printing
Flexo Line	A printing technique using only spot colours
Flexo Process	A printing technique using both process and spot colours
Multicolour printing	Printing technology that mixes base colours to achieve other colours
Order Fulfilment Packaging Material	The process of producing and delivering packaging material
Process colour	Base colour that can be used in colour mixtures
QSV (Quality-Size-Variant)	Production specification of an order
Reel	1 reel=1 web
Roll-fed	Packages delivered on rolls
Roto	A high quality printing technique
SKU	Design code for an order
Spot colour	Unique colour that cannot be combined.
TB	Tetra Brik
TBA	Tetra Brik Aseptic
Tetra Rex	Pre cut packages delivered on pallets
Web	One roll contains many webs. The number of webs is depending on the size of the package

Contents

1 Introduction

This opening chapter is intended to provide the reader with an introduction to the supply chain division at Tetra Pak Japan. It will also describe the trends in the Japanese market that leads to the complexity of the current supply chain. This leads to the final part of the chapter that discusses the balance between cost efficiency and responsiveness towards customers and presents the purpose of this thesis.

1.1 Background

Tetra Pak has many years of experience within the packaging material business, a strong customer base and valuable knowledge that has lead to a strong market position. In 2005, the company changed the focus of their production strategy from a traditional approach to a more customer oriented approach. This was the starting point of the supply chain concept at Tetra Pak. The aim of introducing the supply chain philosophy was to lay stronger emphasis on the total flow of products, from inbound logistics to outbound logistics, and to improve the integration with suppliers and customers. (Prem, 2010)

Tetra Pak provides 150 markets around the world with processing and packaging solutions for food. The company is regionalised with manufacturing and market companies worldwide, amongst them Tetra Pak Japan. Japan constitutes Tetra Pak's third largest market. (TetraPak, 2010)

At present, Japan has 55 000 convenience stores competing to sell packages for juice and milk to the consumers. Due to the large number of suppliers, the Japanese market for packaging material is fragmented, calling for differentiated products. Accordingly, Tetra Pak Japan specialises in producing packages in a range of sizes and with various designs to serve their customers. In line with the general trend on the Japanese market, Tetra Pak Japan's customers are very specific regarding quality and expect high levels of service. This has lead to a strong focus on realising the instant and short-term needs of the customers, compromising on long-term relation and integration with the customers. Also, the global Tetra Pak standards have at times been disregarded, in order to fulfil demands on the local marketplace. (Prem, 2010)

1.2 Problem Discussion

The production philosophy at Tetra Pak Japan is make-to-order. This implies that production occurs solely after receiving an order from the customer. The current system is intended to reflect real demand and prevent non value-adding activities in terms of high stock levels. This is not the prevailing situation for Tetra Pak Japan. Due to price reductions for larger order sizes and the requirement of minimum order sizes for production efficiency, the majority of customers order larger quantities than demanded. Consequently, Tetra Pak Japan produces more packages than needed for that point in time. In addition, the flexibility towards customers is reduced as a result of the minimum order sizes, preventing the customers from ordering smaller quantities.

The current production system has also lead to high inventory levels of finished goods. The price reduction system encourages the customers to place a large total order. At the same time, Tetra Pak Japan allows the customers to make call offs, that is the total order can be dispatched on different dates, depending on the number of packages that the customer currently needs. Since the resulting products are stored in Tetra Pak Japan's warehouses, and some customers do not make the last call off until one year after production, the inventory levels are high. The internal warehouse is not large enough to store all inventories, which has called for Tetra Pak Japan to utilize two external warehouses. These are both costly and time-consuming.

The present situation calls for a change of the supply chain structure. The marketplace is changing alongside with customer demands and increasing competition. For continued long term success for Tetra Pak Japan it is important to find a balance between cost efficiency and responsiveness towards customer demands. Neither of these can be compromised upon. The production is dependent on large volumes to remain efficient, and to stay competitive, excellent service to customers is a requirement. The question is whether it is possible to combine these central parts of the supply chain. Is there a solution for producing on real demand and at the same time retain production efficiency?

One possible solution to achieve this balance is co-printing, which is parallel printing of several designs on one roll. As a result, it enables simultaneous printing of different customers' designs. This allows for smaller order volumes from each customer without compromising the production efficiency. Presently, the use of co-printing is limited to a small percentage of the total production volume at Tetra Pak Japan. This is mainly due to the current pricing structure and the customer's resistance for co-printing with other customers' designs. The question is whether this system is sustainable in the long term? Would it be possible to change the pricing structure and the customer's standpoint? Could co-printing on real demand achieve the desired balance between cost and service?

1.3 Purpose

The current supply chain complexity described in the previous section inspired Tetra Pak Japan to take action and investigate a possible optimisation of the supply chain structure. This has lead to the purpose of this thesis.

> *The purpose of this master's thesis is to explore the possibilities of combining cost efficiency with responsiveness towards customer demands. This balance will be investigated through co-printing on real demand.*

1.4 Delimitations

This thesis is delimited to Tetra Pak Japan and the Japanese market for packaging material. Thus, other Tetra Pak market companies are not explored. Furthermore, the aim is to investigate the possibility for co-printing on real demand for Roll Fed products. As a result, the production and demand for Tetra Rex packages are not included.

1.5 Target Audience

The target group is assumed to have basic knowledge within the supply chain management domain. Resultantly, the primary target audience for this thesis is scholars, students and Tetra Pak employees interested in supply chain management. Also, the thesis is aimed at companies acting in high efficient industries facing the challenge of balancing cost efficiency and responsiveness towards customer demands.

2 Methodology

This chapter aims to provide the reader with an understanding of the process which has guided us in the fulfilment of the thesis. The chapter starts off with an introduction to the case and the methodological approach, describing the various research methods utilized. Thereafter the means of data collection, which are interviews, observations and secondary data, will be explained. The chapter ends with an illustration of the process of the data analysis, and the validity and reliability of the thesis.

2.1 Introducing the Case

As outlined in the introduction chapter the purpose of this master's thesis is to "*explore the possibilities of combining cost efficiency with responsiveness towards customer demands. This balance will be investigated through co-printing on real demand.*"

Within our masters program *Technology Management* we have specialised in the field of supply chain management. The object of study was therefore chosen according to the possibilities of conducting the thesis within this area. Tetra Pak is a global company with various functions and processes, amongst them supply chain management. Japan was selected since the market company provided an opportunity to investigate a real case problem with supply chain efficiency as the main priority. Additionally, Japan has long been in the forefront regarding lean manufacturing and production efficiency. This inspired us to conduct the thesis in Japan and contribute to Tetra Pak Japan in striving for lean and agile manufacturing.

To fulfil the purpose, empirics on current activities within the supply chain and in the production at Tetra Pak Japan, have been gathered to understand the gap between present production and producing according to real demand. Alongside, information on customer demand has been collected to receive an understanding of the parameters that creates value for Tetra Pak Japan's customers. Foremost, the customers' perception of flexibility has been evaluated. Since the aim is to investigate the co-printing possibilities on real demand, numerical data has been gathered to perform the co-print simulation. Additionally, numerical data on the average number of days in the inventory and cost of the inventory has been gathered.

For the theoretical framework, literature and articles on supply chain management and lean and agile manufacturing have been carefully studied. Also, qualitative data have been collected from methodological literature regarding research methods, means of data collection and data analysis.

2.2 Introducing the Methodological Approach

In academic studies, a transparent and well defined research method is important to establish confidence for the results. Research methods create awareness of the various choices of data collection and data analysis. Thus, the most appropriate method for a specific case can be selected. It also highlights the important criteria to consider in regard to each method and introduces a critical approach to the method and the results from the study. Additionally, research methods provide an insight in the overall process and illuminates and connects the various stages of the study. (Bryman, et al., 2007)

2.2.1 Combining the Empirical World and the Theoretical World

The data collection and the search for appropriate theory have in this thesis been in line with the research approach of *systematic combining*. This implies a continuous movement between the empirical world and the theoretical world. It also highlights the role of case studies in the development of theory through in-depth insights in an empirical phenomenon. Systematic combining stresses the parallel nature of the activities involved in the case research. The movement between the empirical world and the theoretical world strengthens the understanding of both worlds. The theoretical framework sets the direction of empirical search and the data collected will give rise to unanticipated findings that result in the search for new or additional theory. Systematic combining has been inspired by *abduction*, which is a research approach that emphasises the relation between the "everyday language and concepts". In abduction it is pointed out that the theoretical framework is modified according to the empirical findings and the findings of additional literature. (Dubois, et al., 2002)

Systematic combining is also similar to the *balanced approach model*. This model combines two different approaches of the study and investigation of a phenomenon, the inductive and the deductive approach. The balance is achieved through shifting focus back and forth between the two approaches, see Figure 1. (Kotzab, et al., 2005)

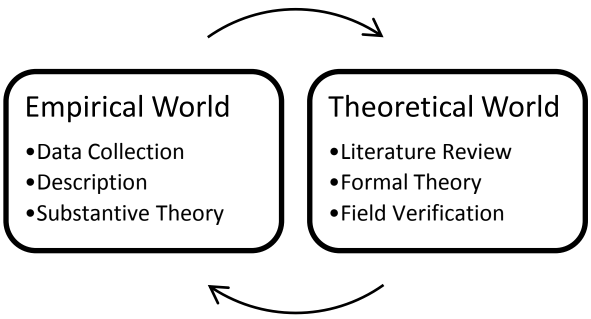

Figure 1: The balanced approach model, remodelled (Kotzab, et al., 2005)

The inductive approach starts off with data collection to understand the phenomenon. Relevant theories are then chosen according to the results from the empirical study. This approach is relevant to use when the aim is to understand new and complex phenomena. The opposite is prevalent for the deductive approach where the aim is to develop and test formal theory. It starts off with theoretical studies that are then applied on the phenomena to test the presumptions in a real context. (Kotzab, et al., 2005)

2.2.2 Systematic Combining within the Thesis

Conducting the thesis has involved parallel searching for empirics and theory. We were introduced to the phenomenon of study prior to our arrival to Japan. The geographical distance prevented data collection at that point in time. As a result, we began the literature review to gain ideas and methods on means to solve the problem. Thus, parts of the theoretical framework started to develop before the arrival to Japan. Lean manufacturing constituted the starting point of the literature study. This concept is broad, including several models and frameworks in regard to supply chain efficiency. We found parts of the concept valuable and applicable to test and verify during the field study.

Upon arrival at Tetra Pak Japan we began the collection of data to understand the complexity of the supply chain. This included an outline of the gap between the current production and producing on real demand. The lean philosophy guided us in finding the gap. The gap was put in relation to the supply chain structure and the customer requirements for a description of the overall situation. A deeper understanding of the phenomenon gave rise to possible solutions to the problem.

We realised that the focus on responsiveness to customer requirements is strong in Japan. As a result, we began the search for additional literature that puts even stronger emphasis on customer demands than lean manufacturing does. This set the direction towards agile manufacturing. A combination of the two frameworks proved to be valuable in regard to the purpose of the thesis. Lean manufacturing lays emphasis on removal of all non-value adding activities, whereas agility focuses on responsiveness to customer requirements. Both realise the importance of producing on real demand. The *Total Value Metrics* proved to be valuable in summarising lean and agile manufacturing and was therefore selected as the main theoretical framework for the thesis.

After some time, we realised that introducing co-printing and multicolour printing at Tetra Pak Japan would bring about production on real demand. These findings gave rise to additional data collection as the co-printing simulation required comprised numerical data and the multicolour printing required detailed information on the technology.

2.2.3 Researching for Qualitative and Quantitative Data

The qualitative and quantitative research methods differ regarding the information selected from the empirics. Three distinctions can be made between qualitative and quantitative data.

- Qualitative data is based on meanings expressed through words and maximises realism whereas quantitative data is based on numbers and optimises control and generalisability (Kotzab, et al., 2005).
- Qualitative data collection results in differentiated data that requires classification into categories. The opposite prevails for quantitative data that result in numerical and standardised data. (Saunders, et al., 2007)
- Analysis of qualitative data is performed using conceptualization and notions of the empirical findings, whereas analysis of quantitative data is conducted through the use of statistics, tables and diagrams (Saunders, et al., 2007).

The purpose of the thesis has necessitated the collection of both qualitative and quantitative data. With the aim to understand the supply chain activities and the market, qualitative data from interviews, observations and secondary sources have been gathered. The qualitative data constituted the base for conclusions on the existing problems in the various supply chain activities. The assembly of quantitative data was conducted in order to perform the co-printing simulation and the calculations regarding the printer setup times and inventory levels. The numerical data enabled the quantification of the results from producing on real demand.

2.3 Data Collection

The collection of data has been performed using a triangular search. Triangulation means that different data collection techniques are used in order to verify that the results from the data are in accordance with the presumptions (Saunders, et al., 2007). The three different methods used in this thesis are interviews, observations and secondary data. These methods are complementary to each other and will in combination contribute to a more objective perspective of the phenomenon. The techniques are further described in the sections that follow.

2.3.1 Interviews

Several methods exist on how to conduct interviews. They may be categorized according to the level of formality and structure and linked to the purpose of the research.

Structured interviews: interviews based on standardised and predetermined questionnaires. Quantitative data is collected and the purpose is to identify general patterns through descriptive research. (Saunders, et al., 2007)
Semi-structured interviews: interviews where the setup is based on a set of questions related to a certain theme. The interviewer can then select among these questions depending on the respondent, as well as adding additional questions according to the outcome of the interview. In general, semi-structured interviews result in qualitative data and explain relationships between variables in a research study. (Saunders, et al., 2007)
Unstructured or in-depth interviews: informal interviews where the interviewer and the respondent discuss the subject freely. In-depth interviews are preferable when the purpose is to explore a new field and search for new insights. (Saunders, et al., 2007)

2.3.2 Interviewing at Tetra Pak Japan

The majority of interviews within this thesis were performed using a semi-structured technique. We prepared questions related to the activity, such as the warehouse, that was the theme of the specific interview. We discussed the topic with the respondent based on these questions, although the discussion altered in different directions depending on the respondent’s answers.

During the three month period in Japan interviews have been held with managers and employees from all activities within the supply chain. Interviews were performed within Design, Customer Service, Planning, Production and Warehouse & Logistics. The interviews gave us a valuable knowledge base of the product flow and the strengths and weaknesses for each activity within the supply chain. Also, this enabled us to distinguish between value and non-value adding activities. Understanding of customer values and of the market situation for packaging material has played an important role for fulfilment of the project goal. Due the language barrier, it was not possible for us to conduct interviews with customers directly. Instead, interviews with managers working closely with customers and one manager responsible for the customer common agenda have been performed.

On average, each interview lasted between 50-60 minutes. As mentioned earlier, the majority of the interviews were semi-structured and we prepared questions related to the expertise of the respondent. Regardless of the preparation, the questions consistently allowed for open-ended answers, to avoid bias in the answers from the respondents. All interviews were performed face-to-face since we were placed at the Tetra Pak offices in Gotemba and Tokyo. Also, all interviews were conducted in English since we do not speak Japanese. The scheduling of the interviews was made in collaboration with our tutor at Tetra Pak Japan. To make the respondents feel comfortable we began every interview by introducing ourselves and the purpose of the thesis.

During each of the interviews, we took notes simultaneously to asking questions to the respondent. As a rule, one of us was responsible for the flow of the interview and the other was in charge of taking notes. The interviews were summarised immediately after conclusion. For information accuracy, we discussed and consolidated our respective notes regarding each question. The discussions opened up for data clarifications and made us aware of areas that were to be complemented with additional information.

It has been in our favour to conduct all fieldwork on site in Japan. The closeness to the respondents facilitated the process of scheduling interview appointments. Also, it enabled for us to return to the respondents with additional questions at any point in time. Some of the respondents have been interviewed at several occasions, as a result of the parallel search for literature and data collection. Moreover, the onsite placement has made it possible for us to establish valuable contacts within the organisation. These contacts have proved to be helpful due to informal discussions where we have gained important information for the thesis.

2.3.3 Observations

Observations allow visualisation of discrepancies between what the interviewees said and what the interviewees actually did. There are two main types of observations, participant observations and structured observations.

Participant observations: observations based on finding the meaning behind the actions of people. This research method generates qualitative data. The researcher can select to conceal or reveal the purpose of the observation to the respondents. (Saunders, et al., 2007)
Structured observations: observations based on finding the frequency of the actions and results in *quantitative* data (Saunders, et al., 2007).

2.3.4 Observing at Tetra Pak Japan

Participant observations have been used in the fulfilment of this thesis. Observations of the production process and the internal and external warehouses have been conducted. Additionally, we participated in the quarterly supply chain all hands meeting. During all the observations we revealed the purpose of our study.

Production process; we were provided a thorough understanding and insight in the production process when observing each function, such as the prepress, the printer, the laminator and the slitters (see section 4.10). The observations of the creation of the packaging material constituted a knowledge base that we could return to during the interviews with the employees as well as in the later analysis of the collected data. Co-printing was carefully observed to comprehend the advantages and limitations of the printing method. With the process of co-printing in mind the calculations regarding cost-savings and production scheduling were facilitated as we could take into account all important figures and numbers.

Internal and external warehouses; observations of the various warehouses enabled us to view the levels of work-in-progress and finished goods inventories. A guided tour within the internal warehouse was provided to us and visits to all three external warehouses have been conducted. The warehouse observations were an important factor in fulfilling part of the purpose - reduction of the finished goods inventories.

Supply chain all hands meeting; we took part of the meeting held every fourth month, including the total supply chain division, excluding production. Presentations regarding sales statistics and market trends were performed and the material was proved to be valuable for the market analysis. Also, we were given the opportunity to observe the manager-employee relations.

2.3.5 Documentary Secondary Sources

Documentary secondary data sources include written and non-written materials, and generate both qualitative and quantitative data.

Written; data from organisational databases, organisational communications and organisational websites. Written data can provide numerical data on company profitability and costs or more qualitative data such as visions and strategy. (Saunders, et al., 2007)

Non-written; data from media accounts, video recordings and voice recordings. Non-written data are often used to support findings from primary sources (Saunders, et al., 2007).

2.3.6 Finding Secondary Sources

Secondary sources have been collected through organisational communications from the various supply chain activities and market statistics. In addition, facts and figures about Tetra Pak and Tetra Pak Japan were gathered from the company website.

Collection of quantitative data has been vital to fulfil parts of the purpose. The numerical data was collected from the organisation database *R3*. The data concerned above all data for the co-printing simulation. It also included data on the finished goods inventory and the printer setups. Similarly to conducting the interviews, we were fortunate to be closely situated to the employees in charge of the quantitative data and could therefore gain access to all internal data. This facilitated the co-printing simulation and calculations on the inventory levels and printer setup times.

2.4 Data Analysis

Data collection and data analysis are often interrelated and interactive processes (Saunders, et al., 2007). This is valid also for this thesis. There have been no specific instances of moving from data collection to data analysis. The reason for that is the systematic combination of the empirical world and the theoretical world in the implementation of this thesis. This has lead to continuous discussions on the analysis of the data, overlapping the search for additional empirics and theory. At times the insights have come suddenly, when we have taken time off work such as in a park in Tokyo or at a weekend trip to Hakone. These *"aha"* moments have proved valuable and added different perspectives to the analysis. Although sudden insights have been important, the majority of the analytical work has been structured and intentional. The qualitative and quantitative data have been analysed using different structures, both which will be explained in the following section.

2.4.1 Performing Qualitative Analysis

The qualitative data has been analysed using four techniques; categorisation, unitising, recognising relationships and developing and testing theory.

Categorisation involves classification of data according to meaningful categories guided by the purpose of the thesis. The categories provide a structure that will be useful in the further analysis of the data. The next activity *unitising* involves adding data to the suitable category. The unit of data may be a complete paragraph, a sentence or a number of words. *Recognising relationships* involves identifying relationships between the various categories, finding out about similarities and differences and adding additional information to the categories. Finally, *developing and testing theory means that* hypothesis are formed and tested to reveal patterns within the data. The relationships between the categories have to be tested in order to conclude the actual connection between the data. (Saunders, et al., 2007)

The *categorisation* within this thesis has been organised according to the different supply chain activities at Tetra Pak Japan. The activities are Design, Customer Service, Planning, Production and Warehouse & Logistics. Furthermore the qualitative data has been classified in terms of market trends and customer demands in order to identify the customer values and requirements. The *unitising* of the data occurred continuously since the information was gathered at different times in accordance with the systematic combination of empirics and theory. The *recognition of relationships* between the categories began when data was collected on all supply chain activities. We identified the gap between the current production and producing on real demand. This was related to internal integration and responsiveness to customer demands. The final activity consisted of analysing the defined categories according to the *Total Value Metrics*. This theoretical framework was used to identify the output in terms of customer value in relation to the four parameters; service, quality, cost and lead time.

2.4.2 Performing Quantitative Analysis

The quantitative data has been analysed in two steps.

Preparing, inputting and checking data (Saunders, et al., 2007)*;* in this thesis the numerical data was gathered from the database R3 at Tetra Pak Japan. The data was placed and organised in a Master Sheet (see appendix A). The master sheet functioned as the base for all calculations within the thesis. To verify and test the data from R3, we compared the data with information in the internal database Tetra Link.

Exploring and presenting data (Saunders, et al., 2007)***;*** the numerical data has been analysed in different sets. Firstly, a comprised co-print simulation was performed. We manually simulated the possibilities of co-printing on real demand at Tetra Pak Japan today. The results are presented in the co-printing summary (see appendix B). This simulation then constituted the base for the remaining sets of calculations. Colour calculations, inventory calculations and calculations of the printer setup time have been performed (see appendix D). Finally an additional, less extensive co-print simulation was performed, in order to analyse the possibilities for co-printing on real demand in the future (see appendix B).

2.4.3 Ensuring Credibility

Reliability and validity are important measurements of the trustworthiness of research findings (Bryman, et al., 2007). These will be described in more detail in the next section. Firstly, an overview of our attempts to create trustworthiness and to avoid biased respondents will be provided.

Trustworthiness; as previously mentioned, a triangular search has been used for data collection. The use of multiple empirical sources has strengthened the trustworthiness in such ways that the same data has been collected at different points in time. It has been helpful to be two authors when analysing the data. Together we have summarised and discussed the findings from the data collection. When the opinions have differed regarding a certain matter, we have asked the respondent again for a verified result. All empirics were collected and analysed firsthand at Tetra Pak Japan. This gave rise to valuable informal discussions and observations, which further strengthened our understanding of the study.

Avoiding biased respondents; throughout the interviews we have been aware of the risk for biased respondents. We have therefore been critical to the collected data. To assure an objective perspective and for true understanding of the phenomenon we discussed the same topic with several respondents. In addition, the matter was also discussed with our tutor at Tetra Pak Japan and our tutors at Lund University.

2.4.4 Ensuring Reliability

Reliability is referred to as to what extent a measure of a concept is stable. This implies that the results from the study ought to be repeatable and consistent with later measurements of the same concept. (Bryman, et al., 2007)

For reliable results the data has been collected from the internal databases R3 and Tetra Link. The data is automatically generated in the databases from the different activities at Tetra Pak Japan, increasing the consistency between different points in time. The co-print simulation was performed using data from October 2009. The reason for this is that the customer demand for that month was without seasonal variations or other discrepancies. It was therefore realistic to assume that the results could be representative for the whole year of 2009.

We held a presentation to the supply chain managers before leaving Japan. This way, the results and the conclusions from the study were tested and discussed. The managers were overall very content about the findings and regarded the information as valuable input for the future supply chain strategy. The presentation has further strengthened the reliability of the results from the study.

2.4.5 Ensuring Validity

Validity is referred to as whether or not the study measures what it is intended to measure. It concerns the integrity of the conclusions generated from the research. Validity assumes reliability. If the measure is unstable and thereby unreliable, it will not be measured correctly, thus not valid. (Bryman, et al., 2007)

The validity has been taken into consideration for both data collection and data analysis. To measure the gap between the current supply chain and a supply chain producing on real demand, data has been collected from all the supply chain activities. We constantly turned to employees within one activity to ensure a specific answer on a certain topic related to that activity. The co-printing simulation required vast amounts of data and the chance for validity increased with the firsthand information at a hands reach at Tetra Pak Japan. We could always turn to experts within each field to assure correct and valid data. The analysis was performed evaluating Tetra Pak Japan using the Total Value Metrics and through a co-printing simulation on real demand. It resulted in measurements that fulfilled the purpose of this thesis such as increasing the customer value and reducing the cost of finished goods inventories.

3 Theoretical Framework

In this chapter, the theoretical framework will be explained. It starts with an introduction to supply chain management and the increasing importance of the supply chain in today's business environment. Thereafter, lean and agile manufacturing are highlighted as two frameworks that are central when striving to achieve value-adding activities and customer value. The chapter ends in a description of the Total Value Metrics, where lean and agility are combined.

3.1 Introducing the Supply Chain

Companies all around the world are facing global competition. The focus is on quick response to customer needs at low cost, market access and rapid deployment of technology. A transformation from mass production including standardised products and services towards customised production of both products and services is taking place. This change requires new ways of managing the supply chain process. A single firm cannot manage the complete process of meeting customer demands in the context of the new world. Firms must focus on managing processes that engage other firms as partners to perform the activities necessary to fulfil the process. (Skjott-Larsen, et al., 2007) The supply chain can be defined as "a *system whose constituent parts include material suppliers, production facilities, distribution services and customers linked together via a feed-forward flow of information"* (Naylor, et al., 1999). Customer requirements have emphasised integration between actors in the supply chain;

> *"Supply chains compete, not companies."* (Christopher, et al., 2001)

The above statement is generally accepted and as a consequence the concept and attributes of the supply chain has gained increased recognition. The survival of the supply chain lies in the hand of the customers. When designing a supply chain, it is therefore vital to consider customer satisfaction and marketplace understanding. The ultimate supply chain is capable of both reducing costs and responding to customer demands, resulting in a balance of supply and demand. (Christopher, et al., 2001)

The design of the supply chain is a result of the company's supply chain strategy. In general, the strategy aims at creating a balance between push and pull. This means producing according to factory efficiency as well as customer demand. There are two main options for the design of the supply chain; *make to order* and *make to stock*.

Make to order; this strategy focuses on producing according to customer requirements. The demand is visible throughout the supply chain and allows for fluctuations in demand and product customization. (Naylor, et al., 1999) Consequently the supply chain only operates on the basis of orders received. Therefore focus is more pull oriented where the customer order pulls the product through the supply chain. The optimal structure would be a virtual supply chain of suppliers, assembly and distribution created for a single order. (Skjott-Larsen, et al., 2007)

Make to stock; this supply chain strategy focuses on production of standard products, and brings attention to accurate forecasts. The production schedule is planned to maximise the efficiency in the factory. To be efficient, it requires a steady overall demand and large inventory levels. The strategy is push oriented considering that the production is independent from the customer demand. (Naylor, et al., 1999)

The de-coupling point separates the supply chain in two parts and defines the supply chain strategy, see Figure 2. The upstream part is based on planning, whereas the downstream part is more customer-oriented. This way the de-coupling point links together the more predictable production output with the more unpredictable customer demands. (Naylor, et al., 1999) It also indicates how far demand is visible throughout the supply chain. The further upstream the de-coupling point is, the more visible the demand is to all actors in the supply chain. It denotes that customer information is shared between internal and external actors of the supply chain. As a result, all activities are considered when striving to fulfil customer requirements. At present, in the majority of supply chains, the de-coupling point is placed at the end of the chain. Consequently, the supply chains are forecast driven rather than demand driven, and inventory levels exist between all activities from the supplier to the end customer. (Christopher, 2000)

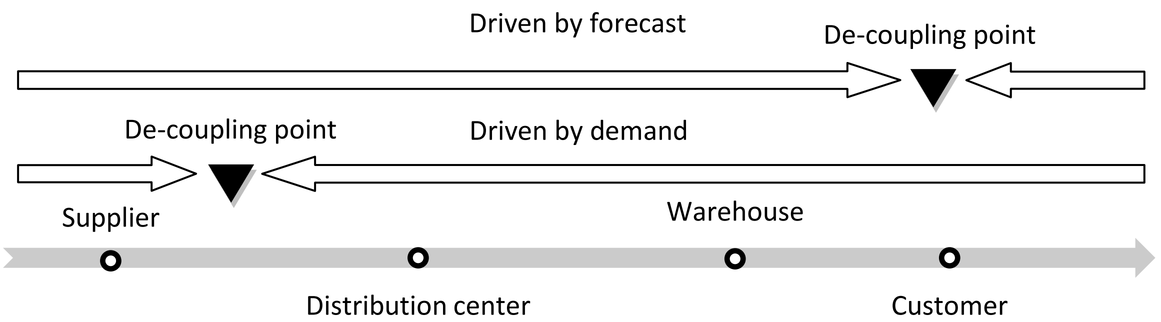

Figure 2: De-coupling points and strategic inventory, remodelled (Christopher, 2000)

Upstream the demand is often stable and standard products flow through a number of value streams (Naylor, et al., 1999). As a result, information and material regarding the product can be forecast driven before the de-coupling point (Christopher, 2000). The opposite goes for the downstream demand that is volatile where a number of products flow through one value stream (Naylor, et al., 1999). This indicates that product information and material supply should be demand driven after the de-coupling point (Christopher, 2000).

3.2 Introducing Lean

The cornerstone within the lean philosophy is for the company to identify the customer value and thereafter act in order to fulfil these values. It lays emphasis on cost efficiency and high quality throughout the flow of information and goods. A lean organisation strives to satisfy customers by eliminating or reducing waste. (Hines, et al., 2008) Waste can be defined as non value adding activities that do not add value to the customer, such as overproduction, unnecessary transports and excess inventory (Liker, 2004). The concept of lean was originally pioneered at the Toyota motor company after the World War II and has completely influenced the company. Shortly after, other Japanese motor companies and industries followed Toyota and introduced the concept of lean within their manufacturing. (Womack, et al., 2007) In order to identify the customer value a lean organisation must define the internal and external value streams and processes. Lean can be defined as:

> *"The production is lean if it is accomplished with minimal waste due to unneeded operations, inefficient operations, or excessive buffering in operations."* (Hallgren, et al., 2009)

Lean is a philosophy with a higher aim than just satisfying the customer. A lean firm should strive to become a competitive company doing the right thing for its employees, the customer and the society as a whole. (Liker, 2004)

3.3 The Road to Lean

The concept of lean includes methods to apply when striving to become lean and principles resulting in a deeper company cultural transformation. Through the introduction of lean, most companies focus on the methods and disregard important factors such as problem solving and engaging the employees. (Liker, 2004) *The five lean principles* provide an action plan for a company in order to transform itself into a lean organisation. The five steps are; specify value, map the value stream, create flow, establish pull and seek perfection, see Figure 3. (Womack, et al., 2003)

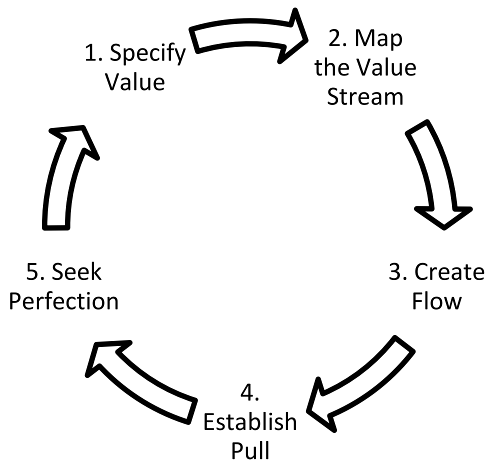

Figure 3: The five lean principles, remodelled (Hines, et al., 2008)

Specify Value; the critical starting point is to define the value to the customer derived from the product or service. The company needs to receive accurate customer requirements to be able to produce and create this value to the customer. If the company does not have a clear view of what is really needed, the critical first step is unfulfilled and the wrong product is provided, resulting in waste. To continually achieve customer value, a lean organisation ought to regularly reconsider its products and services to balance supply with demand. (Womack, et al., 2003)

Map the value stream; the value stream is the set of all actions needed to bring a product or service from order received through product transformation to customer delivery. The entire value stream for each product should be identified to be able to find the non value added activities along the process. (Womack, et al., 2003)

Create flow; the next step is to make the value creating steps flow. The ideal flow would include direct transportation of the products to the following activity, without waiting time in between. Also, it is vital to reduce the changeover times and produce according to real demand from the customer. The objective for creating flow is to eliminate all stoppages in the production process and to continue to improve the tool designs until the flow is achieved. (Womack, et al., 2003)

Establish pull; creating flow and introducing pull in a production system will reduce the time from order received to customer delivery. Also, the produced products will then be in line with the demand from the customer. Producing according to a pull system implies level selling in order to achieve a stable production volume. Level selling is accomplished through removal of promotions and by keeping prices constant. Introducing a one price system leads to real demand from the customer and a smooth production process. Alongside with producing on real demand, companies should strive to reduce lead times and inventory levels in order to avoid fluctuations on the market place. (Womack, et al., 2003)

Seek Perfection; the final principle in the road to lean is striving for perfection. This indicates continuous improvements along the line of reducing costs and time to achieve customer value. The solution is not to increase the number of working hours; on the contrary it is about creating more efficient working methods. The company should focus on some activities in the process when striving for perfection in order to successfully utilise the available resources. (Womack, et al., 2003)

3.4 Introducing Agility

In today's marketplace, demand and customer requirements are changing rapidly. Alongside with increasing competition, it makes the marketplace volatile and unstable. To remain successful, companies have to carefully consider time as an important factor. (Yusuf, et al., 1999) Reflecting on time, shorter lead times within the supply chain, is gaining increasing recognition in many business strategies today. Although reduced lead times are creating a more responsive and fast moving organisation, speed alone is not enough to respond to various customer demands. Manoeuvrability and the ability to foresee, adapt and respond to change are equally important, thereby introducing the concept of agility. (Christopher, 2000) The concept was first introduced in 1991, by a group of scholars at the Iaccoca Institute of Lehigh University in the US (Yusuf, et al., 1999).

The marketplace has turned into a battlefield and apart from time and manoeuvrability there are competing priorities such as quality, flexibility, delivery, time and global competition. In an increasingly competitive environment manufacturing companies have to select their strategy accordingly. This includes an augmented integration with customers to understand their needs and thereby act proactively to suggest solutions for the customer's requirements. Integration between the organisation's internal functions is also vital, to achieve long term success and knowledge transparency. (Yusuf, et al., 1999)

> *"Agility is the ability of an organization to respond rapidly to changes in demand, both in terms of volume and variety"* (Christopher, 2000).

Agility lays emphasis on the ability of an organization to respond to customer demands and underlines the importance of the organisation's willingness to change according to the various demands. The total need of the customer is vital and responsiveness is prioritised higher than cost reductions. (Gunasekaran, 1999)

> *"Agility means using market knowledge and a virtual corporation to exploit profitable opportunities in a volatile marketplace"* (Naylor, et al., 1999).

An agile organisation is flexible, originating from the Flexible Manufacturing Systems (FMS). Agility takes flexibility one step further than FMS and extends the concept to include the whole organisation instead of just reduced setup times and reduced inventory levels. (Christopher, 2000) Consequently, agility supports a holistic, rather than sub-optimal approach to manufacturing. This comprises striving for harmonisation of functions within the organisation to respond to external requirements. For a higher level of agility, companies should aim at inter-enterprise collaborations and to have an extended relationship with suppliers. (Yusuf, et al., 1999) The interdependence of functions highlights the importance of incorporating the production as a part of the supply chain. This avoids treating activities such as sales and production as isolated islands and serves the total supply chain strategy, resulting in improved adjustments for individual customer demands. (Skjott-Larsen, et al., 2007)

> *"Agility is about casting off those old ways of doing things that are no longer appropriate, changing pattern of traditional operation".* (Gunasekaran, 1999)

Agility has introduced the concepts of continuous change and effectiveness in supply chains. Furthermore, it has altered the focus in manufacturing towards customisation as opposed to mass production. (Skjott-Larsen, et al., 2007) This has challenged businesses to think and act in different manners, creating more flexible and responsive organizations (Gunasekaran, 1999).

3.5 The Road to Agility

To become truly agile, a supply chain should fulfil four criteria; market sensitive, virtual, process integration and network based, see Figure 4 (Christopher, 2000).

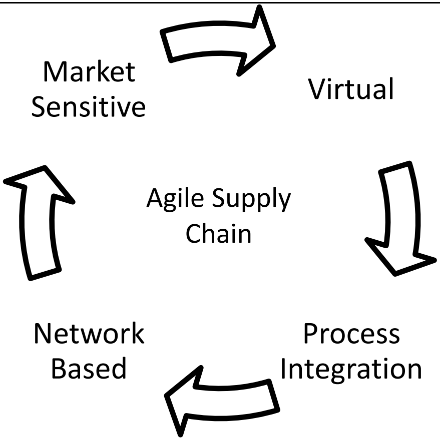

Figure 4: The agile supply chain, remodelled (Christopher, 2000)

Market sensitive; means that the supply chain is demand driven and has the ability to understand and respond to real demand (Christopher, 2000). An agile organisation acts rapidly to reach the marketplace before the competitors and proactively to the customers with solutions and service (Yusuf, et al., 1999). This is the opposite of a forecast driven supply chain where the information on real customer demand is limited and the production is based on past order sizes and shipments, resulting in high levels of inventory (Christopher, 2000).

Virtual; signifies a supply chain that is information based rather than inventory based. Due to information technology, information on real demand is visible for all actors in the supply chain. The supply chain can thereby focus on what the customer really wants and to satisfy the customer as soon as possible. The aim for a virtual organisation is to produce on demand and to reduce the inventory levels to zero. (Christopher, 2000)

Process integration; indicates an increased collaboration of the various actors in the supply chain, such as breaking down internal function silos and joint product development between the company and its suppliers (Christopher, 2000). Process integration is important to consider in regard to core competence management which is one criterion to achieve when striving for agility. This includes knowledge sharing and learning across the organisation, and integrating skills and technologies. All these factors are important for process excellence to satisfy the customer. (Yusuf, et al., 1999) For overall success, the agile strategies should be decided on a top-down level and the implementation of the strategies should be performed on a bottom-up level, to motivate the workforce (Gunasekaran, 1999).

Network based; the supply chain can be described as a system of partners joined together as a network (Christopher, 2000). To achieve competitive advantage, companies can collaborate with their partners on various levels, such as strategic, operational or both. Large enterprises can join together and benefit from re-organisation, thereby focusing on their respective core competencies. Smaller enterprises can explore the possibility of alignment to achieve product delivery and customer satisfaction, activities that would not be managed individually. (Yusuf, et al., 1999)

As companies grow and extend their product portfolio, business complexity increases, creating a barrier to agility. The complexity evolves through an excess of product differentiation or organisational and management structures grown up over a long period of time. Neither of these is value adding or creates value to the customer. In striving for agility, companies should evaluate their product portfolio, eliminating non-value adding activities and break down functional silos. Cross-functional teams and multi-skilling are important to consider for complexity redundancy. (Christopher, 2000)

3.6 Combining Lean and Agility

Long term success requires simultaneous achievements of lean and agility. The two concepts do not equal each other, although they are complementary. They should not be considered in either progression or isolation, instead they can add value to a company in the terms of a total supply chain perspective. (Naylor, et al., 1999)

> *"Lean is about doing more with less, and can be described as containing little fat, whereas agility is defined as nimble"* (Christopher, 2000).

Lean and agility have eight characteristics that are equal, similar or as different, see Table 1, (Naylor, et al., 1999).

Table 1: Importance of different characteristics of leanness and agility (Naylor, et al., 1999)

Keyword	**Lean**	**Agile**
Use of market knowledge	●●●	●●●
Virtual corporation/Value stream/Integrated supply chain	●●●	●●●
Lead time compression	●●●	●●●
Eliminate waste	●●●	●●
Rapid reconfiguration	●●	●●●
Robustness	●	●●●
Smooth demand/Level scheduling	●●●	●

Note: ●●●=essential, ●●=desirable, ●=arbitrary

The three equal characteristics focus on speed to market. Firstly, *use of market knowledge*, that is both lean and agility stress the importance of understanding the customer and producing on real customer demand. Secondly, *virtual corporation* implies improving the responsiveness towards customers where the two principles highlight the significance of integrating the various actors in the supply chain. This simplifies the flow of information and material. Thirdly, *lead time compression* is a key component within both concepts. In lean manufacturing, the redundancy of non-value adding activities including time waste is essential. In agile manufacturing the call for time compression is necessary due to the focus for rapid responsiveness to the customer. (Naylor, et al., 1999)

Similar characteristics on the other hand focus on internal activities to improve the supply chain structure. *Elimination of waste* is a requirement when applying the lean principle and means using less, or a minimum of the resources required for production. This is achieved from the removal of all non-value adding activities. The ultimate goal is to have zero inventories and no slack. This optimum is not realistic; hence the term Minimum Reasonable Inventory (MRI) is valid. At this point, it is not worthwhile to further lower the inventory levels. Agility similarly aims at reducing non-value adding activities. The difference is that within agility, flexibility is higher valued. As a consequence, some fundamental, although not necessary activities remain, to assure the ability to rapidly respond to customer requirements. The above reasoning causes the cost efficiency parameter to be slightly more essential within lean than within agility. *Rapid configuration* is essential in an agile supply chain and the key to success is the ability to quickly respond to changing customer demands. As a result, rapid re-configuration of the supply chain process regarding information and material is a crucial component. Lean also focuses on configuration in terms of limiting the time it takes to setup the production from one product to another. However, in order to fulfil the production schedule and eliminate waste, some margin is required. Concluding, re-configuration is prioritised higher within agility than within lean. Agility compromises on cost reductions in order to accomplish improved service levels. (Naylor, et al., 1999)

The two remaining characteristics explain the reason that lean and agility should not be implemented at the same point in any supply chain. Note, the principles are still compatible, and can be implemented in parallel, although not within the same activity. *Robustness means that* an agile supply chain is designed to be stable also in volatile marketplaces and profit from it. Thus, customer demands do not have to be stable. *Smooth demand implies that* a lean supply chain on the other hand, is designed to avoid fluctuations in the demand through the use of e.g. market knowledge and streamlining of the supply chain. Hence, lean calls for stable customer demands. (Naylor, et al., 1999)

3.7 Introducing the Total Value Metrics

Customers value and appreciate various attributes from their supplier; quality, service, cost and lead time. Lean and agility contributes to the fulfilment of all these attributes, although the focus of the respective principle is different. (Naylor, et al., 1999) The drivers of lean and agility differs as such that lean is to a larger extent related to production streamlining whereas agility is called for in more volatile marketplaces. Consequently, the outcome of the respective principles diverges to some extent. Lean and agility both influence the fulfilment of quality and lead time. Lean has shown to influence cost to a larger extent than agility, and the opposite stands for service, where the linkage with agility is stronger, see Table 2. (Hallgren, et al., 2009)

Table 2: Importance of different attributes for leanness and agility (Naylor, et al., 1999)

Attribute	Lean	Agile
Lead time	●●●	●●●
Service	●●	●●●
Costs	●●●	●●
Quality	●●●	●●●

Note: ●●●=key attribute, ●●=secondary attribute, ●=arbitrary attribute

These four attributes creating customer value can be summarised in *the total value metrics model*, see Figure 5. To increase customer value the different attributes have to be improved by enhancing various activities. For the *quality* attribute it is important to focus on activities such as meeting customer requirements, eliminating waste and performing continuous improvements. Managing flexibility towards customer demand and meeting changes on the market place leads to an improved *service* attribute. To reduce *costs* important focus areas are design and engineering, distribution and controlling the inventory levels. The last attribute, *lead time* concerns activities such as time to market, lead time in internal processes and response to market forces. (Naylor, et al., 1999)

$$\frac{\text{Quality} \times \text{Service}}{\text{Costs} \times \text{Lead Time}} = \text{Customer Value}$$

Figure 5: Total value metrics, remodelled (Naylor, et al., 1999)

Meeting customer requirements of product quality would improve customer satisfaction resulting in an increased *quality* attribute. Also, eliminating waste leads to process transparency and an increased emphasis on the value adding activities. Consequently, *quality* is increased. Working with continuous improvements means incremental changes, not radical changes. These small improvements will improve *quality* on a long term perspective. It is important for a company to be responsive towards customer demands and changes on the market place. As a result the *service* will be increased. This affects the capability of satisfying existing customers and finding new customers on the market. (Naylor, et al., 1999)

Reducing *costs* throughout the supply chain without affecting the other attributes negatively would benefit both the company and the customer. Thus, the company should evaluate activities such as the designing phase, distribution of products and inventory levels to explore the opportunities for cost efficiency. A reduced *lead time* is another important attribute that the customer's value. A shorter process from order received to delivery of the products will increase the customer satisfaction since their products will be brought more rapidly to the marketplace. As a result from the reduced lead time, the producer will benefit in terms of both serving existing customers and gaining new customers through increased market reputation. The capability of delivering the products at the right point in time and more rapid than the competitors will result in an increased *lead time* satisfaction. (Naylor, et al., 1999)

The four attributes in the total value metrics combine lean and agility, resulting in increased customer value. The total value metrics will be used in this master's thesis as the framework for collection and analysis of data.

4 Empirics

The empirical chapter starts off with a description of Tetra Pak Japan as well as the trends and customer demands of the Japanese market for packaging material. The reader will then be provided with an illustration of the external and internal integration projects that Tetra Pak Japan carries out today. In the final part of the chapter there is a mapping and description of the various supply chain activities, including co-printing and multicolour printing - two technologies that will influence the results of this thesis.

4.1 Introducing Tetra Pak Japan

Tetra Pak is structured in several market and converting companies, supporting specific markets all around the world. The companies are responsible for different global processes, see Figure 6. The processes that aim to maintain relations with the suppliers and serve the customers are further described below (Matsuzaki, 2010).

- *Supplier Management* is responsible for procurement of direct material and indirect material.
- *Innovation* is in charge of packaging material research and the development of filling machines.
- *Industrialisation* is a central organisation responsible for the process of producing packaging material. This includes controlling if standards and regulations are pursued on at the various market companies.
- *Order Fulfilment Capital Equipment* procures and deliveries filling machines to Tetra Pak's customers.
- *Order Fulfilment Packaging Material* is serving customers within all activities concerning packaging material such as new design requests, manufacturing, deliveries and claims of packages.
- *Order Fulfilment Technical Sales and Service* is in charge of the maintenance of the filling machines at the customer's production sites.
- *Customer Management* is responsible for sales and customer relations.

The various market companies are specialised on different processes. Tetra Pak Japan, constituting of both a converting company and a market company, is responsible for Order Fulfilment Packaging Material. That is, Tetra Pak Japan focuses on producing and delivering packaging material to the Japanese customers. (Matsuzaki, 2010)

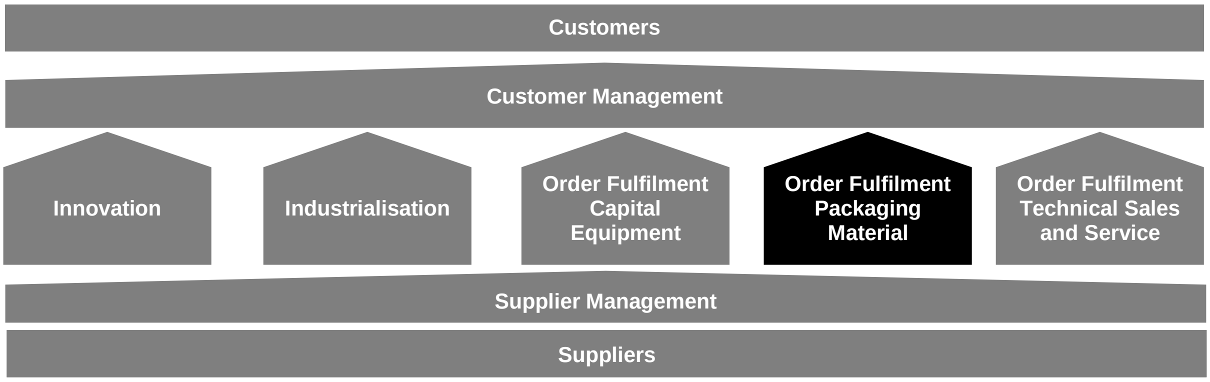

Figure 6: The global processes (Prem, 2010)

The supply chain of packaging material at Tetra Pak Japan is organised according to Figure 7. The supplier provides Tetra Pak Japan with the raw material such as paperboard. The packages are then produced at the manufacturing site at Tetra Pak Japan, and delivered to the customers. The latter fills the packages with their specific product such as juice or milk. Thereafter the customer delivers the product to the retailer that sells it to the consumer. (Kohtani, 2010)

Figure 7: The supply chain of packaging material (Kohtani, 2010)

Tetra Pak Japan supplies a range of packages in different sizes where the smallest is 0.1 litres and the largest 1 litre. It is the only company within Tetra Pak that manufactures premium packages based on Roto printing, a high quality printing technique. Other than Roto, Tetra Pak Japan utilises the two printing techniques, Flexo Process (FP) and Flexo Line (F). These printing techniques are aimed at packages defined as roll-fed packages. This means that the packages are delivered on rolls to the customers, as opposed to pre-cut packages. (Matsuzaki, 2010) Tetra Pak Japan produces both aseptic, Tetra Brik Aseptic (TBA) and non aseptic packages, Tetra Brik (TB). The advantage with TBA packages is the additional coating that results in longer lasting packages and thereby extra shelf time. Tetra Pak Japan produces only packages for non-carbonated drinks. (Bengtsson, 2010)

4.2 Market Trends for the Japanese Packaging Material Market

The most distinguishable trends for the market are:

- Decreasing customer demand
- Fashion drinks influencing the market
- Small packages being popular

The population in Japan is decreasing, in 2015 more than a quarter of its citizens are expected to be aged over 65, and in 50 years its population is set to shrink by a third (Kubota, 2010). This has an implication on the Japanese packaging material market, expected to decrease by 6% from 2009 to 2012. Consequently the customer demand will decrease, resulting in customer requirements of ordering lower volumes of packaging material. (Watanabe, 2010)

The market in Japan is trend sensitive, influencing the sales of fashion drinks. If someone invents or promotes special drinks it will drive the market. Recently, the health trend increased sales of health products, as for example the soy products. This trend has increased competition on the market due to launches of substitute products, such as sugar free carbonated drinks in pet bottles. The companies producing these kinds of carbonated drinks promote the drinks as health products to attract more consumers. (Matsuzaki, 2010)

In Japan all companies and people in general have small areas to store their purchased goods. This has affected the market and has lead to the success of the small packages among the Japanese customers. Recently some customers, due to economic crisis, have become more price sensitive and started to buy larger packages. The market for small packages has declined to some extent although it is still the most popular product among consumers. (Matsuzaki, 2010)

The year 2009 was a year with declining sales for the Tetra Pak Japan business, the number of packages sold declined to the same level as that of year 1987. Despite a declining market until 2012 Tetra Pak Japan has an aspiration of outperforming the market by 1.5 percent. (Watanabe, 2010)

4.3 Customer Demands for the Japanese Packaging Material Market

The most important customer demands on the market for packaging material are:

- The focus on high quality
- The requirement of attractive designs
- The emphasis on cost reductions
- The requirement of smaller order sizes
- The focus on lead time reductions

In general all Japanese customers are prioritising product excellence regarding the end product. This implies the requirement of stable packages with a long life-time including perfect printing and paper quality. To start with it is the consumers' preferences that influence all actors in the supply chain. However, the costumers are more specific regarding package quality than the consumers. This Japanese tradition of emphasis on quality puts high pressure on the companies not to fail within this area. (Kohtani, 2010)

Due to the lack of storage space at the majority of retailers the suppliers are competing for space on the shelves. An unpopular product will be replaced at the retailer. This raises the importance of an attractive design on the package to attract the consumers. Also, the customers demand many different package designs, and expect to be able to change the designs frequently. (Matsuzaki, 2010)

"*Our customers today are agile companies requiring flexibility from their supplier to produce the right products at the right point in time*" (Prem, 2010).

For a complete drinking package, such as milk, the cost of the packaging material is about 10 percent of the total cost. This small percentage has historically influenced the customers not to lay emphasis on the packaging material cost. For example, the customers have not regarded a 2 percentage increase or decrease in the packaging material cost as a prioritised issue. However, for the supplier of packaging material, this small percentage change largely impacts their margin. Today, the customers are more experienced within this field due to highly educated purchasers focusing on cost efficiency within every company activity. (Prem, 2010) Furthermore, the economic crisis has emphasised the customers to strive for cost reductions in terms of minimised supply chain costs, such as reduced inventory levels (Kohtani, 2010). The statement below highlights the previous reasoning:

"It is really hard for us today, having the same margins as before." (Prem, 2010)

Moreover, the customers' focus on cost reduction has lead to the decreasing sales of premium products. The Roto packages have decreased from year 2007 to 2010, see Figure 8.

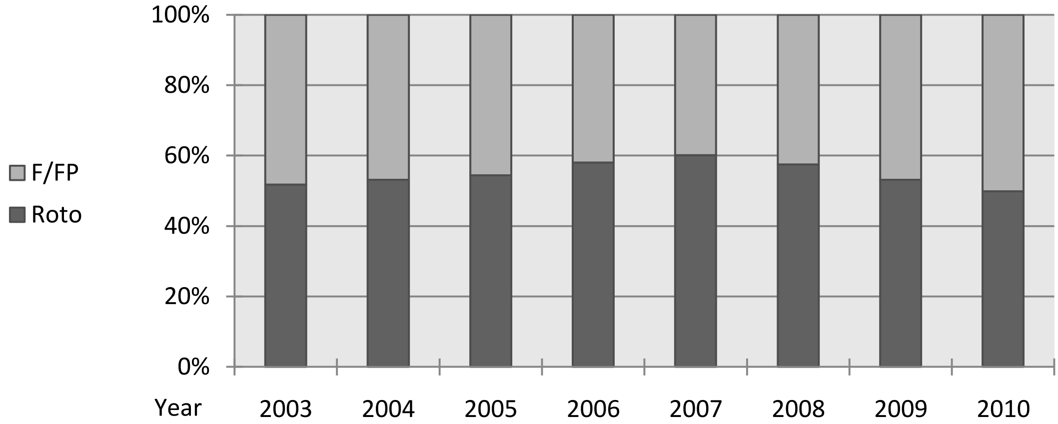

Figure 8: Tetra Pak Japan business trend, dummy numbers (Matsuzaki, 2010)

The competition on the market has lead to short product life cycles for drinking packages. The customers frequently demand new designs to be able to win the battle of the consumers. The initial period in the launch of new products or product designs is a trial period. If this trial period is unsuccessful the bringing of the product to the market is cancelled. As a result of the short product life cycles, the customers lay strong emphasis on small order sizes. In September 2009, Tetra Pak Japan sent out a questionnaire to their sixteen largest customers (excluding the top three), asking them about their most important requirements from their supplier. The majority of the customers prioritised smaller order sizes and elimination of the surplus charge for smaller order volumes. The short product life cycles also result in the requirement of a reduced market lead time. That is the time it takes from the customer placing the order until the order is delivered to the customer. (Kohtani, 2010)

4.4 External Integration at Tetra Pak Japan

The Japanese customers are traditionally conservative and not ready to change their way of working. They are comfortable doing what they have always done; if they change they follow the competitor's move. Consequently the challenge for Tetra Pak Japan is to impact customers to reach improvements in the supply chain. The challenge is significant for the local customers but also for the global customers. Many of Tetra Pak's customers are not aware of importance of improvements in the supply chain. They still have an idea of supply chain management as only regarding loading trucks in an optimal way (Prem, 2010). Tetra Pak has therefore started an integration project, customer common agenda, to improve co-operation. The purpose of the program is to collaborate with customers more intensely than just with product innovation. The project will include important customer functions such as procurement, marketing and manufacturing to receive a full picture of the whole supply chain. This will improve information sharing in both ways and important information will be transferred on how to grow together. Employees initiate discussions with customers to influence customers to order only what they need according to consumption pattern and not according to a stock-in strategy (Kohtani, 2010). As one Tetra Pak Japan employee stated:

> *"Tetra Pak Japan needs to be the trigger for change"* (Kohtani, 2010)

Tetra Pak Japan has also been involved in activities such as proposing new ordering systems for the customer, provide a supply plan and introducing a vendor managed inventory for the customer (Kohtani, 2010). The aim is to achieve an invisible supply chain where information flow is outstanding and all non value added activities are eliminated. Every year they will have new focus areas:

> *"Our focus 2010 is to reduce the inventory levels at warehouses both at Tetra Pak Japan and at the customers."* (Prem, 2010)

Tetra Pak Japan focuses on long term relations with their suppliers, striving to be the best customer. The relation is vital for Tetra Pak Japan because there are no other suppliers to buy such large volumes from. Furthermore, the supplier has no one else to sell these volumes to. In a long term view the customer common agenda will also include the suppliers. For the starting point only customers are integrated in the program. (Prem, 2010)

4.5 Internal Integration at Tetra Pak Japan

Traditionally Tetra Pak Japan has been working in a functional organisation with a lack of information sharing between sections. The production section has influenced most of the sections, and decisions have often been based on what is best for production. There is an information gap between the sales representatives and the production section on what is best for the company and the customers. The sales representatives are resistant to make changes impacting customers. According to the traditional customer service in Japan there is a one way communication channel between the customer and Tetra Pak, the customer claims and Tetra Pak change. (Prem, 2010)

Obsolete packages increase the risk for complications in the relation with the customer. After producing the packages they are placed in the finished goods inventory waiting to be delivered to the customers. The packages have to be invoiced to the customers, even though they do not want the ordered packages. For some customers the sales representatives pay the invoicing for obsolete packages to maintain a good relationship to the customer. (Kohtani, 2010)

Three years ago there were no supply chain division in Tetra Pak Japan and no key performance indicators from end to end for internal activities. Today, the supply chain division is trying to improve collaboration between all sections with better information systems, job rotations and integration projects, all to satisfy the customers. They are working on projects on how to reduce market lead time from customer order to customer delivery, increase flexibility towards the customer and also on projects on how to improve Flexo Process printing quality to minimise the quality gap between Roto and Flexo printing. (Prem, 2010) These projects are important for future development of Tetra Pak Japan due the fact that competitors are more flexible regarding offering smaller order sizes and shorter lead time to customers (Kohtani, 2010).

4.6 Supply Chain Mapping

The Supply Chain Division at Tetra Pak Japan, for roll fed packaging material, includes all activities from receiving the customer order of a new design, until shipment of the final packages to the customer, see
Figure 9. (Matsuzaki, 2010)

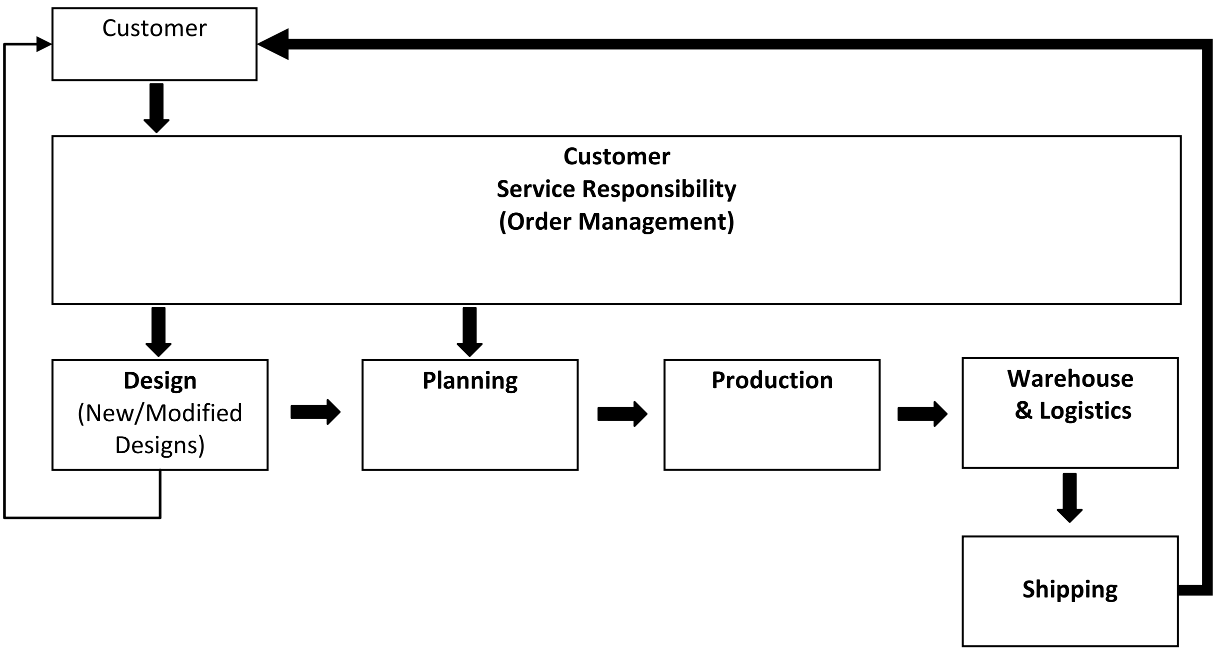

Figure 9: Supply chain mapping (Eckerwall, et al., 2010)

4.6.1 Customer Service Responsibility (CSR)

The tasks of CSR also referred to as order management, include sales order handling, delivery order handling and invoicing. CSR is organised according to customers where one Tetra Pak employee is responsible for one or many customers, depending on the size of the customer. CSR overlooks and controls the total supply chain process for the customer, functioning as the link between the customer and the other activities within the supply chain. (Shinozaki, 2010)

CSR receives a sales order from the customer including the type of product, the number of products and the product's delivery date. (Funato, 2010) The customer has to adjust the *sales order* size (number of products) to Tetra Pak Japan's minimum order size for machine utilisation. Today, the minimum order size on *0.5 rolls* is large in relation to the real customer demand. (Shinozaki, 2010)

> *"The customers have requested a more flexible system regarding minimum order sizes"* (Shinozaki, 2010).

The production philosophy within global Tetra Pak is *make-to-order*. This means that the factories will only start producing if they have received a sales order from the customer. After receiving the sales order, CSR controls the production capacity. This is performed in an information system, shared with planning, where CSR inserts the order according to free capacity. In the information system, CSR can follow the order and find information of when the products will be produced, when they will be moved to the inventory of finished goods and when they will be delivered to the customer. (Funato, 2010)

Customers pay different prices for the products depending on the package type and volume. A price reduction system is implemented for all products, depending on the volume of the sales order. The larger the sales order is, the larger is the reduction in price. The pricelist was implemented many years ago, when Tetra Pak still had two factories, and was intended to support production efficiency, encouraging the customers to order larger volumes. The price list has followed through to the new organisation. Due to the price reduction system, alongside with the minimum order sizes, the majority of customers order larger quantities than demanded at that point in time. This means that the sales orders are larger than the real demand. (Matsuzaki, 2010)

In the majority of global Tetra Pak markets the sales order is equal to the delivery order. This means that when the order is ready to be shipped, the total sales order is delivered to the customer at one time. In Japan, the sales order is often divided into several delivery orders, dispatched at different dates. This implies that the customer can make call-offs depending on the number of products needed for that specific point in time. The remaining products are stored in Tetra Pak's warehouse, free of charge for the customers up until three months. Some customers keep the products in Tetra Pak's warehouse for more than a year. The delivery order system was first implemented at Tetra Pak Japan according to the Japanese custom where the supplier is expected to store products for the customer. This is due to the fact that traditional Japanese warehouses are small and the customers themselves cannot store large amounts of products. Today the system is regarded as a service towards customers increasing flexibility. 95% of Tetra Pak Japan's customers utilises this service. (Funato, 2010)

CSR is responsible for controlling the inventory levels to assure that the customer has the correct level of packages in stock. If a customer places a large sales order due to the price reduction and the sales for that product turns out be lower than expected, Tetra Pak Japan still charges the customer for the total sales order. (Funato, 2010) The combination of the price reduction system and the delivery order system has lead to high inventory levels. To reduce the inventory levels CSR are using the information system to balance customer orders and stock-in. Furthermore, they have introduced a storage fee for customers after three months storing without great impact on inventory levels. (Shinozaki, 2010)

4.6.2 Design

The design section collaborates with CSR regarding customer requests for new and modified designs. A new design is a design that is not yet introduced on the market to be adjusted for printing whereas a modified design is a modification of an existing design. The design section is responsible for controlling the artwork, printability, quality and resolution of the design. Changes are made depending on whether or not the design is according to the printing guidelines at Tetra Pak Japan. (Moriya, 2010)

Before the printing starts, the customer is required to manually sign a proof to admit the final design. In the majority of cases, the customer places a request to the design section for some changes to be made on the design. After finalising the changes, the proof is once again returned to the customer for admittance. The process of the design going back and forth between the customer and Tetra Pak Japan is called a *loop*. These loops are time consuming resulting in an increased design lead time. (Moriya, 2010)

> *"Tetra Pak Japan utilises process and spot colours when printing"* (Bringström, 2010).

Process colours are the four colours cyan, magenta, yellow and black (CMYK). These colours can be combined in order to create additional colours. *Spot colours* on the other hand are unique colours that cannot be mixed with other colours. The advantage with process colours apart from the possibility of colour mixtures is that they enable *digital proofing*. This method implies that the proofs are sent digitally between Tetra Pak Japan and the customer and design modifications can be performed at the customer's site. As a result, the number of loops is reduced and the design lead time for loops can be reduced with up to 24 hours. (Bringström, 2010)

The design section separates the different designs through giving each design a *SKU number*. Design information such as the number of colours and the type of colour is added to the SKU. For further separation each design is provided a *QSV specification*. QSV stands for quality, size and variant and determines the materials required to produce the package. *Quality* is a four digit number, specifying the package system, the coating specification (TBA or TB), the printing method (Roto or Flexo) and the paperboard. The *size* is a three digit number, specifying the package size and the base shape. The *variant* is a two digit number specifying the opening type. (Olsen, 2010)

QSV example; 6611-465-09, an aseptic juice package, 200 slim with a jumbo reel opening (Olsen, 2010).

4.6.3 Planning

The planning section's main task is to schedule the production sequence for the various products. The planning is made according to the sales order from CSR. Tetra Pak Japan does not split orders, due to global Tetra Pak standards. Thereby, Tetra Pak Japan always produces the sales order. Also, splitting orders is hard to manage without correct delivery orders. The planning section sets up the framework for the production schedule, CSR inserts the orders where capacity is free and can thereafter plan each block according to the number and size of the sales orders. (Funato, 2010)

The production schedule is planned according to the laminator, the bottleneck in the production. This way the production efficiency and a minimum number of set-ups for each block are assured. The products are ranked A and B; A products are produced every week, whereas the B products are sequenced for production every other week. The A products amounts to 70% of the total volume produced every month. (Olsen, 2010)

The planning section separates market lead time from production lead time. The market lead time is defined as the time that passes between the order is received from the customer until the products are delivered to the customers. The production lead time is defined as the time that passes between the start of production until stock-in of the products. (Olsen, 2010)

4.6.4 Production

The factory produces the orders within each block according to the planning schedule, provided to them by the planning section. The production for roll fed packages follows the global Tetra Pak structure; (Sugiyama, 2010)

- Prepress
- Printer
- Laminator
- Slitter/Doctor
- Palletiser

The new designs are created and stored in the *prepress*. When an order is ready to be produced the plates are mounted on cylinders, sleeves, in preparation for the printing. From the planning section, the prepress receives information such as SKU number, QSV specification, number of packages and production starting date. (Kitamura, 2010)

From the prepress the sleeves are moved and installed in the *printer*. The inbound raw material, blank paperboard rolls, is transformed, resulting in outbound printed rolls where design and colours are added. Each printed roll is divided into webs. The number of webs on one roll varies from five to eight depending on the package size; the smaller the packages are the more webs fit on one roll. The various webs on one roll can hold the same or various designs. (Maeda, 2010)

At Tetra Pak Japan two printers are installed, one Roto printer and one Flexo printer. The printing quality of Roto is superior to Flexo and Roto is therefore used for production of premium packages. The Flexo printer holds two printing methods, Flexo Line and Flexo Process. The latter is more advanced and as a result the quality of the printed packaging material is better. Also, the Flexo printer holds seven colour stations, thus the maximum number of colours that can be printed on one roll is seven. This is regardless of process or spot colours. (Matsuzaki, 2010)

The Flexo printer includes three different types of setups; *printing method, size* and *design and ink*. Out of these three, the change between Flexo Process and Flexo Line (printing method) is the most time-consuming. Consequently, the production sequence for the printer is scheduled to minimize the number of printing method setups. Similarly, Flexo is limited to print one size and at a time, therefore the production is sequenced to produce orders with the same size after each other. The design and ink setups are not as time-consuming as the two others, even though the total number of design and ink setups is large. (Maeda, 2010)

> *"The current batch size for the printer is 2.4 rolls/batch"* (Maeda, 2010).

Before *lamination*, the printed rolls are transported to the internal warehouse. The laminator has longer average set up times than the two printers. Consequently the inventory and lead time of work in progress (WIP) between the printers and the laminator is presently large, 4 days and 180 rolls/day. (Matsuzaki, 2010) The printed paperboard is transported from the internal warehouse to the laminator, where it is coated. The coating is performed in a different manner depending on the package type, TB or TBA. The TBA products are aseptic, which means the durability of the packages will last for months in unrefrigerated environments. For the milk and juice to sustain qualitative for such a long period of time, the packages need to be protected against oxygen, light and bacteria. Thus, the TBA products are coated with aluminium foil. Additionally, plastic layers of polyethylene are added to the products. The polyethylene used for TBA milk and TBA juice are different. As opposed to the TBA products the TB products are non aseptic. The coating thereby consists of polyethylene only, and aluminium foil is not added to the packages. (Bengtsson, 2010)

After the coating process is finished, the products are transported to the internal warehouse, waiting to be cut in the *slitter*. The current inventory and lead time for WIP between the laminator and the slitter is 2 days and 94 rolls/day. This is due to the higher speed of the laminator than the speed of the slitters. (Bengtsson, 2010) In the slitting area, the printed and coated paperboard rolls, are cut into reels. The reels constitute the batches that will be delivered to the customer. The slitting area consists of three slitters and nine doctors. In the slitters, possible printing and laminating defects on the reels are detected. The defects are thereafter corrected in the doctors. From the slitters or the doctors, the reels are automatically moved to the palletising area. The pallets are plasticised, and relocated to the internal or external warehouse. (Kawashima, 2010)

4.6.5 Warehouse & Logistics

The warehouse & logistics section is responsible for organising and controlling the inventory of raw material, work-in-progress and finished goods (FG) and for the shipment of the products to customers. This includes the disposal of obsolete products and defected raw material. (Higuchi, 2010)

Due to large inventory levels, Tetra Pak cannot handle and store it themselves, and the company therefore has one internal and three external warehouses. In the internal warehouse raw material, WIP and FG products are stored. Regarding the external warehouses, it is organised as such that two of them store FG products and one store raw material. (Eckerwall, et al., 2010) The planning and transportation of products placement and transportation between the internal and external warehouses are time-consuming. The optimal storage handling is to store an order in the same warehouse. This is not always possible due to delivery order handling and customers' call offs. The priority at Tetra Pak is to be flexible towards customers' requests which are not necessarily equivalent with warehouse efficiency. In addition to excess transportation and organisation the external warehouses are costly. Tetra Pak pays a handling fee and a storage fee for each pallet. The handling fee consists of in and out transportation from the warehouse meanwhile the storage fee is paid for each day that the pallet is stored in the external warehouse. (Higuchi, 2010)

> *"The external warehouses are time-consuming and costly"* (Higuchi, 2010).

To limit the transportation between the warehouse and production the work in progress inventory is always stored in the internal warehouse. Compared to other Tetra Pak factories, Japan has a large work in progress inventory of printed as well as coated rolls. This is dependent on the large number of different designs that the Japanese customers demand, which leads to an increased number of setups. Accordingly, unlike other Tetra Pak factories, Japan cannot print, laminate and slit in one single process, and storage is required in between the machines. (Higuchi, 2010) The finished goods inventory is divided between the internal and the external warehouses. Presently, the average pallets of roll fed packages in the finished goods inventory are equal to 6000 and the average lead time is 25 days. Included in the 6000 pallets is a level of safety stock. (Matsuzaki, 2010)

4.7 Co-printing

The co-printing technique combines various designs to be printed on one roll. This enables smaller order sizes for customers, although keeping the same level of machine efficiency in the printer. The technique thereby enables a better balance between supply and demand. The difference between a co-printing batch and a traditional batch can be seen in Figure 10. The production efficiency is the same for the two batches. The difference is the larger number of orders in the co-print batch that enables parallel printing of various customers' designs on one roll. (Oshimo, 2010)

Co-printing batch
Orders: A, B, C

A	B	C	Setup
A	B	C	

Webs: 6
Rolls: 2
Setups: 1
Average batch size=2/1=2 rolls/batch
Orders: 3

Traditional printing batch
Orders: A

A	A	A	Setup
A	A	A	

Webs: 6
Rolls: 2
Setups: 1
Average batch size=2/1=2 rolls/batch
Orders: 1

Figure 10: Example of a co-printing batch and a traditional printing batch

Despite the large number of designs provided to Tetra Pak Japan by their customers, the co-printing technique is not applied on a frequent basis. Today, co-printing is utilised for 1 % of the total printed volume and only with designs from the same customer. The main reason for the low usage is that co-printing can result in the border colour from one design being transferred to the inside of the package of the design printed next to it. Thus, considering the strong focuses on quality, the customers do currently not accept that Tetra Pak Japan co-prints their designs together with other customer's designs. Globally at Tetra Pak Japan, co-printing is commonly used. Hence, resources and know-how for introducing co-printing exists within the company. (Shinozaki, 2010)

Co-printing requires a number of preconditions, due to the combination of various designs;

- Flexo printing technique
- Same QSV
- Colour matching

Co-printing can only be performed in the Flexo printer. This is due to the flexible sleeves that the operators can mount manually. All the different designs combined on the same roll must have the same QSV. The reason for this is that the printer requires the same size and variant whereas the laminator requires the same quality for the production of the roll. The maximum number of spot and process colours in the Flexo printer is seven. Accordingly, the total number of colours for the various designs cannot exceed seven. (Kitajima, 2010)

4.8 Multicolour Printing

Multicolour printing can be used to facilitate printing of several different colours in the Flexo Printer. The technology enables the mixture of base colours in the printer to create multiple colour combinations. Three or more colours are added to the original four process colours (cyan, yellow, magenta and black) to make up the total colour base, for example violet, orange and green. The colour mixtures of the base colours are then performed in the design section. For example, creating a bright orange requires a mix of 100% base orange, 40% magenta and 10% yellow. (Bringström, 2010)

> *"10 base colours could generate 60% of the total colour base at Tetra Pak Japan today"* (Bringström, 2010).

Thus, the introduction of multicolour printing would make the use of spot colours redundant. This would also imply a reduced number of ink changes due to the reduction of the total number of colours. Today, none of the Tetra Pak market companies has implemented the multicolour printing technology. However, there are projects investigating a possible introduction of the technology within the company. Some competitors have already introduced the technology. (Bringström, 2010)

5 Analysis

In this chapter the current supply chain complexity at Tetra Pak Japan will be explained. To find a solution to this, a co-printing simulation on real demand has been performed. The results from the simulation will guide the reader to the next part of the analysis which is the colour challenge and multicolour printing. The chapter is concluded with the results from a second co-printing simulation and the necessary actions for implementation of the solution.

5.1 Identifying the Supply Chain Complexity at Tetra Pak Japan

The supply chain is gaining increasing recognition for overall company success. As a result, an efficient supply chain is important to fulfil the customer requirements and outperform the competitors. This thesis utilises a combination of *lean manufacturing* and *agile manufacturing* in striving to improve the supply chain structure at Tetra Pak Japan. *The total value metrics* summarises the various characteristics influencing the two manufacturing strategies.

Producing on real demand; produce only what the customer demands. This means producing according to the actual consumption pattern instead of producing on forecasts and perceptions of customer needs.

Efficient supply chain; produce on real demand with the aim to understand the customer requirements and achieve competitive advantage. Strive for a just-in-time system with minimum inventory and reduced non-value added activities, and an agile approach that highlights the flexibility towards customers.

A supply chain that fulfils customer needs requires a steady flow of goods and services from one end to the other in the supply chain. Tetra Pak Japan emphasises highly efficient production. This has lead to an inefficient end to end supply chain. The reason is that the focus is solely on efficiency within the actual production process. Efficiency within activities in the beginning and in the end of the supply chain, such as order in-take and warehousing, are not prioritised. More specifically, it has lead to a lower capability of responding to customer requirements and high inventory levels, see Figure 11.

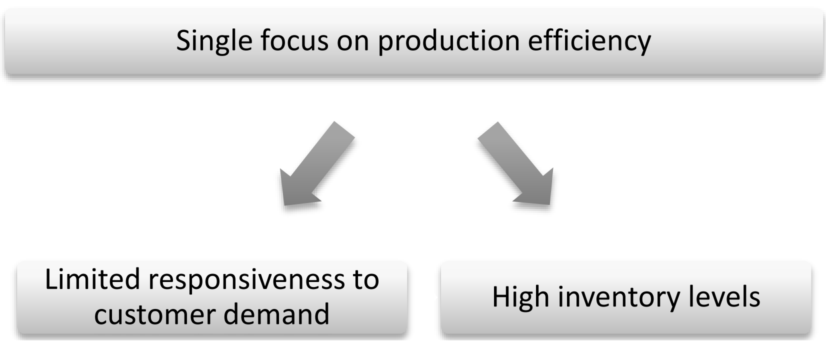

Figure 11: Complexity with single focus on production efficiency

5.1.1 Limited Responsiveness to Customer Demand

High minimum order size; today the minimum order size for customers is based on production capabilities and is set to 0.5 rolls. The majority of customers regard this as a high minimum order size and an inflexible system. Consequently, Tetra Pak Japan cannot respond to the customer requirements due to limitations within the production.
Instable supply chain; the production at Tetra Pak Japan is dependent on high volume orders to be efficient. Thereby the current supply chain is not structured to remain robust when demand is changing.
Slow reconfiguration; the current supply chain contains non-value adding activities such as high levels of work-in-progress and finished goods inventory and transportation between Tetra Pak Japan and the external warehouses. These activities and routines are well established and prevent changes in information and material flows. This causes inflexibility within the supply chain and delimits Tetra Pak Japan to quickly respond to customer requirements.
Inventory based supply chain; at present the supply chain at Tetra Pak Japan is inventory based rather than information based. The real demand is not visible throughout the supply chain. As a result, short term daily operations are prioritised before long term interactions with suppliers and customers.

5.1.2 High Inventory Levels

Discount on large volume orders; the pricing structure at Tetra Pak Japan is based on discount for large volume orders and surplus charges for smaller orders. The structure is aimed at catering for a high-efficient production. Resultantly, the customers are encouraged to order larger volumes than needed at a specific point in time and the real demand is not reflected.
Production efficiency versus future demand; the trend points at a decreasing market for packaging material in Japan. This indicates smaller order sizes from the customers in the future. Thus, the current supply chain design does not prepare the production for future demand patterns.
Call-off system; in order to serve the customers Tetra Japan provides them with a call-off system. This implies that Tetra Pak Japan offers to divide the sales order into various delivery orders and dispatch the delivery orders on different points in time to the customer. Consequently, the majority of delivery orders differ from the sales order, leading to high inventory levels for Tetra Pak Japan.
High risk; the high inventory levels indicates a higher risk for Tetra Pak Japan and the customers. Given that the customers order larger volumes than actually needed, the number of obsolete products rises due to product life-cycles and unsuccessful campaigns. The customers thereby run the risk to pay for products that cannot be sold. Tetra Pak Japan on the other hand runs the risk of conflicts with the customers due to different opinions of whose responsibility it is to pay for the obsolete stock.
Make to order only in theory; the supply chain policy at Tetra Pak Japan is make-to-order. Considering the pricing structure, the call-off system and the high inventory levels it can be concluded that this policy is only in theory. In reality, the supply chain structure is better described as make-to-stock.

5.1.3 Impact on Customer Value

The irresponsiveness to customer requirements and the high inventory levels have a negative effect on all of the parameters in the total value metrics.

The *service* level towards customers is reduced due to a rigid supply chain and the inability to rapidly respond to changes in the marketplace. The slow response to market forces prolongs the *lead time* of introducing new customer concepts on the market. The *costs* are increased for both Tetra Pak Japan and the customers as a result of the high inventory levels. For Tetra Pak Japan it implies costs for external warehouses, tied up capital and cost of capital. Some of these costs will be transferred to the customers in terms of increased product prices and higher logistics costs such as the warehousing fee. In addition, the customers run the risk of increasing costs in regard to the payment of obsolete stock. Production in excess of real demand is regarded as waste and will affect the *quality* in the production process. This influences the integrity of the supply chain process and leads to a less robust and changeable supply chain.

According to the above stated the current supply chain at Tetra Pak Japan is inefficient. The supply chain does not act on real demand resulting in higher costs and lower customer responsiveness.

5.2 The Co-printing Solution to Produce on Real Demand

Considering the reasoning in the previous section it can be concluded that Tetra Pak Japan does not produce on real demand. The main reason for this is the focus on production efficiency and the current pricing structure that encourages the customers to order larger volumes than needed. In this thesis, a possible solution to produce on real demand in a high efficient industry will be investigated through co-printing. A precondition to co-print on real demand is to change the pricing structure to a one price system.

To increase the value for the customer and Tetra Pak Japan, it is important to widen the perspective and regard the total supply chain as one steady flow of products. The supply chain at Tetra Pak Japan produces and delivers products according to customer orders. For this reason it is central to change the organisation early on in the supply chain, and influence the customers to order what they really want at that point in time. The mean to achieve this is by changing the pricing structure to a one price system. This would influence the customers to place sales orders based on their consumption pattern instead of large volume discounts. This way Tetra Pak Japan will attain and produce on real demand from the customers and achieve a steady flow of goods throughout the supply chain from order received to customer delivery.

Co-printing enables parallel printing of different designs. Co-printing with designs from various customers enables the customers to place smaller order sizes than today. Tetra Pak Japan can thereby maintain high production efficiency and at the same time respond better to customer needs. The smaller order sizes lead to a lower volume of stock-in for each customer. This reduces the call-offs and thus the inventory of finished goods. This would be beneficial both for the customers and for Tetra Pak Japan due to the lower risk for obsolete products. The market for packaging material in

Japan is decreasing and so will the sales orders from the customers. Therefore, the production at Tetra Pak Japan has to prepare for future smaller demand. Co-printing on real demand combines high production efficiency with flexibility for the customers.

5.2.1 Co-printing Simulation 1

A co-printing simulation of 1010 SKU's has been performed in order to investigate the possibility of co-printing on real demand based on current conditions at Tetra Pak Japan. Data from delivery orders of October 2009 was used to receive the real demand from the customers. The total volume for each SKU was calculated and normalised to a weekly demand to set it in relation with the one week production cycle. The simulation was performed through combining orders in terms of colours and demanded webs to create a co-print batch, which is a batch with several orders that can be co-printed together. The aim of the co-print procedure is to achieve as long batches as possible to decrease the number of design setups. In the simulation assumptions have been made that are presented below.

- *One price system;* to influence the customer to order on real demand.
- *Same QSV:* only SKU's with the same QSV number has been combined.
- *Roto volume → Flexo Process volume;* the market for Roto products is decreasing and it is therefore reasonable to assume a transfer of this volume to Flexo Process.
- *2 web minimum order size;* considering the quality issues the customer has to order at least 2 webs.
- *Customer agreement;* the production efficiency is increased through combining orders from different customers. It has therefore been assumed that customers agree on this.
- *Maximum 7 different colours;* according to the fact that the number of colour stations in the Flexo printer is seven.
- *Minimum batch size set to 0.5 rolls;* this is due to production capabilities.
- *One paperboard for all SKU's; t*o enable co-printing with several SKU's.

To demonstrate the procedure for the co-printing simulation a selection of SKU's has been made, see Figure 12 and the co-print batch in Figure 13. The data has been analysed according to the following mode of procedure;

1. *Sort SKU's according to ascending web demand.*
   In order to facilitate the finding of the web constraints, the small order sizes.
2. *Find co-printing possibilities in terms of colours.*
   Analyse the colours to find the same colours for several SKU's.
3. *Find co-printing possibilities in terms of demanded webs.*
   The orders should be combined to fill up all webs on the rolls.

4. *Maximise number of co-printable colours and orders.*
   Maximum number of different colours is set to 7 and number of maximum orders is equal to the number of webs on one roll.
5. *Place the co-printed rolls in the co-print batch.*
   The characters in the co-print batch refer to the order name.
6. *Sum the total nr of design changes (DC).*
7. *Calculate the average batch size,* see Figure 14.

CDES (SKU code)	Colour 1	Colour 2	Colour 3	Colour 4	Webs/Roll	Demand	Nr Rolls	Name
D50-C0Y1-03	A3967	P1787	C5550	C9047	8	2		A
D50-C10C-03	P1787	C9047	C5550		8	2		B
D50-C15Q-02	E8300	P1787	E0802	C5550	8	2		C
D50-C16G-02	E8300	A1255	P1787	C5550	8	2		D
DJP-C1AG-01	C0516	P1787	C9047	C5550	8	5		E
DJP-C1AJ-01	D2785	P1787	C9047	C5550	8	6		F
D50-C0ZJ-04	C0516	P1787	C9047	C5550	8	6		G
DJP-C1AF-01	A1566	P1787	C9047	C5550	8	7		H
						32	4	

Figure 12: Selection of delivery orders for demonstration

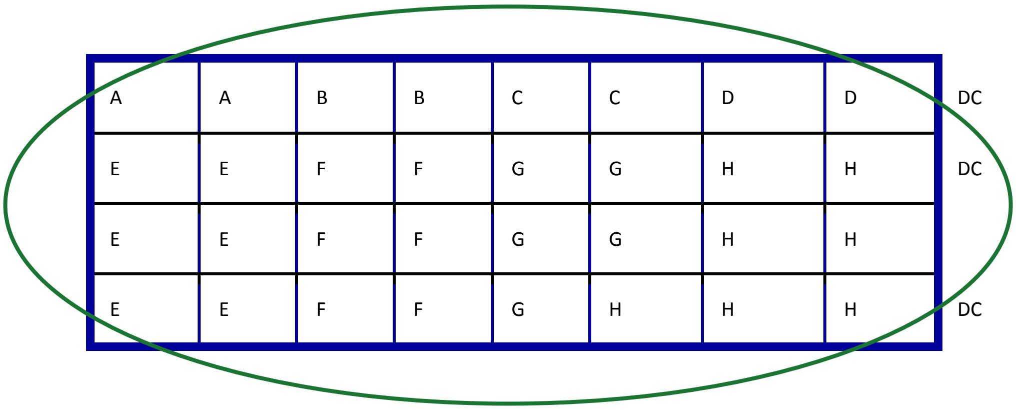

Figure 13: Co-print batch for the selected delivery orders

$$Average\ Batch\ Size = \frac{nr\ rolls}{nr\ setups} = \frac{4}{3} = 1.3\ \text{(rolls/batch)}$$

Figure 14: Result of the selected SKU's

5.2.2 Result of the Co-printing Simulation 1

To receive the result of production efficiency, that is average batch size for the total simulation, the number of setups and total volume of printed rolls were calculated, see appendix B. In Table 3, the results are presented. The average batch size when co-printing on current conditions at Tetra Pak Japan was calculated to 1.2 rolls/batch. This number can be compared to the current batch size in the printer that is 2.4 rolls/batch. Thus co-printing on real demand today will reduce the production efficiency with 50%. In addition to the low average batch size, 65 rolls cannot be co-printed due to delimitations such as minimum batch size of 0.5 rolls.

Table 3: Result of co-printing simulation 1

Average batch size (rolls/batch)	1.2
Current batch size (rolls/batch)	2.4
Unprintable rolls (rolls)	65

The results from the simulation illustrate the problem of co-printing due to the colour constraint and the large number of small delivery orders. For all SKU's, the total number of different colours were 1500. This makes it hard to combine the various orders considering the maximum number of different colours is seven. 647 out of 1010 SKU's demanded only 2 webs. This required the combination of many orders on one roll and lead to a challenge in regard to the large number of colours. The 2 webs order sizes, highlight the fact that the real demand from the customers is small and differ from the sales orders placed today.

5.2.3 Impact on Customer Value

All the factors in the total value metrics will be negatively affected by co-printing on real demand according to current conditions. Regarding *quality* Tetra Pak Japan will meet customer requirements by enabling smaller order sizes. On the other hand, some small orders (65 rolls) will not be able to produce due to the requirement of a minimum batch size of 0.5 rolls. Thus, the total waste will increase due to more setups in production and more initial paper waste. In line with the incapability to produce some orders the service level will decrease and Tetra Pak Japan cannot meet changes on the marketplace. As a result, the production will not be prepared for a future decreasing demand and smaller volumes from each customer. The *costs* in production will increase due to a larger number of setups and overall lower production efficiency. The increased number of setups will also result in a longer production *lead time.*

According to the above reasoning, co-printing on real demand today will increase the costs and reduce the responsiveness towards customer demands. Consequently co-printing on real demand is not possible considering the current conditions.

5.3 Realising the Colour Challenge

The results from the previous section stated that co-printing on real demand according to the current situation is not efficient. Furthermore, the main constraint was concluded to be the large number of different colours that Tetra Pak Japan has today. To gain a deeper understanding of the great impact that the colours had on the co-printing simulation, two colour calculations have been performed, that is the number of average colours and reduction of spot colours.

As a starting point, the total number of process and spot colours in the simulation (delivery orders from October 2009) was compiled. Thereafter, the average number of colours per SKU was calculated. The results are shown in Table 4.

Table 4: Calculation of number of colours

	Average Process	Average Spot	Average Total
Colour/SKU in simulation	**2**	**3**	**5**

The next step involved co-printing on two average SKU’s. Each SKU was given two process (P) colours and three spot (S) colours each. The process colours were assumed to be the same for the two SKU’s, whereas all spot colours were assumed to be unique. See Figure 15.

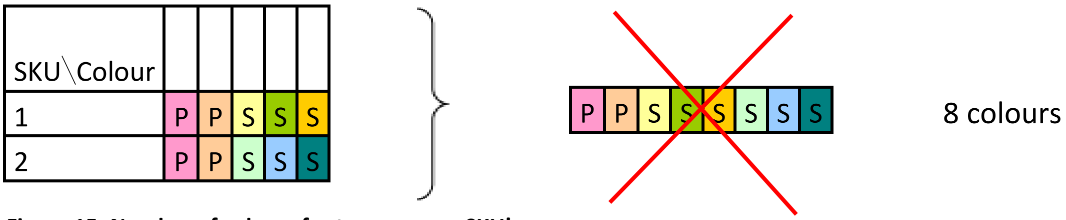

Figure 15: Number of colours for two average SKU's

As seen in Figure 15, the total number of different colours for the two SKU's exceeds seven, which is the maximum numbers of colours that are possible to print at the same time. It can be concluded that two average SKUs cannot be co-printed. This demonstrates the constraint that the large number of spot colours gives rise to in regard to co-printing.

The second colour calculation was performed with the aim to find out whether or not a reduction of the number of spot colours would have an impact on the co-printing simulation.

The number of spot colours has been reduced with two thirds. This implies that the average number of spot colours for each SKU decreases from three to one. Assuming that the total average number of colours remains the same, each SKU is given four process colours and one spot colour. Similarly to the previous calculation, the process colours were assumed to be the same for the different SKU's, whereas all spot colours were assumed to be unique. See Figure 16.

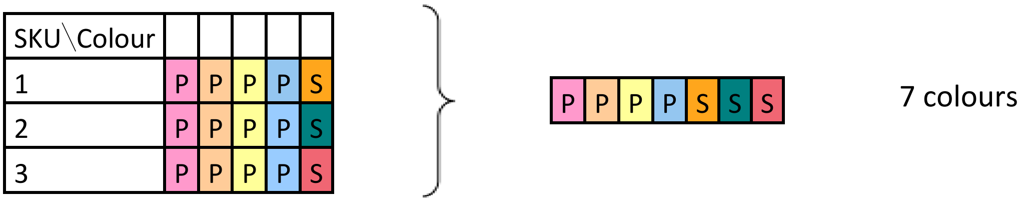

Figure 16: Number of colours with 2/3 reduction of spot colours

The results from Figure 16 illustrates that a maximum of three average SKUs can be co-printed in order to remain within the limitation of totally seven colours. Considering that the aim at Tetra Pak Japan is to co-print eight various SKUs, the possibility to co-print three average SKUs is not satisfactory. The reduction of spot colours with two thirds is thereby not enough to cater for efficient co-printing. The colour calculations prove that the large number of spot colours that Tetra Pak Japan has today delimits co-printing. It thereby also delimits production on real demand.

Not only co-printing is negatively affected by the large number of spot colours. There are also other areas that are impinged on.

- *Ink setups in production*; the large number of colours is directly correlated with a large number of ink setups in the printer. Every ink setup requires time for preparation and change, such as washing and cleaning. Additionally, the large number of spot colours has led to a high ink inventory and an increased amount of ink waste.

- *The design process is extended* due to the spot colours. The reason for this is that spot colours prevent digital proofing, meaning that the design proofs cannot be digitally visualised to the customers. Instead the designs require manual demonstrations which prolong the design process with up to 24 hours.
- The prevention of digital proofing creates *an inflexible design process* towards customers.

5.3.1 Impact on Customer Value

The large number of spot colours has a negative impact on all parameters in the total value metrics. The *service* level decreases alongside with the inflexibility in design. The responsiveness to creation of designs in regard to new campaigns or events does thereby not fulfil the customers' expectations. The *lead time* in design is prolonged due to the prevention of digital proofing. In production the large number of different colours lengthens the total setup time in the printer due to many ink changes. The *cost* increases as a result of the ink setups, the ink inventory and the ink waste. The *quality* is influenced since the waste increases in production and the process integrity in design is affected.

According to the colour calculations of the SKU's the spot colours delimits co-printing and increase costs in several sections. Consequently spot colours prevent co-printing on real demand.

5.4 Multicolour Printing Enables Co-printing on Real Demand

In the previous section it was concluded that the spot colours delimit co-printing on real demand. A possible solution to this is multicolour printing. Multicolour printing generates a number of advantages.

- *Colour flexibility*; the technology enables total flexibility of colour mixtures. The combination of base colours will create multiple different colours. 10 base colours will generate 60% of all the colours at Tetra Pak Japan today.
- *Enables co-printing*; the flexibility of colour mixtures will enable co-printing on real demand. The combinations of base colours take place in design. As a result, only base colours will be used in the printer. This way, the total number of different colours for the co-printed SKUs will not exceed the maximum number of colours in the printer. Consequently, all SKUs can be co-printed, irrespective of the different colours.
- *Colourful designs*; the mixture of base colours allows for brighter colour combinations than spot colours. As a result, Tetra Pak Japan can provide the customers with a selection of more colourful designs.
- *Enables digital proofing*; in contrast to spot colours, base colours allow digital proofing. Consequently, the design process will be faster and more flexible. For loops, the lead time will be shortened by 24 hours.

- *Competitive advantage;* although one of Tetra Pak's largest competitors in Europe utilises multicolour printing it is not yet widespread in Japan. Multicolour printing will thus give Tetra Pak Japan a competitive advantage.
- *Reducing ink inventory and waste*; the decreased number of spot colours is correlated to a reduced level of ink inventory and ink waste.
- *Reducing the printer setup time;* the printer setup time will be reduced with 6% due to the reduced number of ink changes. As a result, the lead time will be shortened. See Table 5.

Table 5: Setup time reduction

Average additional time/ink setup (min)	5,7
Total nr ink changes/year (2009)	3928
Total reduced colour ink change time(min)	22371,8
Average time/week (min)	430,2
Average time/week (h)	7,2
Production time/week	120
Setup time reduction (%)	**6,0**

The example below, Figure 17, illustrates the positive effect that multicolour printing has on co-printing. Due to the total flexibility of colour mixtures the only remaining constraint for co-printing is the small web demand. This way the combination of various designs is facilitated. In the example all the SKUs have the same base colours. Thus, an infinite number of various SKUs can be co-printed without exceeding the colour capacity of the printer.

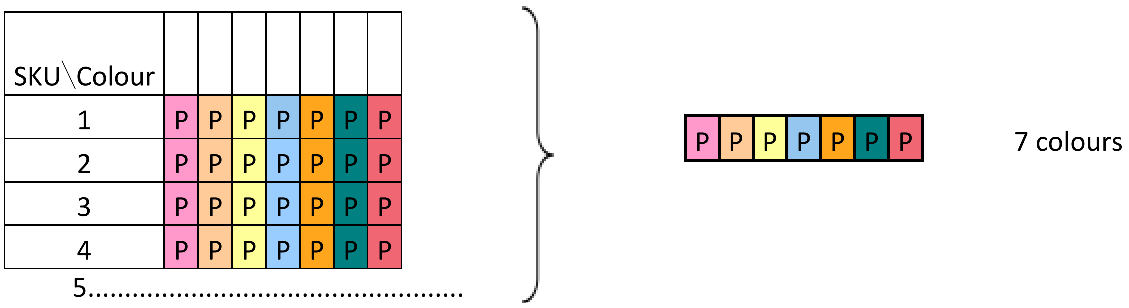

Figure 17, Printing benefits with multicolour printing

Multicolour printing eliminates spot colours and enables co-printing on real demand.

5.4.1 Co-printing Simulation 2

In the previous section it was concluded that multicolour printing enables co-printing on real demand. A second co-printing simulation has therefore been performed to investigate whether or not multicolour printing would have a positive impact on the results from the co-printing simulation one. The second simulation has been performed using the same data as in simulation one. The difference is that the colour constraint is removed, and thereby only the demand constraint is left to consider. The assumptions are similar to those in co-printing simulation one, with two exceptions, those are explained further below.

- *One price system*
- *Same QSV*
- *Roto volume → Flexo Process volume*
- *2 web minimum order size*
- *Customer agreement*
- *No colour constraints;* due to the multicolour printing technology
- *One paperboard for all SKU's*

The data is analysed according to the procedure below, see Figure 18.

1. *Sort SKU's according to ascending web demand.*
2. *Divide the batch into web demands of 2's and larger than 2's.*
   Divide the batch into small orders and larger orders to facilitate the calculation.
3. *Summarise the number of 2's and divide the sum with the number of webs to receive the number of rolls.*
4. *Divide the number of rolls with 2 and round up to receive the number of design changes.*
   For the 2 web demand orders the webs are split on two rolls.
5. *Summarise the number of large webs and divide the sum with the number of webs to receive the nr of roll.s*
6. *Divide the nr of rolls with the smallest web demand (ex 3 or 4) and round up to receive the nr of design changes.*
   For the largest orders the webs are split on number of rolls equal to the smallest demand.
7. *Subtract 1 design change for each web demand that is double the nr of maximum webs on one roll (Ex, if the nr of maximum webs on one roll is 5, and one web demand is 12, subtract 1 design change).*
8. *Sum the total nr of design changes from 2's and the total nr of design changes from the large web demands.*
9. *Calculate the average batch size.*

CDES (SKU code)	Max nr webs/Size	Correct webs	Nr or rolls	Total Nr Rolls	DC	Total DC	ABS
D50-C0KK-02	7	2					
D50-C11T-02	7	2					
D50-C12Y-02	7	2					
D50-C466-07	7	2					
D50-C589-05	7	2					
		10	**1,4**		**1**		
D50-D870-03	7	3					
D50-CC29-03	7	4					
D50-D821-04	7	6					
D50-C12Y-03	7	8					
Total		**21**	**3**	**4,4**	**2**	**3**	**1,5**

Figure 18: Calculations of QSV example

5.4.2 Result of Co-printing Simulation 2

The results from the co-printing simulation two are summarized in Table 6. The average batch size is set to 2.6 rolls/batch, which is 8% better than the current batch size in the printer.

Table 6: Result of co-printing simulation 2

Average batch size	2.6
Current batch size	2.4
Improved production efficiency	(2.6-2.4)/2.4=0.08

It can be concluded that introducing multicolour printing would have a positive impact on the results from co-printing simulation one. The combination of co-printing on real demand and multicolour printing would enable Tetra Pak Japan to produce on real demand although retaining production efficiency. As a result, the minimum order size for customers would decrease by 34% in average for each SKU, see appendix E.

Furthermore, the cost of finished goods inventory will decrease by 61% and also tied-up capital will decrease by 61%, see appendix D. The cost of external warehouses will be reduced by 92%, see appendix D. These calculations are performed based on a one week consumption level for all products in the finished goods inventory and additional one week consumption considering safety stock. A summary of the results is provided in Figure 19.

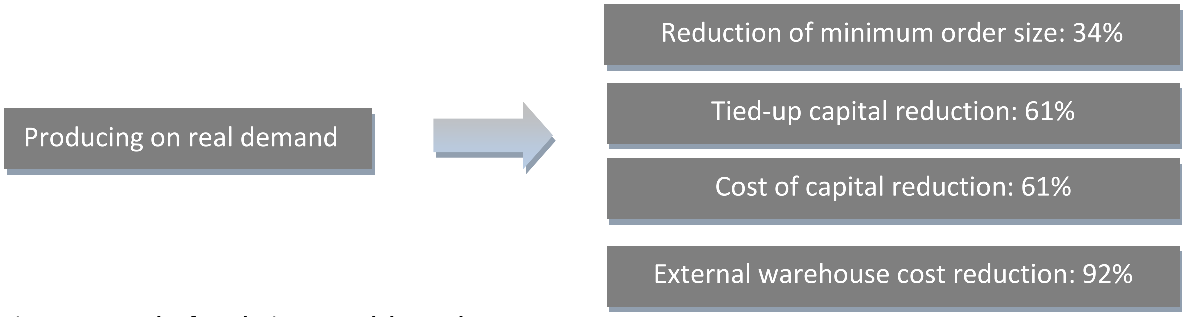

Figure 19: Result of producing on real demand

5.4.3 Impact on Customer Value

All the factors in the total value metrics will be positively affected by using co-printing and multicolour printing to produce on real demand. The *quality* attribute will be improved since the possibility of more colourful designs will meet customer requirements. Also, the production on real demand will result in less variance in the flow of goods throughout the supply chain from received order to customer delivery. The latter will be fulfilled shortly after stock-in of finished goods. This will decrease the risk for obsolete products. In addition, producing on real demand will eliminate waste. If Tetra Pak Japan concentrates on producing only what the customer demands, the effort placed on the non-value adding activities will be removed. Focusing on the value adding activities will result in more emphasis on continuous improvements that will increase the quality and the customer value.

In regard to *service*, this will be improved due to the 34% reduction of minimum order sizes for customers. Tetra Pak Japan will enable smaller order sizes and thereby responding to the customer requirements of a more flexible order system. Also, the production will through co-printing be prepared for a future change in the consumption pattern. The supply chain will remain robust and points at the capability to respond to changes on the market.

The *costs* will be significant lower. In the production the number of setups and the paper waste from the setups will decrease. Also the printer setup time will be reduced by 6% due to less ink changes and the ink waste and ink inventory will decrease accordingly. The production on real demand will reduce the inventory costs considerably. The number of pallets will be reduced from 6000 to 2338, see appendix D. This implies a 61 % reduction of the tied-up capital and the cost of capital and a 92% reduction of the external warehouse costs. As a matter of fact, the reduction of pallets leads to the external warehouses becoming almost redundant. The reduced costs for Tetra Pak Japan will lead to increased customer value in terms of resources being transferred towards activities that will benefit the customers. Besides, the customer's inventory costs will be reduced alongside with the production on real demand.

The increased flexibility in the supply chain will reduce the *lead time* in response to market forces. In the design section the proof lead time will be shortened. The customer will receive a digital proof instead of the analogue proof that is currently used. This enables more rapid colour and design changes. The setup time in production will be decreased by 6 % if all ink setups are eliminated which will also decrease the market lead time from order received to delivery of the package to the customer.

It can be concluded that co-printing on real demand in combination with multicolour printing will reduce costs and increase the responsiveness towards customer demands. Thus, co-printing on real demand will work in the future at Tetra Pak Japan.

5.5 Implementing Production on Real Demand

To put into practice the solution of co-printing and multicolour printing actions need to be taken and investments need to be made. See Figure 20.

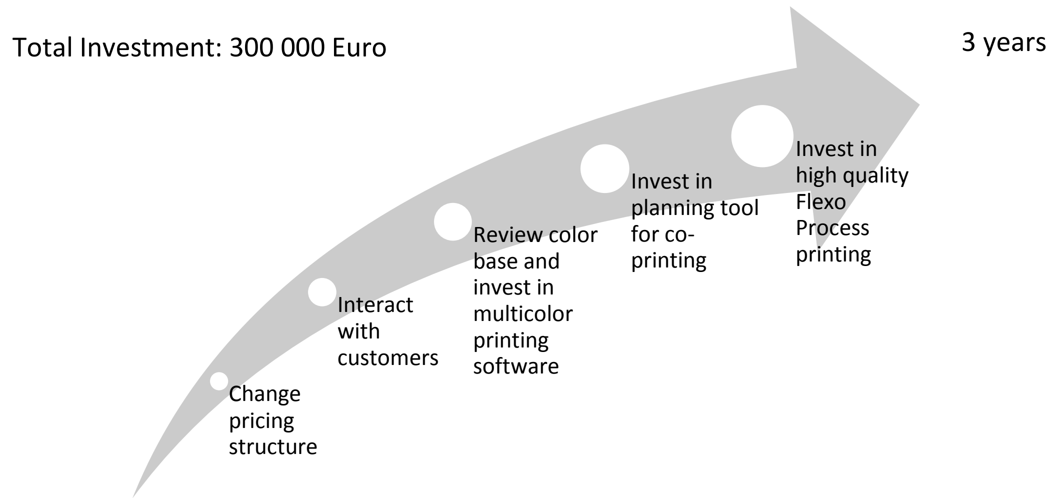

Figure 20: Actions needed for implementation

5.5.1 Actions

The current *pricing structure* has to change. Co-printing on real demand requires a one price system. The motive is that the current pricing structure does not reflect real demand and does not prepare the production for future demand patterns. The current system with large volume discounts and surplus charges for small order sizes is not sustainable in the long term.

During the implementation process it is vital for Tetra Pak Japan to *interact with the customers*. Introducing co-printing and multicolour printing and changing the pricing structure require collaboration with the customers. It is important to communicate the benefits which will gain increased value to the customers.

Prior to the introduction of multicolour printing it is necessary to analyse the current colour base at Tetra Pak Japan. Today many of the different colours are similar and therefore the colour base can be significantly reduced. The result of the colour review will indicate the number of colours that the mixture of the different base colours will have to generate.

5.5.2 Investments

The introduction of multicolour printing requires an investment in the software license for multicolour printing. Additionally, time and resources need to be set aside. An upgrade of the current planning tool for co-printing is a condition for the planning department to organise the increased intake of co-printing orders. The possibility of future transfers of Roto products to Flexo Process products requires an investment in higher quality Flexo Process printing. Today the Roto Printer prints high quality packages and to respond to the customer demands it will be necessary to improve the quality in the Flexo printer to achieve a similar level to the Roto. For total investments see Table 7.

Table 7: Investments needed for implementation

Investments	**Resources Needed (Euro)**
Multicolour printing	50 000
Planning tool for co-printing	50 000
Higher quality Flexo Process printing	200 000
Total	**300 000**

5.5.3 Timeline

The implementation is estimated to take three years. This is based on the time it will take to introduce multicolour printing which requires a longer introduction time than the other actions and investments. The three years are based upon a preface period where Tetra Pak Japan will, apart from the actual implementation, analyse the colour base, and gain approval from the global Tetra Pak organisation. Multicolour printing is up until this date not utilised at Tetra Pak factories and it is therefore important to inform and establish confidence for the technology within the company.

6 Discussion

In this last chapter the conclusions are presented. Thereafter, a general discussion on effectiveness and efficiency will be provided. This is followed by a description of the specific challenges that might arise for Tetra Pak Japan in regard to the implementation of co-printing on real demand and multicolour printing. The chapter will end with a discussion on managerial, theoretical and methodological implications.

6.1 Conclusions

As outlined in the introduction chapter, the purpose of this master's thesis has been to *"explore the possibilities of combining cost efficiency with responsiveness towards customer demands. This balance will be investigated through co-printing on real demand."*

The results from the thesis have shown that co-printing on real demand will combine a cost efficient production with a supply chain that responds to customer requirements. It can be concluded that co-printing on real demand and introducing multicolour printing at Tetra Pak Japan will lead to:

- 61 % reduction of the finished goods inventories
- 34 % reduction in the minimum order size for customers

Furthermore, it was stated that co-printing on real demand will not work at Tetra Pak Japan today. The reason for this is that the large number of spot colours prevents the combination of different customer designs. Tetra Pak Japan's customers value the extensive range of colours presently offered to them. It has therefore been important to find a replacement for the large number of spot colours without reducing the value to the customers. The solution to this has been concluded to be multicolour printing. The technology implies that the mixture of base colours will lead to multiple colour combinations. In addition, it leads to a more rapid design process and more colourful designs. Multicolour printing thereby enables co-printing on real demand and increases the customer value.

6.2 Challenges

The conclusions are brought down to a solution of co-printing on real demand in combination with multicolour printing. This implies a change of the supply chain structure and introduces a new line of thought. As a result the service level towards customers will increase. In regard to the result of increased service levels a more general discussion on the two concepts effectiveness and efficiency is relevant. The concepts differ as such that *effectiveness* is about *"doing the right things",* and *efficiency* is about *"doing the things right"* (Drucker, 2006). It can be a challenge to achieve both of these concepts. For overall success, it is important to strive for fulfilment of both.

From the solution in this thesis it can be concluded that the right thing to do is to begin producing on real demand. This will lead to a more flexible supply chain that emphasises customer value. By doing so, the effectiveness criterion will be achieved. Furthermore, it can be concluded that the effectiveness did not automatically lead to efficiency. The results from the first co-printing simulation illustrated that producing on real demand today does not generate production efficiency. The output did not respond to the input and the waste increased. The efficiency criterion was fulfilled for the first time in the second simulation. The reason is that multicolour printing was introduced. The technology enabled co-printing on real demand in parallel with fulfilment of an efficient production. As a resultant, the balance between service and cost was achieved.

So, the balance between cost and responsiveness towards customer demands leads to fulfilment of both the effectiveness and the efficiency criteria. This is important to keep in mind when introducing new concepts or solutions. It is also related to the *total value metrics*. Single focus on one characteristic, such as service, can influence the other parameters negatively. An increased service level can lead to direct costs in terms of increased administration or implementation costs. Also, indirect costs such as sub-optimisation can arise due to resistance to change. Similarly, it is important to communicate the value to the customers. The benefits of a new concept need to be understood by the customers, or complications such as quality aspects might arise. Thus, it is important to find the balance between the various characteristics in the *total value metrics* to achieve both effectiveness and efficiency.

The solution of co-printing on real demand in combination with multicolour printing will lead to both effectiveness and efficiency for Tetra Pak Japan. Although, it implies a change in the supply chain structure at Tetra Pak Japan. It requires an improved integration between the company and its customers. Also, it introduces a new technology, multicolour printing, to implement. Thus the actualisation of this solution will give rise to a number of challenges at Tetra Pak Japan. These are highlighted below.

- Reaching customer agreement
- Changing the pricing structure
- Fulfilling the colour demand

The customers of Tetra Pak Japan have specific demands unique for each customer. This is in line with their expectations of high quality and high service levels. The supply chain structure at Tetra Pak Japan can therefore not be changed without collaboration from the customers. Co-printing on real demand requires simultaneous printing of different customer designs. This implies a new supply chain philosophy and involves the risk of negative reactions from the customers.

The pricing structure is the responsibility of the sales function at Tetra Pak Japan. It will thereby play an important role of the realisation of the proposal to change the pricing structure. The sales function together with the key account management function has continuous contact with the customers. They lay strong emphasis on customer requirements and are resistant to change if it threatens their relationship towards the customers. Thus, the question of changing the pricing structure involves the risk of sub-optimisation.

The main technical challenge with introducing multicolour printing is misregistration. This means a lack of conformity in the mixture between the base colours. This leads to colours being screened instead of solid on the package. Furthermore, the multicolour printing technology creates multiple colour combinations using a small number of base colours. Regardless of this fact it will be a challenge to reach all of the different colours that Tetra Pak Japan offers the customers today. Additionally, it will be a technical challenge to reach the same quality in the Flexo Process printer as in the Roto printer. Co-printing all designs at Tetra Pak Japan involves the transfer of Roto products to Flexo Process products. The reason for this is that the multicolour printing technology cannot be implemented in the Roto Printer.

Realising the challenges on beforehand will facilitate the search for solutions and thereby the road to implementation. The following solutions are suggested.

- Achieving customer integration
- Achieving company integration
- Investing in printing technology

To achieve customer agreement Tetra Pak Japan should be the trigger to widen the customer's perspective. The solution presented in this thesis will benefit the customers in terms of increased flexibility, in particular the smaller batch sizes, and reduced risk for obsolete products due to lower inventory levels. It is important that Tetra Pak Japan communicates these values to the customers. The customer common agenda project emphasises customer interaction and the programme could be extended to include the communication of these benefits.

Interaction between the supply chain and other functions is essential to actualise the one price system. The sales function and key account management function hold valuable insights in the demand of the customers. To succeed with the change in pricing structure the supply chain needs to cooperate with these functions and communicate the advantages that will follow from a one price system. Improved internal integration will benefit Tetra Pak Japan in a longer perspective and lead to the facilitation of future cross-functional projects.

To reduce the risk of misregistration, trapping can be used. This means that small overlaps are created between the adjoining colours utilised in the mixture. Regarding the fulfilment of the customer's colour demand, it is necessary to review the current colour base. This review will result in the number of redundant colours that can be deleted from the colour base. Thereafter it can be concluded the total number of colours that the multicolour printing technique has to reach. Based on the result Tetra Pak Japan will make the selection of the correct number of base colours to include in the multicolour printing. Concerning the quality in Flexo Process versus Roto, the market for Roto products are decreasing in Japan. Tetra Pak Japan will eventually have to find a solution on how to replace volume from Roto to Flexo Process. Investing in technology for high quality Flexo Process printing will generate returns on investment in the future.

6.3 Introducing a Wider Perspective of the Results from the Thesis

The below sections will bring to light the implications of the solution from a managerial, theoretical and methodological perspective. This involves discussions on global Tetra Pak, the total Value metrics and critical success factors in our working process.

6.3.1 Managerial Implications

In discussing possible generalisation of the solution for global Tetra Pak it is important to emphasise the customer requirements. Introducing co-printing on real demand and multicolour printing will generate customer value, although it will also lead to changes in the supply chain structure. This requires increased customer integration. Therefore, careful research on customer demands on each market is necessary before implementing the solution on other Tetra Pak markets. In Japan the customers highly value flexibility in terms of smaller batch sizes. This might not be the case for customers on other markets. Thus, the impact from the production of smaller volumes might not generate the same effect. In addition, all Tetra Pak factories do not operate a call-off system. If not, the impact on the inventory levels from producing on real demand might not be as large as for Tetra Pak Japan.

The multicolour printing involves a new way of thinking regarding the colour base, design and printing. It is therefore important that the introduction gains support from the global organisation. To achieve the support the benefits from multicolour printing will have to be communicated outside of Japan. The benefits that will apply to all Tetra Pak's customers include a shorter lead time in the design process and more colourful designs. In addition, introducing multicolour printing within a short timeframe would place Tetra Pak in the forefront of applying the new technology. Thus, it would lead to a competitive advantage.

The question whether the solution from this thesis can be generalised to other Tetra Pak markets requires further research. Specifically on customer demands that are unique for each market and the different supply chain activities. However, it can be concluded that to continue on the road of growth and profitability it is important that Tetra Pak innovates and responds to changes on the marketplace. Restructuring the supply chain will lead to process innovation. The solution of co-printing on real demand in combination with multicolour printing will benefit Tetra Pak globally in terms of a more agile and responsive supply chain. As a result, the customer value will increase.

6.3.2 Theoretical Implications

Within this thesis the *total value metrics* have been used to combine lean and agile manufacturing. The metrics provides a summary of the various aspects from the two frameworks that results in the four characteristics; cost, service, quality and lead time. In the fulfilment of the thesis, the *total value metrics* has been valuable in the categorisation and understanding of customer demands. The four characteristics have been used to identify the different needs of the customers. Also, the analysis has been structured according to the metrics in order to determine the impact that co-printing and multicolour printing have on customer value. Above all, the metrics have been guiding us towards finding a balance between the four characteristics. It highlights that customer value is the result from a combination of the four. In responding to customer demands one of them might be focused upon, although none of them can be neglected.

As the reasoning in the previous part stated, the *total value metrics* is valuable in defining and balancing the customer value. Placing it in a broader concept, and relating it to the earlier discussion about effectiveness and efficiency it can be concluded that additional perspectives can be added to the framework. The single focus on customer value can lead to an imbalance between the producer and the customer. Creating customer value is often the right thing to do and thereby effective. The question is whether the customer value also leads to value for the producer. If not, the efficiency criterion is not fulfilled and the overall result is not successful. For future research it would be interesting to extend the balance between the four characteristics to a balance between the customer and the producer. This will place the value term in a broader perspective and increase the probability that effectiveness will also bring about efficiency.

6.3.3 Methodological Implications

In the process of conducting this thesis four critical success factors have been defined and these are; proximity, triangulation, systematic combining and testing conclusions.

Firstly, the presence in Japan enabled proximity to the sources for information and facilitated the communication between us and the employees at Tetra Pak Japan. This way, we have gained access to all necessary internal data needed for conclusions and calculations. *Secondly,* the possibility for triangulation has contributed to a more holistic perspective of the object of study. We have collected data through interviews, observations and secondary sources. Thereby we have been able to cross-check the trustworthiness of the received information. *Thirdly*, the systematic combining of the empirical world and the theoretical world have been beneficial. There has been a continuous search for additional information and perspectives on solutions to the problem. The theoretical world has contributed with testing of hypothesises based on the empirical world. The empirical world has enabled the verification or contradiction of the theoretical world. *Fourthly*, the credibility of the results has been strengthened as the conclusions have been tested. The results were discussed at the presentation that we held for the supply chain management team at Tetra Pak Japan. This team has deep insight in all the supply chain activities and their verification of the results reinforces the credibility of the thesis. In addition, we have been two authors equally responsible for the thesis and this has benefited the results in terms of increased inputs and perspectives. We have continuously tested the results through analysis and discussions between us two.

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8 Appendices

8.1 Appendix A Master Sheet

CDES (SKU code)	Q-S-V	Colour 1	Colour 2	Colour 3	Colour 4	Colour 5	Colour 6	Max nr webs/ Size	A, B1, B2	Web Demand	Packages /pallet	Pallets	Average Inventory (pallets)	Average Inventory with SS (pallets)	Pallets/ month produced
D50-A927-02	6003-230-05	A0605	T5211	P0097				6	B1	2	200000	0,8	0,8	0,8	1,7
D50-A018-02	6011-230-03	P0097						6	B1	2	200000	0,8	0,8	0,8	1,7
D50-A00Y-17	6011-230-09	D3145	A9929	C8113				6	B1	34	200000	14,1	14,1	14,1	28,2
D50-A01M-04	6011-230-09	E8011	D9496	D7509	C7578			6	B1	15	200000	6,2	6,2	6,2	12,5
D50-A01N-03	6011-230-09	E8011	B1765	B4317	C7578			6	B1	55	200000	22,8	22,8	22,8	45,7
D50-A02X-04	6011-230-09	E8303	A0172	A9052	C4374			6	B1	4	200000	1,7	1,7	1,7	3,3
D50-E0DB-02	6611-230-09	P0014	P0053	P0083	E1685	P0097		8	A	2	161000	0,6	0,3	0,6	2,5
D50-E0H7-03	6611-230-09	P0014	B3084	P0083	E7819	P0097		8	A	2	161000	0,6	0,3	0,6	2,5
D50-E0J5-03	6611-230-09	P0014	B3084	P0083	B2334	A3414	P0097	8	A	2	161000	0,6	0,3	0,6	2,5
D50-E0MY-01	6611-230-09	P0014	B3084	P0083	P0097			8	A	2	161000	0,6	0,3	0,6	2,5
D50-E0N2-07	6611-230-09	P0014	B3084	P0083	B8132	P0097		8	A	2	161000	0,6	0,3	0,6	2,5
D50-E0Q1-06	6611-230-09	P0014	B3084	P0083	A6100	P0097		8	A	2	161000	0,6	0,3	0,6	2,5
D50-E0VC-01	6611-230-09	P0014	B3084	P0083	C6006	P0097		8	A	2	161000	0,6	0,3	0,6	2,5
D50-E0VD-01	6611-230-09	P0014	B3084	P0083	A8486	P0097		8	A	2	161000	0,6	0,3	0,6	2,5
D50-E0VE-01	6611-230-09	P0014	B3084	P0083	A6523	P0097		8	A	2	161000	0,6	0,3	0,6	2,5
D50-E386-02	6611-230-09	P0014	P0053	P0083	E2623	P0097		8	A	2	161000	0,6	0,3	0,6	2,5
D50-E445-06	6611-230-09	P0014	B3084	P0083	E0865	P0097		8	A	5	161000	1,6	0,8	1,6	6,2
D50-E505-05	6611-230-09	A0612	A9266	A7256	C4713			8	A	3	161000	0,9	0,5	0,9	3,7
D50-E658-03	6611-230-09	P0014	P0053	P0083	E2335	C6456	P0097	8	A	2	161000	0,6	0,3	0,6	2,5
D50-E671-02	6611-230-09	P0014	P0053	P0083	C1016	P0097		8	A	2	161000	0,6	0,3	0,6	2,5
D50-C046-12	7124-350-29	A0563	A8679	P0097	P0097			8	A	5	140000	1,6	0,8	1,6	6,3
D50-C0QV-06	7124-350-29	B5819	B3568	B8068	E1131			8	A	3	140000	0,9	0,5	0,9	3,8
D50-C14F-02	7124-350-29	E9170	P1787	E2382	C5550			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C14G-02	7124-350-29	A0192	E5306	P1787	C5550			8	A	2	140000	0,6	0,3	0,6	2,5

D50-C14H-02	7124-350-29	A1014	E2370	P1787	C5550			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C14J-02	7124-350-29	A2871	P1787	A7708	C5550			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C14K-02	7124-350-29	D0253	P1787	E2382	C5550			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C14L-02	7124-350-29	A4252	P1787	A6043	C5550			8	A	5	140000	1,6	0,8	1,6	6,3
D50-C15N-03	7124-350-29	E8300	P1787	D2064	C5550			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C15P-03	7124-350-29	E8300	P1787	A3965	C5550			8	A	3	140000	0,9	0,5	0,9	3,8
D50-C0LD-01	7429-350-29	P0097						8	A	2	140000	0,6	0,3	0,6	2,5
D50-E0AT-04	7429-350-29	P0014	P0053	P0083	D8991	C8131		8	A	2	140000	0,6	0,3	0,6	2,5
D50-E0DZ-03	7429-350-29	P0014	P0053	P0083	A4795	P0097		8	A	2	140000	0,6	0,3	0,6	2,5
D50-E0DZ-04	7429-350-29	P0014	P0053	P0083	A4795	P0097		8	A	4	140000	1,3	0,6	1,3	5,0
D50-E0E1-03	7429-350-29	P0014	P0053	P0083	E0685	P0097		8	A	3	140000	0,9	0,5	0,9	3,8
D50-E0E1-04	7429-350-29	E8327	B3084	P0083	E0709	P0097		8	A	2	140000	0,6	0,3	0,6	2,5
D50-E0EC-04	7429-350-29	P0014	P0053	P0083	B4985	P0097		8	A	2	140000	0,6	0,3	0,6	2,5
D50-E0K7-02	7429-350-29							8	A	2	140000	0,6	0,3	0,6	2,5
D50-E0KV-02	7429-350-29	P0014	B3084	P0083	B8597	P0097		8	A	2	140000	0,6	0,3	0,6	2,5
D50-E0Q3-01	7429-350-29	P0014	B3084	P0083	B3070	B2220	C3654	8	A	2	140000	0,6	0,3	0,6	2,5
D50-E0R9-02	7429-350-29	P0014	B3084	P0083	A9874	B6182	P0097	8	A	3	140000	0,9	0,5	0,9	3,8
D50-E0S9-01	7429-350-29	P0014	B3084	P0083	A1358	C7852	P0097	8	A	2	140000	0,6	0,3	0,6	2,5
D50-E0TD-03	7429-350-29	P0014	B3084	P0083	A0607	A9097	P0097	8	A	2	140000	0,6	0,3	0,6	2,5
D50-E0VQ-01	7429-350-29	P0014	B3084	P0083	B3578	B2814	P0097	8	A	2	140000	0,6	0,3	0,6	2,5
D50-E916-05	7429-350-29	P0014	B3084	P0083	A9874	A0632	P0097	8	A	2	140000	0,6	0,3	0,6	2,5
D50-E916-06	7429-350-29	P0014	B3084	P0083	A9874	A0632	P0097	8	A	14	140000	4,4	2,2	4,4	17,6
DJP-C1AS-01	7028-350-29	C5569						8	B1	2	140000	0,6	0,6	0,6	1,3
D50-C052-07	7028-350-29	A8556	D0913	C5070				8	B1	2	140000	0,6	0,6	0,6	1,3

D50-C0EK-02	7028-350-29	A0108	A3658	E1132	A5981			8	B1	2	140000	0,6	0,6	0,6	1,3
D50-C0EM-02	7028-350-29	A0108	A0564	A4364	E1132			8	B1	2	140000	0,6	0,6	0,6	1,3
D50-C0RZ-02	7028-350-29	A7873	C1674	A8286	C6666			8	B1	2	140000	0,6	0,6	0,6	1,3
D50-C0VK-03	7028-350-29	A2543	A8556	P0097				8	B1	2	140000	0,6	0,6	0,6	1,3
D50-C17L-02	7028-350-29	B0336	E3135					8	B1	4	140000	1,3	1,3	1,3	2,5
D50-CC06-02	7028-350-29	A3991	A3770	A4281	C6666			8	B1	2	140000	0,6	0,6	0,6	1,3
D50-CC08-02	7028-350-29	E8793	A0715	E3264	C6666			8	B1	2	140000	0,6	0,6	0,6	1,3
D50-D293-02	7028-350-29	U0127	A9125	A3978	A9666			8	B1	2	140000	0,6	0,6	0,6	1,3
D50-D353-02	7028-350-29	A0108	B3067	A9901	E1132			8	B1	2	140000	0,6	0,6	0,6	1,3
D50-D356-02	7028-350-29	A0108	A3658	E1132	A5981			8	B1	2	140000	0,6	0,6	0,6	1,3
D50-D422-01	7028-350-29	A0599	A7988	A3222	E0849			8	B1	2	140000	0,6	0,6	0,6	1,3
D50-C004-04	7124-350-29	E6839	B0961	A8962	P0097			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C01Z-03	7124-350-29	A0973	B1120	E1097	A9717			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C022-03	7124-350-29	E5288	E3327	C1053	A0026			8	A	3	140000	0,9	0,5	0,9	3,8
D50-C07E-06	7124-350-29	E5212	E5246	A5396	E0784			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C07U-03	7124-350-29	A2939	A7765	E3186	E0154			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0CM-03	7124-350-29	A8997	B2330	E3135	C5095			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0CU-04	7124-350-29	A0563	A3479	A8960	A5954			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0ES-03	7124-350-29	B4201	B8089	E2676	A7232			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0EV-05	7124-350-29	E8304	A9103	B2259	D9803			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0EX-05	7124-350-29	E5212	A0195	E3327	E0469			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0GM-04	7124-350-29	A2516	E0784	P0097				8	A	5	140000	1,6	0,8	1,6	6,3
D50-C0KA-02	7124-350-29	P0097						8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0NZ-04	7124-350-29	A0564	A3479	A8580	D7695			8	A	2	140000	0,6	0,3	0,6	2,5

D50-C0Q9-03	7124-350-29	B1816	C1733	B3133	P0097			8	A	4	140000	1,3	0,6	1,3	5,0
D50-C0SD-03	7124-350-29	A2031	A2499	E0469	A8336			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0SE-03	7124-350-29	A7397	B9666	A9954	A4282			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0T4-04	7124-350-29	P0144	A9201	E2393	E0469			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0T4-05	7124-350-29	P0144	E6885	A9201	E2393	E0469		8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0T5-03	7124-350-29	E8891	P0144	E3680	D9288			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0XC-04	7124-350-29	A0592	A6243	E3702	C6666			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0XR-05	7124-350-29	A0092	A9811	A7765	D9767			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C0Z1-02	7124-350-29	A0099	A7522	A8016	A4628	E0847		8	A	2	140000	0,6	0,3	0,6	2,5
D50-C10E-03	7124-350-29	E8308	A2977	A4348	A8957	E2526		8	A	2	140000	0,6	0,3	0,6	2,5
D50-C10H-02	7124-350-29	E8304	A1014	E2676	B1951	E1627		8	A	2	140000	0,6	0,3	0,6	2,5
D50-C148-04	7124-350-29	A0563	A8578	B8014	D9767			8	A	4	140000	1,3	0,6	1,3	5,0
D50-C17T-01	7124-350-29	A0568	A0562	A8957	E2380	A5177		8	A	2	140000	0,6	0,3	0,6	2,5
D50-C233-03	7124-350-29	A0973	A8578	E1165	P0097			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C237-05	7124-350-29	A0568	A8957	E2380	A5177			8	A	11	140000	3,5	1,7	3,5	13,8
D50-C368-03	7124-350-29	A3537	E8793	P0151	E0234			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C594-03	7124-350-29	A0563	A6167	E1418	P0097			8	A	4	140000	1,3	0,6	1,3	5,0
D50-C776-03	7124-350-29	A2500	A8960	E1314	C3804			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C941-03	7124-350-29	E8002	A0562	D9571	A2281			8	A	2	140000	0,6	0,3	0,6	2,5
D50-C947-03	7124-350-29	A1670	A9373	A4245	C0640			8	A	2	140000	0,6	0,3	0,6	2,5
D50-CC14-04	7124-350-29	E8891	A6515	E4263	A9673			8	A	2	140000	0,6	0,3	0,6	2,5
D50-D218-04	7124-350-29	A1610	A9091	A2290	P0097			8	A	10	140000	3,1	1,6	3,1	12,6
D50-D242-03	7124-350-29	A0563	E4801	E1260	C6090			8	A	2	140000	0,6	0,3	0,6	2,5
D50-D254-03	7124-350-29	A0563	A8946	B7990	D9736			8	A	6	140000	1,9	0,9	1,9	7,5

D50-D383-03	7124-350-29	A0092	A4771	A7958	E1258			8	A	2	140000	0,6	0,3	0,6	2,5
D50-D492-02	7124-350-29	A4655	A6144	E3360	E1442			8	A	2	140000	0,6	0,3	0,6	2,5
D50-D629-08	7124-350-29	A1440	A5584	E0786	P0097			8	A	2	140000	0,6	0,3	0,6	2,5
D50-D668-03	7124-350-29	A0553	A3479	A4655	A7891	E1861		8	A	2	140000	0,6	0,3	0,6	2,5
D50-D724-03	7124-350-29	A2500	A8960	E1846	C4428			8	A	2	140000	0,6	0,3	0,6	2,5
D50-D741-04	7124-350-29	A2011	A7765	A4542	A5188			8	A	3	140000	0,9	0,5	0,9	3,8
D50-D742-04	7124-350-29	A0101	A7765	A3755	P4975			8	A	2	140000	0,6	0,3	0,6	2,5
D50-D746-04	7124-350-29	A0552	A3923	D9689	P0097			8	A	2	140000	0,6	0,3	0,6	2,5
D50-D749-04	7124-350-29	E8911	A2500	E3264	A5207			8	A	2	140000	0,6	0,3	0,6	2,5
D50-D874-02	7124-350-29	A2790	A8608	E2050	P0097			8	A	2	140000	0,6	0,3	0,6	2,5
D50-D877-04	7124-350-29	A3537	P0151	P0185	E0248			8	A	2	140000	0,6	0,3	0,6	2,5
D50-D941-02	7124-350-29	A0568	A8957	E2380	A5177			8	A	6	140000	1,9	0,9	1,9	7,5
DJP-C19S-01	7124-350-29	E9164	A3479	E4189	P1787	D9288		8	A	2	140000	0,6	0,3	0,6	2,5
DJP-C1BB-02	7124-350-29	E3598	E3203	E3858	A7928	P0097		8	A	2	140000	0,6	0,3	0,6	2,5
D50-F074-06	7482-350-29	P0083	P0053	P0014	C8453	C5569		8	B1	17	140000	5,3	5,3	5,3	10,7
D50-F0FA-02	7482-350-29	P0083	P0053	P0014	B4673	A8556	P0097	8	B1	8	140000	2,5	2,5	2,5	5,0
D50-F011-03	7429-350-29	P0083	P0053	P0014	A4816	E2090		8	A	9	140000	2,8	1,4	2,8	11,3
D50-F02R-05	7429-350-29	P0083	P0053	P0014	A1866	A6447	P0097	8	A	2	140000	0,6	0,3	0,6	2,5
D50-F05T-08	7429-350-29	P0083	P0053	P0014	A2376	P0097		8	A	3	140000	0,9	0,5	0,9	3,8
D50-F05V-04	7429-350-29	P0083	P0053	P0014	A1866	B9644	P0097	8	A	2	140000	0,6	0,3	0,6	2,5
D50-F07Y-03	7429-350-29	P0083	P0053	P0014	P0097			8	A	2	140000	0,6	0,3	0,6	2,5
D50-F07Z-03	7429-350-29	P0083	P0053	P0014	P0097			8	A	2	140000	0,6	0,3	0,6	2,5
D50-F083-03	7429-350-29	P0083	P0053	P0014	P0097			8	A	2	140000	0,6	0,3	0,6	2,5
D50-F095-02	7429-350-29	P0083	P0053	P0014	A8493	E1465	P0097	8	A	2	140000	0,6	0,3	0,6	2,5

D50-F0CM-02	7429-350-29	P0083	P0053	P0014	A9875	E0263	P0097	8	A	2	140000	0,6	0,3	0,6	2,5
D50-F0CN-02	7429-350-29	P0083	P0053	P0014	A9875	E0263	P0097	8	A	2	140000	0,6	0,3	0,6	2,5
DJP-C1AT-01	7124-350-29	C5569						8	A	2	140000	0,6	0,3	0,6	2,5
D50-F0FB-01	7482-350-29	P0083	P0053	P0014	A0982	A9823	P0097	8	B1	4	140000	1,3	1,3	1,3	2,5
D50-E0AU-05	7429-350-29	A1624	B3111	P0097				8	A	7	140000	2,2	1,1	2,2	8,8
D50-F0DT-04	7429-350-29	P0083	P0053	P0014	C5074	P0097		8	A	7	140000	2,2	1,1	2,2	8,8
D50-F0DU-05	7429-350-29	P0083	P0053	P0014	E8794	A8604	P0097	8	A	13	140000	4,1	2,0	4,1	16,3
D50-F0DV-05	7429-350-29	P0083	P0053	P0014	B9693	C1096	P0097	8	A	8	140000	2,5	1,3	2,5	10,1
D50-F0DX-04	7429-350-29	P0083	P0053	P0014	A9875	B3609	P0097	8	A	11	140000	3,5	1,7	3,5	13,8
D50-F0DY-04	7429-350-29	P0083	P0053	P0014	B9693	C1096	P0097	8	A	2	140000	0,6	0,3	0,6	2,5
D50-F0DY-05	7429-350-29	P0083	P0053	P0014	B9693	C1096	P0097	8	A	6	140000	1,9	0,9	1,9	7,5
D50-F0DZ-04	7429-350-29	P0083	P0053	P0014	A9875	B3609	P0097	8	A	11	140000	3,5	1,7	3,5	13,8
DJP-F0H5-01	7429-350-29	P0083	P0053	P0014	A1829	P0097		8	A	6	140000	1,9	0,9	1,9	7,5
D50-C0GG-04	7124-420-82	A0569	A2558	A6243	P0097			6	B1	2	100000	0,8	0,8	0,8	1,7
D50-C0ZV-03	7124-420-82	B4201	B3570	E1370	A9128	P0097		6	B1	6	100000	2,5	2,5	2,5	5,0
D50-C14S-04	7124-420-82	A0960	A7859	A8657	A8840	P0097		6	B1	2	100000	0,8	0,8	0,8	1,7
D50-A01S-08	6050-460-29	C2354	A2073	C7570	P0097			7	B2	11	100000	4,7	4,7	4,7	9,5
D50-A02D-05	6050-460-29	A0548	E2587	D2732	C6065			7	B2	18	100000	7,7	7,7	7,7	15,5
D50-A859-05	6050-460-29	T1625	T4416	T4415				7	B2	17	100000	7,3	7,3	7,3	14,6
D50-A004-01	6050-460-25	P0128	P0172	T6164	P0498			7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A019-01	6050-460-25	P0192	P0354	T6923	T6929			7	B2	4	100000	1,7	1,7	1,7	3,4
D50-A01B-02	6050-460-25	P1585	P0697	P0097				7	B2	4	100000	1,7	1,7	1,7	3,4
D50-A01J-03	6050-460-25	P1215	T6922	E3327	T0409			7	B2	7	100000	3,0	3,0	3,0	6,0
D50-A01U-05	6050-460-25	A6679	A0667	E3233	E1578	C5615		7	B2	6	100000	2,6	2,6	2,6	5,2

D50-A02E-01	6050-460-25	A9822	C8639	E3476	P0097			7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A035-01	6050-460-25	A0172	A8603	A1494	A1356			7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A037-01	6050-460-25	A1511	D0913	A9877	C8696			7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A03J-02	6050-460-25	P0108	D0246	A9092	E4175	P0653		7	B2	7	100000	3,0	3,0	3,0	6,0
D50-A094-03	6050-460-25	A3955	E4593	E1097	C8131			7	B2	4	100000	1,7	1,7	1,7	3,4
D50-A112-02	6050-460-25	A0562	B3073	A9127	B8886	E3656		7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A148-02	6050-460-25	T5975						7	B2	3	100000	1,3	1,3	1,3	2,6
D50-A159-01	6050-460-25	T5975	T0409					7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A188-01	6050-460-25	T1617	P1787	T4399	P0097			7	B2	6	100000	2,6	2,6	2,6	5,2
D50-A200-02	6050-460-25	A1632	B5606	P0497	P0097			7	B2	3	100000	1,3	1,3	1,3	2,6
D50-A207-03	6050-460-25	P4755	P0172	B0336	C5568	P0097		7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A234-04	6050-460-25	A1043	A6191	A5156				7	B2	5	100000	2,2	2,2	2,2	4,3
D50-A236-02	6050-460-25	A2007	B4825	P0097				7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A405-03	6050-460-25	A4422	A8475	P0354	A7234			7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A429-13	6050-460-25	U1205	A2173	P1788	P0497			7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A481-01	6050-460-25	P0130	P1788	T4399				7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A582-01	6050-460-25	A8954	C6065	P0097				7	B2	3	100000	1,3	1,3	1,3	2,6
D50-A802-01	6050-460-25	A0548	E4588	A8954	E1227			7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A825-03	6050-460-25	A9091	C7212					7	B2	7	100000	3,0	3,0	3,0	6,0
D50-A926-04	6050-460-25	A8953	E4605	D0246	C7252			7	B2	6	100000	2,6	2,6	2,6	5,2
D50-AFBK-03	6050-460-25	E3234	P0192	C7642				7	B2	6	100000	2,6	2,6	2,6	5,2
D50-A007-05	6050-460-29	A9090	C9279					7	B2	18	100000	7,7	7,7	7,7	15,5
D50-A00K-06	6050-460-29	D2018	D1764	C4514				7	B2	13	100000	5,6	5,6	5,6	11,2
D50-A00S-04	6050-460-29	A9090	D1764	C3801				7	B2	13	100000	5,6	5,6	5,6	11,2

D50-A00X-01	6050-460-29	P0185	D0915	C7172				7	B2	9	100000	3,9	3,9	3,9	7,7
D50-A01S-09	6050-460-29	C2354	A2073	C7570	P0097			7	B2	37	100000	15,9	15,9	15,9	31,8
D50-A023-03	6050-460-29	P0097						7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A02Q-01	6050-460-29	P1805	C5583	P0097				7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A03C-02	6050-460-29	A8608	D0915					7	B2	18	100000	7,7	7,7	7,7	15,5
D50-A03M-02	6050-460-29	E1254	A9126	C7658				7	B2	13	100000	5,6	5,6	5,6	11,2
D50-A054-04	6050-460-29	A5590	A8556	A3126	A3319	A8425		7	B2	13	100000	5,6	5,6	5,6	11,2
D50-A073-05	6050-460-29	P0031	P0376	C6089				7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A111-02	6050-460-29	A0690	E6096	A5128	P0097			7	B2	12	100000	5,2	5,2	5,2	10,3
D50-A147-03	6050-460-29	A9126	E2846					7	B2	24	100000	10,3	10,3	10,3	20,6
D50-A160-02	6050-460-29	P0120	D1200	E4593	C8147			7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A169-04	6050-460-29	B0336	E3135					7	B2	8	100000	3,4	3,4	3,4	6,9
D50-A172-01	6050-460-29	E3218	T4346	E1289				7	B2	4	100000	1,7	1,7	1,7	3,4
D50-A176-08	6050-460-29	A2977	A9090	D1682	P0097			7	B2	6	100000	2,6	2,6	2,6	5,2
D50-A246-05	6050-460-29	E3506	A9090	C8872				7	B2	6	100000	2,6	2,6	2,6	5,2
D50-A259-05	6050-460-29	A0076	B0329	E6861	D2732	C5692		7	B2	18	100000	7,7	7,7	7,7	15,5
D50-A319-03	6050-460-29	D3915	C6583					7	B2	4	100000	1,7	1,7	1,7	3,4
D50-A320-04	6050-460-29	P1788	P0355	C8583	P0097			7	B2	2	100000	0,9	0,9	0,9	1,7
D50-A339-02	6050-460-29	P1655	P0361	P0097				7	B2	6	100000	2,6	2,6	2,6	5,2
D50-A389-04	6050-460-29	E3506	A9090	C8872				7	B2	14	100000	6,0	6,0	6,0	12,0
D50-A417-10	6050-460-29	D0214	A0973	P1805	E3506	E0873		7	B2	9	100000	3,9	3,9	3,9	7,7
D50-A452-10	6050-460-29	A8630	C6076	E4281				7	B2	24	100000	10,3	10,3	10,3	20,6
D50-A827-07	6050-460-29	E1254	A9126	C7658				7	B2	9	100000	3,9	3,9	3,9	7,7
D50-A888-01	6050-460-29	A8955	E1846	C6077				7	B2	6	100000	2,6	2,6	2,6	5,2

D50-A932-03	6050-460-29	A8580	E4781	D0389				7	B2	41	100000	17,6	17,6	17,6	35,3
D50-AA03-05	6050-460-29	D1682	C6065					7	B2	32	100000	13,8	13,8	13,8	27,5
DJP-A040-01	6050-460-29	A8476	D6291	C9287				7	B2	39	100000	16,8	16,8	16,8	33,5
DJP-A043-01	6050-460-29	E1254	A9126	D1916	D2237	P0097		7	B2	18	100000	7,7	7,7	7,7	15,5
D50-E0CJ-02	7429-460-29	P0014	B3084	P0083	A4664	E1345		7	B1	2	87500	0,9	0,9	0,9	1,9
D50-E0FT-03	7429-460-29	P0014	B3084	P0083	A8947	P0097		7	B1	4	87500	1,9	1,9	1,9	3,7
D50-E962-03	7429-460-29	P0014	B3084	P0083	E3279	E0898		7	B1	6	87500	2,8	2,8	2,8	5,6
D50-E964-02	7429-460-29	P0014	B3084	P0083	A5898	A8922		7	B1	2	87500	0,9	0,9	0,9	1,9
D50-C106-02	7028-460-07	A2028	A6144	A3319	P0097			7	A	2	92500	0,9	0,4	0,9	3,5
D50-C04F-01	7028-460-29	D8740	D7926	A8580	P0097			7	A	3	92500	1,3	0,7	1,3	5,3
D50-C187-03	7028-460-29	A2487	A3291	P0097				7	A	2	92500	0,9	0,4	0,9	3,5
D50-C279-03	7028-460-29	P3115	P1787	P0368	C7139			7	A	9	92500	4,0	2,0	4,0	16,0
D50-C819-04	7028-460-29	E8020	A7433	P0097				7	A	2	92500	0,9	0,4	0,9	3,5
D50-CC45-04	7028-460-29	A1138	P0185	A1512	A5176			7	A	5	92500	2,2	1,1	2,2	8,9
D50-D085-12	7028-460-29	P1235	P1788	D6897	P0097			7	A	2	92500	0,9	0,4	0,9	3,5
D50-D168-12	7028-460-29	B0336	E3135					7	A	2	92500	0,9	0,4	0,9	3,5
D50-D934-02	7028-460-29	A8333	P0097					7	A	2	92500	0,9	0,4	0,9	3,5
D50-C0KK-02	7124-460-29	P0097						7	B1	2	92500	0,9	0,9	0,9	1,8
D50-C11T-02	7124-460-29	E4175	E0863	P0097				7	B1	2	92500	0,9	0,9	0,9	1,8
D50-C12Y-02	7124-460-29	D9668	P0097					7	B1	2	92500	0,9	0,9	0,9	1,8
D50-C12Y-03	7124-460-29	D0246	D7536	C5116				7	B1	8	92500	3,5	3,5	3,5	7,1
D50-C466-07	7124-460-29	A0939	A8146	C6666	P0097			7	B1	2	92500	0,9	0,9	0,9	1,8
D50-C589-05	7124-460-29	B2347	T2175	T5142	P0497			7	B1	2	92500	0,9	0,9	0,9	1,8
D50-CC29-03	7124-460-29	A0108	A8579	C9299	E0209			7	B1	4	92500	1,8	1,8	1,8	3,5

D50-D821-04	7124-460-29	B3570	D7926	C6666	P0097			7	B1	6	92500	2,7	2,7	2,7	5,3
D50-D870-03	7124-460-29	P2985	P0339	P0097				7	B1	3	92500	1,3	1,3	1,3	2,7
D50-F000-06	7429-460-29	P0083	P0053	P0014	P0021	P0097		7	B1	4	87500	1,9	1,9	1,9	3,7
D50-A020-03	6050-465-03	A9090	E1254	P0097				8	B2	2	96000	0,7	0,7	0,7	1,5
D50-A02C-02	6050-465-09	A8488	C7186					8	B2	20	96000	7,3	7,3	7,3	14,6
D50-A02Y-05	6050-465-09	C6668						8	B2	14	96000	5,1	5,1	5,1	10,2
D50-A03L-01	6050-465-09	E1195	A0548	C8696	P0097			8	B2	28	96000	10,2	10,2	10,2	20,4
D50-A03P-01	6050-465-09	A0827	A7895	C4428				8	B2	9	96000	3,3	3,3	3,3	6,6
D50-A956-11	6050-465-09	A8955	C8162	E4074				8	B2	16	96000	5,8	5,8	5,8	11,7
D50-H002-05	6070-465-09	C5568	E6823	B1829	C8377	D0882	C5551	8	B1	15	96000	5,2	5,2	5,2	10,3
D50-H006-03	6070-465-09	C5568	E6823	B0335	C8476	C8036		8	B1	65	96000	22,3	22,3	22,3	44,7
D50-H00C-04	6070-465-09	C5568	E6823	B1829	C8377	D0882	C5551	8	B1	11	96000	3,8	3,8	3,8	7,6
D50-H00E-02	6070-465-09	C5568	E6823	B0335	C8476	C8036		8	B1	6	96000	2,1	2,1	2,1	4,1
D50-H0R0-04	6070-465-09	C5568	E6823	B1829	C8377	D0882	C5551	8	B1	44	96000	15,1	15,1	15,1	30,3
D50-H0R6-04	6070-465-09	C5568	E6823	B1829	C8377	D0882	C5551	8	B1	24	96000	8,3	8,3	8,3	16,5
D50-C0LJ-01	7429-465-09	P0097						8	A	2	90000	0,7	0,4	0,7	2,9
D50-E04H-04	7429-465-09	P0014	B3084	P0083	A6101	C4325		8	A	8	90000	2,9	1,5	2,9	11,7
D50-E05L-08	7429-465-09	P0014	B3084	P0083	E5250	E3304	P0097	8	A	7	90000	2,6	1,3	2,6	10,3
D50-E069-03	7429-465-09	P0014	B3084	P0083	A4316	B1973	P0097	8	A	3	90000	1,1	0,6	1,1	4,4
D50-E078-08	7429-465-09	P0014	B3084	P0083	A8464	P0097		8	A	4	90000	1,5	0,7	1,5	5,9
D50-E081-08	7429-465-09	P0014	P0053	P0083	A9058	P0097		8	A	3	90000	1,1	0,6	1,1	4,4
D50-E085-08	7429-465-09	P0014	P0053	P0083	E1819	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-E09F-12	7429-465-09	P0014	B3084	P0083	A4362	A9819	P0097	8	A	24	90000	8,8	4,4	8,8	35,2
D50-E0A3-10	7429-465-09	P0014	B3084	P0083	A5584	A9165	P0097	8	A	55	90000	20,2	10,1	20,2	80,7

D50-E0BC-08	7429-465-09	P0014	B3084	P0083	A9091	A9122	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0C1-02	7429-465-09	P0014	B0337	D1109	C9544	C3773		8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0C2-03	7429-465-09	P0014	B3084	P0083	A9877	A9267	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0C3-04	7429-465-09	P0014	P0053	P0083	A4657	A9267	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0DF-03	7429-465-09	P0014	B3084	P0083	A9301	D9856	P0097	8	A	3	90000	1,1	0,6	1,1	4,4
D50-E0E8-05	7429-465-09	P0014	B3084	P0083	A9090	C9452	P0097	8	A	3	90000	1,1	0,6	1,1	4,4
D50-E0F5-07	7429-465-09	P0014	B3084	P0083	B8132	P0097		8	A	15	90000	5,5	2,8	5,5	22,0
D50-E0F5-08	7429-465-09	P0014	B3084	P0083	B8132	P0097		8	A	24	90000	8,8	4,4	8,8	35,2
D50-E0FH-06	7429-465-09	P0014	B3084	P0083	E0865	P0097		8	A	4	90000	1,5	0,7	1,5	5,9
D50-E0FL-07	7429-465-09	P0014	B3084	P0083	A5584	A9165	P0097	8	A	5	90000	1,8	0,9	1,8	7,3
D50-E0FR-04	7429-465-09	P0014	B3084	P0083	A5263	P0097		8	A	3	90000	1,1	0,6	1,1	4,4
D50-E0H0-05	7429-465-09	P0014	B3084	P0083	E8997	E1827	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0H3-05	7429-465-09	P0014	B3084	P0083	A0828	E0750	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0JP-06	7429-465-09	A0987	B0406	A6646	B0374	P0097		8	A	3	90000	1,1	0,6	1,1	4,4
D50-E0K0-03	7429-465-09	P0014	B3084	P0083	A0983	A6037	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0K9-04	7429-465-09	P0014	B3084	P0083	E2408	E1716	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0L0-08	7429-465-09	P0014	B3084	P0083	A6100	P0097		8	A	6	90000	2,2	1,1	2,2	8,8
D50-E0L0-09	7429-465-09	P0014	B3084	P0083	A6100	P0097		8	A	26	90000	9,5	4,8	9,5	38,1
D50-E0M6-02	7429-465-09	P0014	B3084	P0083	A9900	E1611	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0MA-04	7429-465-09	P0014	B3084	P0083	E8997	A9884	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0N1-05	7429-465-09	P0014	B3084	P0083	E0865	P0097		8	A	56	90000	20,5	10,3	20,5	82,1
D50-E0N9-04	7429-465-09	P0014	B3084	P0083	A7779	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0NX-04	7429-465-09	P0014	B3084	P0083	B3082	P0097		8	A	5	90000	1,8	0,9	1,8	7,3
D50-E0NZ-01	7429-465-09	E8945	A1681	D3913	A6895	C3776	P0097	8	A	2	90000	0,7	0,4	0,7	2,9

D50-E0P1-03	7429-465-09	P0014	B3084	P0083	D0259	C8054	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0P8-05	7429-465-09	P0014	B3084	P0083	A5505	C7811	P0097	8	A	8	90000	2,9	1,5	2,9	11,7
D50-E0PT-02	7429-465-09	P0014	B3084	P0083	A1016	C4325		8	A	3	90000	1,1	0,6	1,1	4,4
D50-E0PU-02	7429-465-09	P0014	B3084	P0083	E1200	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0Q7-03	7429-465-09	P0014	B3084	P0083	A9889	A0663	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0R1-02	7429-465-09	P0014	B3084	P0083	A0217	A9011	P0097	8	A	15	90000	5,5	2,8	5,5	22,0
D50-E0RL-01	7429-465-09	P0014	B3084	P0083	E0896			8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0RM-02	7429-465-09	P0014	B3084	P0083	A9164	D9289	P0097	8	A	6	90000	2,2	1,1	2,2	8,8
D50-E0RN-01	7429-465-09	P0014	B3084	P0083	A7408	D9289	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0RP-01	7429-465-09	P0014	B3084	P0083	A9902	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0RY-03	7429-465-09	P0014	B3084	P0083	A3822	A8579	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0S0-02	7429-465-09	P0014	B3084	P0083	E9162	B1859	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0SB-01	7429-465-09	P0014	B3084	P0083	E7305	A7954	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0SL-03	7429-465-09	P0014	B3084	P0083	A7395	B2332	P0097	8	A	5	90000	1,8	0,9	1,8	7,3
D50-E0SM-02	7429-465-09	P0014	B3084	P0083	A0568	D0012	P0097	8	A	3	90000	1,1	0,6	1,1	4,4
D50-E0SU-03	7429-465-09	P0014	B3084	P0083	B7687	B3494	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0T0-01	7429-465-09	A0604	A7991	A2420	A4283			8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0T8-01	7429-465-09	P0014	B3084	P0083	E8998	P0097		8	A	6	90000	2,2	1,1	2,2	8,8
D50-E0TG-03	7429-465-09	P0014	B3084	P0083	A6517	B1952	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0TH-03	7429-465-09	P0014	B3084	P0083	E4596	D9214	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0TR-01	7429-465-09	P0014	B3084	P0083	B3495	D1909	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0TT-03	7429-465-09	P0014	B3084	P0083	D9650	D3763		8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0TU-01	7429-465-09	P0014	B3084	P0083	A9048	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0TU-02	7429-465-09	B0274	P0014	B3084	P0083	E0865	P0097	8	A	2	90000	0,7	0,4	0,7	2,9

D50-E0TV-01	7429-465-09	P0014	B3084	P0083	A2944	B2282	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0U4-02	7429-465-09	P0014	B3084	P0083	E6282	P0097		8	A	8	90000	2,9	1,5	2,9	11,7
D50-E0U5-02	7429-465-09	P0014	B3084	P0083	A0948	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0U6-02	7429-465-09	P0014	B3084	P0083	A3530	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0UV-01	7429-465-09	P0014	B3084	P0083	E8997	A5284	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0UX-01	7429-465-09	P0014	B3084	P0083	E8997	B5974	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0V9-01	7429-465-09	P0014	B3084	P0083	A9948	C4325		8	A	6	90000	2,2	1,1	2,2	8,8
D50-E0VF-01	7429-465-09	P0014	B3084	P0083	A6523	E4265	P0097	8	A	4	90000	1,5	0,7	1,5	5,9
D50-E0VR-01	7429-465-09	P0014	B3084	P0083	E1818	P0097		8	A	9	90000	3,3	1,7	3,3	13,2
D50-E0VS-01	7429-465-09	P0014	B3084	P0083	E4226	P0097		8	A	4	90000	1,5	0,7	1,5	5,9
D50-E0VT-01	7429-465-09	P0014	B3084	P0083	E8874	P0097		8	A	6	90000	2,2	1,1	2,2	8,8
D50-E0VU-01	7429-465-09	P0014	B3084	P0083	A0561	P0097		8	A	3	90000	1,1	0,6	1,1	4,4
D50-E0VV-01	7429-465-09	P0014	B3084	P0083	A4654	P0097		8	A	5	90000	1,8	0,9	1,8	7,3
D50-E0VX-01	7429-465-09	P0014	B3084	P0083	A9015	P0097		8	A	5	90000	1,8	0,9	1,8	7,3
D50-E0VZ-01	7429-465-09	P0014	B3084	P0083	A8609	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-E123-04	7429-465-09	P0014	B3084	P0083	B1973	A9161	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E134-04	7429-465-09	P0014	P0053	P0083	A5341	P0097		8	A	3	90000	1,1	0,6	1,1	4,4
D50-E2GB-04	7429-465-09	P0014	B3084	P0083	B3049	C4325	P0097	8	A	7	90000	2,6	1,3	2,6	10,3
D50-E598-03	7429-465-09	P0014	P0053	P0083	E2008	E0709	P0097	8	A	3	90000	1,1	0,6	1,1	4,4
D50-E856-05	7429-465-09	P0014	B3084	P0083	A9874	B0849	P0097	8	A	8	90000	2,9	1,5	2,9	11,7
D50-E882-08	7429-465-09	P0014	B3084	P0083	E1804	P0097		8	A	5	90000	1,8	0,9	1,8	7,3
D50-E931-06	7429-465-09	P0014	B3084	P0083	E0865	P0097		8	A	38	90000	13,9	7,0	13,9	55,7
D50-E935-02	7429-465-09	P0014	P0053	P0083	D5075	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-E981-01	7429-465-09	P0014	P0053	P0083	E0311	P0097		8	A	2	90000	0,7	0,4	0,7	2,9

D50-EE44-03	7429-465-09	P0014	P0053	P0083	A8957	B0214	P0097	8	A	3	90000	1,1	0,6	1,1	4,4
D50-EE50-02	7429-465-09	P0014	B3084	P0083	B1712	P0097		8	A	3	90000	1,1	0,6	1,1	4,4
D50-EE51-02	7429-465-09	P0014	B3084	P0083	A4167	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-EID0-04	7429-465-09	P0014	B3084	P0083	E2009	C4325	P0097	8	A	4	90000	1,5	0,7	1,5	5,9
DJP-E0X9-01	7429-465-09	P0014	B3084	P0083	A0149	A6063	P0097	8	A	4	90000	1,5	0,7	1,5	5,9
DJP-E0XA-01	7429-465-09	P0014	B3084	P0083	A0150	A8723	P0097	8	A	9	90000	3,3	1,7	3,3	13,2
DJP-E0XD-01	7429-465-09	P0014	B3084	P0083	A1569	A6108	P0097	8	A	3	90000	1,1	0,6	1,1	4,4
DJP-E0XE-01	7429-465-09	P0014	B3084	P0083	B5415	B9755	P0097	8	A	3	90000	1,1	0,6	1,1	4,4
D50-C0SQ-03	7124-465-09	B3524	A9201	D0017	C4496			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0Y1-03	7124-465-09	A3967	P1787	C5550	C9047			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0ZJ-04	7124-465-09	C0516	P1787	C9047	C5550			8	A	5	84000	2,0	1,0	2,0	7,9
D50-C10C-03	7124-465-09	P1787	C9047	C5550				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C15Q-02	7124-465-09	E8300	P1787	E0802	C5550			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C15R-02	7124-465-09	E8300	P1787	C5684				8	A	4	84000	1,6	0,8	1,6	6,3
D50-C16G-02	7124-465-09	E8300	A1255	P1787	C5550			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C890-02	7124-465-09	E8303	B1815	A9904	D9669			8	A	2	84000	0,8	0,4	0,8	3,1
D50-E005-05	7429-465-09	E6064	E3485	D9195	P0097			8	A	3	90000	1,1	0,6	1,1	4,4
D50-C0UQ-03	7124-465-09	U0012	A8579	E4263	E1229			8	A	2	84000	0,8	0,4	0,8	3,1
D50-E03F-02	6933-465-09	T0950	P0014	P0053	P0083	D9360	P0097	8	B2	2	78000	0,8	0,8	0,8	1,5
D50-E04P-02	6933-465-09	T0950	T0950	A3748	A9203	A0034		8	B2	2	78000	0,8	0,8	0,8	1,5
D50-E0GA-02	6933-465-09	T0950	P0014	B3084	P0083	A1121	A9443	8	B2	8	78000	3,1	3,1	3,1	6,2
D50-E0GA-03	6933-465-09	T0950	P0014	B3084	P0083	A1121	A9443	8	B2	10	78000	3,8	3,8	3,8	7,7
D50-E0GC-03	6933-465-09	T0950	P0014	B3084	P0083	A0635	A5224	8	B2	24	78000	9,2	9,2	9,2	18,5
D50-E0RX-01	6933-465-09	T0950	P0014	B3084	P0083	C8129	P0097	8	B2	2	78000	0,8	0,8	0,8	1,5

D50-E0SG-02	6933-465-09	T0950	E8327	B3084	P0083	A1468	C7786	8	B2	5	78000	1,9	1,9	1,9	3,8
D50-E0SQ-02	6933-465-09	T0950	P0014	B3084	P0083	A0190	C7962	8	B2	2	78000	0,8	0,8	0,8	1,5
D50-E0UP-01	6933-465-09	T0950	E8827	B3084	P0083	A8437	P0097	8	B2	2	78000	0,8	0,8	0,8	1,5
D50-E207-02	6933-465-09	T0950	A2056	B3610	A9749	E0659		8	B2	3	78000	1,2	1,2	1,2	2,3
D50-E664-03	6933-465-09	T0950	A0619	P0083	A1329	P0097		8	B2	2	78000	0,8	0,8	0,8	1,5
D50-EE21-02	6933-465-09	T0950	P0014	P0053	P0083	B4270	P0097	8	B2	4	78000	1,5	1,5	1,5	3,1
D50-C719-06	7028-465-09	A2487	A9930	E0372	P0097			8	A	6	84000	2,4	1,2	2,4	9,4
DJP-C1B2-01	7028-465-09	C5569						8	A	2	84000	0,8	0,4	0,8	3,1
DJP-C1BK-01	7028-465-09	D2009	D4707	P0097				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C00K-10	7028-465-09	A9822	D3184	C5512				8	A	7	84000	2,8	1,4	2,8	11,0
D50-C00L-09	7028-465-09	A9822	D3184	C5512				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C01P-03	7028-465-09	A1975	E5215	E2124	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C06Q-02	7028-465-09	A2582	A8953	E2319	A5969			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C06R-01	7028-465-09	U0699	A8488	E2319	A5969			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C09K-03	7028-465-09	P0123	P0190	T5975	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C09N-03	7028-465-09	P0123	T0217	T5966	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0AJ-10	7028-465-09	A1076	A9822	P0097				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0AK-04	7028-465-09	E8004	E1863	P0192	C8149	D9795		8	A	4	84000	1,6	0,8	1,6	6,3
D50-C0ER-03	7028-465-09	E8897	T6918	T6153	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0FZ-04	7028-465-09	A0555	A9130	E1838	C6764			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0HH-06	7028-465-09	A0565	E4666	A9125	E1341			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0HU-10	7028-465-09	A0960	A8556	A7266				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0LB-05	7028-465-09	A1975	A0987	P0031	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0ME-03	7028-465-09	A3109	P0370	P0175	P0097			8	A	4	84000	1,6	0,8	1,6	6,3

D50-C0MT-02	7028-465-09	E4670	P0185	E0350	C6050			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0MT-04	7028-465-09	A3016	A8954	D2780	C9268	A4628		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0S8-03	7028-465-09	B2347	B2494	A7928	A8417	P0097		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0TE-02	7028-465-09	E6257	A1729	A8953	E1829			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0TG-01	7028-465-09	A2010	A0579	E3656	A1786			8	A	3	84000	1,2	0,6	1,2	4,7
D50-C0U2-05	7028-465-09	A0584	A0586	A9822	E5494	A6005		8	A	4	84000	1,6	0,8	1,6	6,3
D50-C0U5-02	7028-465-09	P7401	B1797	D9689	A5214			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0X0-01	7028-465-09	D0909	E2004	A8488	P0097			8	A	4	84000	1,6	0,8	1,6	6,3
D50-C0X2-01	7028-465-09	A0670	A4542	A8488	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0X5-02	7028-465-09	A0458	A7435	A3659	E1525			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0XY-06	7028-465-09	P0116	P0031	B6040	D0246	P0097		8	A	6	84000	2,4	1,2	2,4	9,4
D50-C0Y3-04	7028-465-09	B1312	E6086	A7522	E2249			8	A	4	84000	1,6	0,8	1,6	6,3
D50-C10D-01	7028-465-09	E1132	C6050					8	A	2	84000	0,8	0,4	0,8	3,1
D50-C10N-05	7028-465-09	A0614	P0116	P0031	D0246	P0097		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C10V-03	7028-465-09	E8337	B4754	P0192	E1863	C8149		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C10Y-05	7028-465-09	E8004	D0012	E1863	P0192	C8149		8	A	4	84000	1,6	0,8	1,6	6,3
D50-C10Z-04	7028-465-09	E8004	P0192	D4857	E1863	C8149		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C11K-01	7028-465-09	A0593	D0915	E3263	E1396	A4562		8	A	6	84000	2,4	1,2	2,4	9,4
D50-C11R-04	7028-465-09	A0088	A0459	A9822	E5494	A6005		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C11V-01	7028-465-09	A8939	C5469					8	A	2	84000	0,8	0,4	0,8	3,1
D50-C125-05	7028-465-09	E8004	P0192	D0326	E1863	C8149		8	A	11	84000	4,3	2,2	4,3	17,3
D50-C12P-04	7028-465-09	A2537	A9822	A9559				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C13L-02	7028-465-09	B1953	E3360	D7695	E3707	P0097		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C13M-02	7028-465-09	B1953	D0418	C9268	E3707	P0097		8	A	2	84000	0,8	0,4	0,8	3,1

D50-C14R-02	7028-465-09	P0116	A3955	P0031	D0246	P0097		8	A	5	84000	2,0	1,0	2,0	7,9
D50-C14U-02	7028-465-09	B3524	A0548	B1222	E3656			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C159-02	7028-465-09	B2488	B2419	A9822	E5494	A8395		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C15G-01	7028-465-09	A1645	A0684	E3158	A4195	P0097		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C17B-01	7028-465-09	E5494	A0565	A9130	E0818			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C17C-01	7028-465-09	E7650	A0565	A1645	A4228			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C17E-04	7028-465-09	P0116	B1024	P0031	D0246	P0097		8	A	4	84000	1,6	0,8	1,6	6,3
D50-C17G-03	7028-465-09	E7605	P0116	P0031	D0246	P0097		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C17H-04	7028-465-09	P0116	P0031	D0246	D9596	P0097		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C18A-01	7028-465-09	B4675	A9822	B1120	E2650	P0097		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C260-09	7028-465-09	A0565	A6646	E1838				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C305-07	7028-465-09	P0116	T1616	P0031	D0246	P0097		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C305-08	7028-465-09	P0116	T1616	P0031	D0246	P0097		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C375-07	7028-465-09	P0116	P0014	P0031	D0246	P0097		8	A	10	84000	3,9	2,0	3,9	15,7
D50-C666-06	7028-465-09	A0563	E2526	A8475	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C683-02	7028-465-09	A0562	A5560	E0783	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C763-11	7028-465-09	E7650	A0565	E7715	A0393			8	A	5	84000	2,0	1,0	2,0	7,9
D50-C765-10	7028-465-09	E7650	A0565	A3670	A7170			8	A	7	84000	2,8	1,4	2,8	11,0
D50-C845-04	7028-465-09	A9128	A3319	P0097				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C935-07	7028-465-09	P0116	P0031	P1807	D0246	P0097		8	A	9	84000	3,5	1,8	3,5	14,1
D50-C984-01	7028-465-09	E3515	A9125	C7172				8	A	2	84000	0,8	0,4	0,8	3,1
D50-CC20-07	7028-465-09	P0355	E0905					8	A	2	84000	0,8	0,4	0,8	3,1
D50-CC21-06	7028-465-09	E5215	E1420					8	A	2	84000	0,8	0,4	0,8	3,1
D50-CC22-06	7028-465-09	A1608	P0497					8	A	2	84000	0,8	0,4	0,8	3,1

D50-CC49-02	7028-465-09	P0123	A3646	P0354	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-CZZE-11	7028-465-09	A4403	A7458	E5494	P0647			8	A	8	84000	3,1	1,6	3,1	12,6
D50-D010-04	7028-465-09	P0607	E1627	A0684	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-D118-20	7028-465-09	P0116	P0031	D0246	E4695	P0097		8	A	25	84000	9,8	4,9	9,8	39,3
D50-D118-22	7028-465-09	P0116	P0031	D0246	E4695	P0097		8	A	5	84000	2,0	1,0	2,0	7,9
D50-D137-21	7028-465-09	P0116	P0031	D0246	A2660	P0097		8	A	15	84000	5,9	2,9	5,9	23,6
D50-D138-20	7028-465-09	P0116	D0246	E4412	P0031	P0097		8	A	7	84000	2,8	1,4	2,8	11,0
D50-D271-10	7028-465-09	A0939	A0563	A0142	A8475	P0097		8	A	6	84000	2,4	1,2	2,4	9,4
D50-D348-13	7028-465-09	E4692	A0565	A9130	E0468			8	A	7	84000	2,8	1,4	2,8	11,0
D50-D430-08	7028-465-09	P0116	P0031	D0246	P0174	P0097		8	A	6	84000	2,4	1,2	2,4	9,4
D50-D482-03	7028-465-09	P0115	P0368	P1787	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-D502-04	7028-465-09	A0986	A3659	A8467	E0905			8	A	2	84000	0,8	0,4	0,8	3,1
D50-D508-02	7028-465-09	A8973	E3292	P0097				8	A	2	84000	0,8	0,4	0,8	3,1
D50-D509-04	7028-465-09	A0950	A7435	A4562	E0817			8	A	7	84000	2,8	1,4	2,8	11,0
D50-D732-05	7028-465-09	E8004	E1863	P0192	C8149	D9795		8	A	3	84000	1,2	0,6	1,2	4,7
D50-D758-12	7028-465-09	A9822	E5494	A5478	A5481	A8397		8	A	2	84000	0,8	0,4	0,8	3,1
D50-D773-11	7028-465-09	A9822	E5494	B5342	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-D809-04	7028-465-09	A0569	A2649	A8556	A4282	P0097		8	A	2	84000	0,8	0,4	0,8	3,1
DJP-C19V-01	7028-465-09	P0116	P0031	D0214	C8576	P0097		8	A	2	84000	0,8	0,4	0,8	3,1
DJP-C19X-01	7028-465-09	P0116	P0031	D0246	E4695	P0097		8	A	21	84000	8,3	4,1	8,3	33,0
DJP-C1A9-01	7028-465-09	A2578	A7494	A9822	E5494	A6005		8	A	4	84000	1,6	0,8	1,6	6,3
DJP-C1AA-01	7028-465-09	A0849	E5494	B2570	A3709	E1884		8	A	2	84000	0,8	0,4	0,8	3,1
D50-E0CX-03	7482-465-09	P0014	P0053	P0083	A1205	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0QN-02	7482-465-09	P0014	B3084	P0083	A2942	A8854	P0097	8	A	7	90000	2,6	1,3	2,6	10,3

D50-E0T4-01	7482-465-09	P0014	B3084	P0083	D8466	B0015	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0UB-01	7482-465-09	P0014	B3084	P0083	A0844	A3802	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0UQ-01	7482-465-09	P0014	B3084	P0083	A7421	C6562	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0UR-02	7482-465-09	P0014	B3084	P0083	B0097	C6562	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-E0US-02	7482-465-09	P0014	B3084	P0083	C6562	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-C087-04	7124-465-07	A2940	A8605	E4799	P0097			8	A	5	84000	2,0	1,0	2,0	7,9
D50-C088-06	7124-465-07	B3602	A8605	C1646	P0097			8	A	5	84000	2,0	1,0	2,0	7,9
D50-C0BS-05	7124-465-07	A8605	B6506	C5083				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0BT-04	7124-465-07	A8605	A4542	T4248				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0BU-04	7124-465-07	A8605	A8630	T4248				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0BU-05	7124-465-07	A8605	A8630	C5083				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0FG-04	7124-465-07	P0097						8	A	2	84000	0,8	0,4	0,8	3,1
D50-C118-04	7124-465-07	A2500	A4655	A8605	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C120-06	7124-465-07	A8605	D7804	C5389	C5083			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C14N-03	7124-465-07	A8605	E8793	T4248				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C14N-04	7124-465-07	A8605	E8793	C5083				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C14P-04	7124-465-07	A8605	B3041	C5083				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C16N-02	7124-465-07	A8605	D0852	D6904	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C298-03	7124-465-07	A8605	E3264	E1418				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C721-04	7124-465-07	A8605	D6290	T4248				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C721-05	7124-465-07	A8605	D6290	C5083				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C801-04	7124-465-07	A8605	A0974	T4248				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C806-04	7124-465-07	A8605	B1972	T4248				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C807-04	7124-465-07	A8605	E2847	T4248				8	A	2	84000	0,8	0,4	0,8	3,1

D50-D478-04	7124-465-07	A8605	A9714	T4248				8	A	2	84000	0,8	0,4	0,8	3,1
D50-D515-06	7124-465-07	T6162	A8605	P0228	P0097			8	A	14	84000	5,5	2,8	5,5	22,0
D50-D817-07	7124-465-07	D7896	A8605	D5440	P0097			8	A	3	84000	1,2	0,6	1,2	4,7
D50-D840-02	7124-465-07	A1567	A4223	P0097				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C03C-04	7124-465-09							8	A	5	84000	2,0	1,0	2,0	7,9
D50-C03E-03	7124-465-09	E3127	D8892	C4472	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C062-06	7124-465-09	A0836	A6144	B3265	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C07S-03	7124-465-09	A4310	D0012	C5604	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0H1-06	7124-465-09	A2581	A9200	E1883	A5209			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0K6-02	7124-465-09	U1205	A5287	E1258	A6026			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0M1-03	7124-465-09	A5561	A8488	E0351	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0MU-03	7124-465-09	A5574	A9093	D0445	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0SR-03	7124-465-09	E8300	A1014	A9201	C4496			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0SS-05	7124-465-09	A0959	A7902	A4536	A7247			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0UD-06	7124-465-09	E8801	A1598	E2674	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0UN-02	7124-465-09	A0563	B3075	A8630	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C0XQ-04	7124-465-09	E4256	E3702	A2384	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C12B-02	7124-465-09	E8304	A3052	A9930	E3158	C7620		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C15H-02	7124-465-09	A0701	A3275	P0348	C3802			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C15V-02	7124-465-09	A7894	E6652	E4185	E0848	D9288		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C162-03	7124-465-09	A5504	P0097					8	A	2	84000	0,8	0,4	0,8	3,1
D50-C16B-03	7124-465-09	C9642						8	A	2	84000	0,8	0,4	0,8	3,1
D50-C16U-01	7124-465-09	A0092	B1154	E1396				8	A	2	84000	0,8	0,4	0,8	3,1
D50-C16V-01	7124-465-09	A0092	E6087	C0451	E1396			8	A	2	84000	0,8	0,4	0,8	3,1

D50-C16Y-01	7124-465-09	A0092	A4347	A9903	E1396			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C16Z-01	7124-465-09	A0092	A4347	D0974	E1396			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C18N-01	7124-465-09	E8987	A7384	E6885	E3896	D7333		8	A	2	84000	0,8	0,4	0,8	3,1
D50-C858-04	7124-465-09	A2523	A0254	A9928	E3019			8	A	2	84000	0,8	0,4	0,8	3,1
D50-C890-04	7124-465-09	E8303	B1815	A9904	D9669			8	A	3	84000	1,2	0,6	1,2	4,7
D50-C896-04	7124-465-09	B1815	E3628	E2374	E0372			8	A	2	84000	0,8	0,4	0,8	3,1
D50-D391-03	7124-465-09	A4536	A4348	A5481	A4280			8	A	2	84000	0,8	0,4	0,8	3,1
D50-D496-02	7124-465-09	U3945	U0109	A8483	E0886			8	A	2	84000	0,8	0,4	0,8	3,1
D50-D652-05	7124-465-09	P0116	T0217	T3013	P3415			8	A	3	84000	1,2	0,6	1,2	4,7
D50-D667-04	7124-465-09	P0116	T0217	T3013	P3415			8	A	2	84000	0,8	0,4	0,8	3,1
D50-D803-14	7124-465-09	D0287	A1354	P0097				8	A	4	84000	1,6	0,8	1,6	6,3
D53-C404-02	7124-465-09	A1427	A1446	A1354	P0097			8	A	2	84000	0,8	0,4	0,8	3,1
DJP-C19Q-01	7124-465-09	A0459	A3052	A8493	E0849			8	A	2	84000	0,8	0,4	0,8	3,1
DJP-C19R-01	7124-465-09	B1816	A8493	E0849				8	A	3	84000	1,2	0,6	1,2	4,7
DJP-C1A8-01	7124-465-09	P0185	E5494	E3476	E1340	E0503		8	A	4	84000	1,6	0,8	1,6	6,3
DJP-C1AQ-01	7124-465-09	B5791	A9201	P0097				8	A	2	84000	0,8	0,4	0,8	3,1
D50-E0TN-06	7429-465-09	P0014	B3084	P0083	A5266	C2611		8	A	3	90000	1,1	0,6	1,1	4,4
D50-E0UK-02	7429-465-09	P0014	B3084	P0083	A8489	E3468	P0097	8	A	4	90000	1,5	0,7	1,5	5,9
D50-E0UL-02	7429-465-09	P0014	B3084	P0083	B5506	E3468	P0097	8	A	3	90000	1,1	0,6	1,1	4,4
D50-E0VN-01	7429-465-09	P0014	B3084	P0083	A5259	E3468	P0097	8	A	3	90000	1,1	0,6	1,1	4,4
DJP-E0X0-01	7429-465-09	P0014	B3084	P0083	B1773	C2611		8	A	6	90000	2,2	1,1	2,2	8,8
DJP-E0X2-01	7429-465-09	P0014	B3084	P0083	C5950	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
DJP-E0X2-02	7429-465-09	P0014	B3084	P0083	C5950	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
DJP-E0X3-01	7429-465-09	P0014	B3084	P0083	A0456	A7090	P0097	8	A	3	90000	1,1	0,6	1,1	4,4

DJP-E0X4-01	7429-465-09	P0014	B3084	P0083	C6666	P0097		8	A	9	90000	3,3	1,7	3,3	13,2
D50-F066-07	7429-465-07	P0053	P0014	A8606	E3359	A1866	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-F06F-05	7429-465-07	P0083	P0053	P0014	C0432	E0817	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-F09A-04	7429-465-07	P0083	P0053	P0014	A8604	A1105	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-F09B-04	7429-465-07	P0083	P0053	P0014	A8604	A9603	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-F05S-07	7429-465-09	P0083	P0053	P0014	A2376	P0097		8	A	4	90000	1,5	0,7	1,5	5,9
D50-F05U-06	7429-465-09	P0083	P0053	P0014	A8972	D9783	P0097	8	A	3	90000	1,1	0,6	1,1	4,4
D50-F07F-03	7429-465-09	P0083	P0053	P0014	B2220	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F07G-02	7429-465-09	P0083	P0053	P0014	A3547	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F07H-05	7429-465-09	P0083	P0053	P0014	B4215	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F07J-02	7429-465-09	P0083	P0053	P0014	E3134	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F08H-06	7429-465-09	P0083	P0053	P0014	B1008	C5494	P0097	8	A	4	90000	1,5	0,7	1,5	5,9
D50-F09C-02	7429-465-09	P0083	P0053	P0014	A9055	E1232	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0B4-04	7429-465-09	P0083	P0053	P0014	B0040	E1832	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0B5-02	7429-465-09	P0083	P0053	P0014	B0040	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0BJ-02	7429-465-09	P0083	P0053	P0014	B9068	A3446		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0BK-02	7429-465-09	P0083	P0053	P0014	D0882	A3446		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0BL-03	7429-465-09	P0083	P0053	P0014	A4817	A3446		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0BM-02	7429-465-09	P0083	P0053	P0014	A9954	A3446		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0BP-02	7429-465-09	P0083	P0053	P0014	E2090	A3446		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0CB-02	7429-465-09	P0083	P0053	P0014	A9954	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0CC-02	7429-465-09	P0083	P0053	P0014	D9724	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0CE-03	7429-465-09	P0083	P0053	P0014	A9907	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0CF-03	7429-465-09	P0083	P0053	P0014	A4364	P0097		8	A	2	90000	0,7	0,4	0,7	2,9

D50-F0CL-02	7429-465-09	P0083	P0053	P0014	A9300	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0DD-01	7429-465-09	P0083	P0053	P0014	A9821	E1465	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0DN-01	7429-465-09	P0083	P0053	P0014	A9875	E1876	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0DP-02	7429-465-09	P0083	P0053	P0014	A2069	A5490	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0DQ-02	7429-465-09	P0083	P0053	P0014	E8307	E0734	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0E3-01	7429-465-09	P0083	P0053	P0014	P0097			8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0EC-02	7429-465-09	P0083	P0053	P0014	A9163	P0097		8	A	3	90000	1,1	0,6	1,1	4,4
D50-F0ED-02	7429-465-09	P0083	P0053	P0014	A1867	P0097		8	A	3	90000	1,1	0,6	1,1	4,4
D50-F0FF-02	7429-465-09	P0083	P0053	P0014	B7608	P0097		8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0GD-01	7429-465-09	P0083	P0053	P0014	B0040	B6498	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0GG-01	7429-465-09	P0083	P0053	P0014	B2247	A9419	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
DJP-C1AF-01	7124-465-09	A1566	P1787	C9047	C5550			8	A	7	84000	2,8	1,4	2,8	11,0
DJP-C1AG-01	7124-465-09	C0516	P1787	C9047	C5550			8	A	6	84000	2,4	1,2	2,4	9,4
DJP-C1AJ-01	7124-465-09	D2785	P1787	C9047	C5550			8	A	6	84000	2,4	1,2	2,4	9,4
DJP-C1AX-01	7124-465-09	C5569						8	A	2	84000	0,8	0,4	0,8	3,1
D50-F0E1-01	7482-465-09	P0083	P0053	P0014	A0572	B0039	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0DK-04	7429-465-09	P0083	P0053	P0014	B4152	B1008	P0097	8	A	5	90000	1,8	0,9	1,8	7,3
D50-F0DL-05	7429-465-09	P0083	P0053	P0014	A0822	A8322	P0097	8	A	4	90000	1,5	0,7	1,5	5,9
D50-F0DM-04	7429-465-09	P0083	P0053	P0014	A4747	E1232	P0097	8	A	3	90000	1,1	0,6	1,1	4,4
D50-F0E2-03	7429-465-09	P0083	P0053	P0014	A3056	P0097		8	A	5	90000	1,8	0,9	1,8	7,3
D50-F0E7-05	7429-465-09	P0083	P0053	P0014	A4639	D0534	P0097	8	A	7	90000	2,6	1,3	2,6	10,3
D50-F0E8-05	7429-465-09	P0083	P0053	P0014	E4382	D0534	P0097	8	A	2	90000	0,7	0,4	0,7	2,9
D50-F0E9-05	7429-465-09	P0083	P0053	P0014	A1039	C6581	P0097	8	A	6	90000	2,2	1,1	2,2	8,8
D50-F0EB-05	7429-465-09	P0083	P0053	P0014	A0137	A4216	P0097	8	A	5	90000	1,8	0,9	1,8	7,3

D50-U03B-04	6900-470-09	T0950	P0014	B3084	P0083	D6743	E1843	7	B2	2	78000	0,8	0,8	0,8	1,7
D50-U03E-02	6900-470-09	T0950	P0014	B3084	P0083	E4180	C5621	7	B2	11	78000	4,7	4,7	4,7	9,3
D50-U03F-02	6900-470-09	T0950	P0014	B3084	P0083	E4180	C5621	7	B2	22	78000	9,3	9,3	9,3	18,6
D50-U03M-01	6900-470-09	T0950	P0097					7	B2	2	78000	0,8	0,8	0,8	1,7
D50-U03Q-05	6900-470-09	T0950	A9903	A0660	A0671	A2673	A5226	7	B2	18	78000	7,6	7,6	7,6	15,2
D50-U044-02	6900-470-09	T0950	P0014	B3084	P0083	E4180	C5621	7	B2	2	78000	0,8	0,8	0,8	1,7
D50-U04A-02	6900-470-09	T0950	P0014	B3084	P0083	E4180	C5621	7	B2	8	78000	3,4	3,4	3,4	6,8
D50-U04B-03	6900-470-09	T0950	P0014	B3084	P0083	E4180	C5621	7	B2	10	78000	4,2	4,2	4,2	8,5
D50-U04R-05	6900-470-09	T0950	P0014	B3084	P0083	C8119	P0097	7	B2	7	78000	3,0	3,0	3,0	5,9
D50-U04S-05	6900-470-09	T0950	P0014	B3084	P0083	A5608	P0097	7	B2	11	78000	4,7	4,7	4,7	9,3
D50-U04Z-02	6900-470-09	T0950	P0014	B3084	P0083	E4180	C5621	7	B2	2	78000	0,8	0,8	0,8	1,7
D50-U056-06	6900-470-09	T0950	P0014	B3084	P0083	A6975	A9755	7	B2	12	78000	5,1	5,1	5,1	10,2
D50-U05L-04	6900-470-09	T0950	P0014	A8951	E1320	C3028	P0097	7	B2	8	78000	3,4	3,4	3,4	6,8
D50-U05S-03	6900-470-09	T0950	P0014	B3084	P0083	C5547	P0097	7	B2	16	78000	6,8	6,8	6,8	13,5
D50-U06E-01	6900-470-09	T0950	P0014	B3084	P0083	A1514	A2322	7	B2	2	78000	0,8	0,8	0,8	1,7
D50-U06N-01	6900-470-09	T0950	P0014	B3084	P0083	A4143	P0097	7	B2	12	78000	5,1	5,1	5,1	10,2
D50-U00G-03	7060-470-09	T0950	B3101	A9897	B1189	A9903	E4300	7	B2	9	78000	3,8	3,8	3,8	7,6
D50-U00T-07	7060-470-09	T0950	A1867	A3579	A7480	A9903	E1875	7	B2	13	78000	5,5	5,5	5,5	11,0
D50-U01H-05	7060-470-09	T0950	P0014	B3084	P0083	A9088	P0097	7	B2	16	78000	6,8	6,8	6,8	13,5
D50-U02B-01	7060-470-09	SN111	P0097					7	B2	2	78000	0,8	0,8	0,8	1,7
D50-U02Y-04	7060-470-09	T0950	A9903	E4264	C8503	D0920	C6053	7	B2	9	78000	3,8	3,8	3,8	7,6
D50-U02Z-10	7060-470-09	T0950	A3054	A9903	A3719	A8346	A8415	7	B2	30	78000	12,7	12,7	12,7	25,4
D50-U05P-02	7060-470-09	T0950	P0014	B3084	D1666	D0006	P0097	7	B2	3	78000	1,3	1,3	1,3	2,5
D50-U05Z-02	7060-470-09	T0950	E8556	A9868	D1175	C6035		7	B2	44	78000	18,6	18,6	18,6	37,2

D50-U06A-01	7060-470-09	T0950	E8327	B3084	P0083	A0264	A7220	7	B2	2	78000	0,8	0,8	0,8	1,7
D50-U06L-01	7060-470-09	T0950	E9165	A9903	A1429	E3122	E0875	7	B2	6	78000	2,5	2,5	2,5	5,1
D50-U06M-02	7060-470-09	T0950	P0014	B3084	P0083	B0261	P0097	7	B2	3	78000	1,3	1,3	1,3	2,5
D50-A01E-06	6050-477-09	A7857	C5058					7	B2	9	105000	2,8	2,8	2,8	5,7
D50-A01F-05	6050-477-09	A8608	C9642	E3140				7	B2	4	105000	1,3	1,3	1,3	2,5
D50-C0KP-01	7429-560-09	P0097						7	A	2	75000	0,9	0,4	0,9	3,5
D50-E0JR-03	7429-560-09	A0836	A0659	A9857	A1710	A8431	C5450	7	A	6	75000	2,6	1,3	2,6	10,6
D50-E0MF-01	7429-560-09	P0014	B3084	P0083	E4181	C3791	P0097	7	A	2	75000	0,9	0,4	0,9	3,5
D50-E0QE-01	7429-560-09	P0014	B3084	P0083	E8284	C3791	P0097	7	A	4	75000	1,8	0,9	1,8	7,0
D50-E527-13	7429-560-09	P0014	B3084	P0083	A4793	P0097		7	A	3	75000	1,3	0,7	1,3	5,3
D50-E588-03	7429-560-09	P0014	B3084	P0083	E4181	C3791	P0097	7	A	2	75000	0,9	0,4	0,9	3,5
D50-E693-03	7429-560-09	P0014	B1832	P0083	B0262	D9259	P0097	7	A	2	75000	0,9	0,4	0,9	3,5
D50-E694-03	7429-560-09	P0014	B1832	P0083	B0299	D9259		7	A	2	75000	0,9	0,4	0,9	3,5
D50-E960-01	7429-560-09	P0014	B3084	P0083	A8949	P0097		7	A	2	75000	0,9	0,4	0,9	3,5
D50-EE43-05	7429-560-09	P0014	B3084	P0083	E4181	C3791	P0097	7	A	2	75000	0,9	0,4	0,9	3,5
D50-C02A-05	7124-560-09	E6092	E4256	E2374	E0469			7	A	4	75000	1,8	0,9	1,8	7,0
D50-C17P-03	7124-560-09	A3032	D1737	C8639	A5209	C7175		7	A	9	75000	4,0	2,0	4,0	15,8
D50-C17Q-03	7124-560-09	A0568	A1977	E5275	A5942	D0913		7	A	24	75000	10,6	5,3	10,6	42,2
D50-C17R-03	7124-560-09	A3032	D1737	C8639	A5209	C7175		7	A	15	75000	6,6	3,3	6,6	26,4
D50-C17S-03	7124-560-09	A0568	A1977	E5275	A5942	D0913		7	A	6	75000	2,6	1,3	2,6	10,6
DJP-C19U-01	7124-560-09	E8892	E4583	D0913	A8608	E0235		7	A	6	75000	2,6	1,3	2,6	10,6
D50-E0VY-01	6933-560-09	T0950	P0014	B3084	P0083	C5547	P0097	7	B2	13	70000	6,1	6,1	6,1	12,3
D50-D842-03	7028-560-09	A0646	A8962	D0913	C6668			7	A	14	80000	5,8	2,9	5,8	23,1
DJP-C1AY-01	7028-560-09	C5569						7	A	2	80000	0,8	0,4	0,8	3,3

D50-C05Y-03	7028-560-09	B2347	B4267	P0186	D9740			7	A	2	80000	0,8	0,4	0,8	3,3
D50-C05Z-03	7028-560-09	E8300	A1014	E5161	D9705			7	A	2	80000	0,8	0,4	0,8	3,3
D50-C064-02	7028-560-09	A1993	A4113	A5926	A5167			7	A	2	80000	0,8	0,4	0,8	3,3
D50-C067-02	7028-560-09	D0909	D0445	A9904	C7173			7	A	2	80000	0,8	0,4	0,8	3,3
D50-C06H-02	7028-560-09	A9822	D1158	C7527	P0097			7	A	3	80000	1,2	0,6	1,2	5,0
D50-C0CS-03	7028-560-09	E8314	P0185	A1512	A5176			7	A	2	80000	0,8	0,4	0,8	3,3
D50-C0H4-02	7028-560-09	E8314	P0186	A0667	A5165			7	A	7	80000	2,9	1,4	2,9	11,6
D50-C0KB-02	7028-560-09	P1788	T4416	T5967	E1199	P0653		7	A	2	80000	0,8	0,4	0,8	3,3
D50-C0P9-03	7028-560-09	B4229	A9954	E1883	P0097			7	A	2	80000	0,8	0,4	0,8	3,3
D50-C0PA-01	7028-560-09	A2086	B0493	A8395	P0097			7	A	5	80000	2,1	1,0	2,1	8,3
D50-C0VQ-01	7028-560-09	A1993	A4113	A5926	A5167			7	A	3	80000	1,2	0,6	1,2	5,0
D50-C0XA-02	7028-560-09	A2517	A6515	A8577	E1863	D1959		7	A	3	80000	1,2	0,6	1,2	5,0
D50-C163-01	7028-560-09	A1032	P0185	E3186	D9688			7	A	2	80000	0,8	0,4	0,8	3,3
D50-C614-05	7028-560-09	A3109	P0370	P0175	P0097			7	A	9	80000	3,7	1,9	3,7	14,9
D50-C615-04	7028-560-09	B3101	A8955	B2011	E2124	D1959		7	A	7	80000	2,9	1,4	2,9	11,6
D50-D495-03	7028-560-09	A7987	D0214	D0913	C7680	E1287		7	A	3	80000	1,2	0,6	1,2	5,0
D50-D560-02	7028-560-09	B4229	P0192	P0348	A0254	P0097		7	A	2	80000	0,8	0,4	0,8	3,3
D50-E0G4-03	7482-560-09	A9857	B3497	B1008	B1222	E3114	D9840	7	A	3	90000	1,1	0,6	1,1	4,4
D50-E0G5-04	7482-560-09	A0835	A3484	A6195	A9857	E0837		7	A	2	90000	0,7	0,4	0,7	2,9
D50-E0G6-04	7482-560-09	A9857	E4223	D0220	D0231	C5098		7	A	2	90000	0,7	0,4	0,7	2,9
D50-E721-01	7482-560-09	P0014	P0053	P0083	A2507	A5234		7	A	3	90000	1,1	0,6	1,1	4,4
D50-C065-03	7124-560-09	A3040	A3700	E0425	A5178			7	A	2	75000	0,9	0,4	0,9	3,5
D50-C0HA-02	7124-560-09	P0097						7	A	2	75000	0,9	0,4	0,9	3,5
D50-C0J1-04	7124-560-09	A0145	B1341	D9845	P0097			7	A	2	75000	0,9	0,4	0,9	3,5

D50-C0PB-02	7124-560-09	D2785	C8149	P0097				7	A	2	75000	0,9	0,4	0,9	3,5
D50-C0U1-05	7124-560-09	A0101	A2800	A9904	D5440			7	A	2	75000	0,9	0,4	0,9	3,5
D50-C11A-01	7124-560-09	T4394						7	A	2	75000	0,9	0,4	0,9	3,5
D50-C495-05	7124-560-09	A0680	C4573					7	A	2	75000	0,9	0,4	0,9	3,5
D50-C531-05	7124-560-09	A0459	A2157	D0015	P0097			7	A	2	75000	0,9	0,4	0,9	3,5
D50-C556-06	7124-560-09	E6839	A0483	A0191	E3656	E0784		7	A	2	75000	0,9	0,4	0,9	3,5
D50-E04E-06	7429-560-09	P0014	B3084	P0083	E9052	A9687	P0097	7	A	6	75000	2,6	1,3	2,6	10,6
D50-E0BF-07	7429-560-09	P0014	B3084	P0083	E2527	B5579	P0097	7	A	8	75000	3,5	1,8	3,5	14,1
D50-E0P2-04	7429-560-09	P0014	B3084	P0083	A5491	P0097		7	A	5	75000	2,2	1,1	2,2	8,8
D50-E0UF-02	7429-560-09	P0014	B3084	P0083	E3219	E2649	P0097	7	A	2	75000	0,9	0,4	0,9	3,5
D50-E0UG-02	7429-560-09	P0014	B3084	P0083	A0091	A3027	P0097	7	A	2	75000	0,9	0,4	0,9	3,5
D50-E378-07	7429-560-09	P0014	B3084	P0083	A8489	E3468	P0097	7	A	12	75000	5,3	2,6	5,3	21,1
D50-E506-17	7429-560-09	P0014	B3084	P0083	A5798	B4085		7	A	8	75000	3,5	1,8	3,5	14,1
D50-E803-06	7429-560-09	P0014	B3084	P0083	D1171	C2611		7	A	25	75000	11,0	5,5	11,0	44,0
D50-F09M-02	7429-560-09	P0083	P0053	P0014	E1232	P0097		7	A	2	75000	0,9	0,4	0,9	3,5
D50-F09Q-02	7429-560-09	P0083	P0053	P0014	E1201	P0097		7	A	2	75000	0,9	0,4	0,9	3,5
D50-F09S-02	7429-560-09	P0083	P0053	P0014	A9264	P0097		7	A	2	75000	0,9	0,4	0,9	3,5
DJP-C1AZ-01	7430-560-09	C5569						7	A	2	75000	0,9	0,4	0,9	3,5
D50-F08N-01	7482-560-09	P0083	P0053	P0014	E7822	E0518	P0097	7	A	2	90000	0,7	0,4	0,7	2,9
D50-F08Q-01	7482-560-09	P0083	P0053	P0014	E7822	B0039	P0097	7	A	2	90000	0,7	0,4	0,7	2,9
D50-F08R-01	7482-560-09	P0083	P0053	P0014	E7822	A5397	P0097	7	A	2	90000	0,7	0,4	0,7	2,9
D50-F0EJ-01	7482-560-09	P0083	P0053	P0014	A0982	A9823	P0097	7	A	2	90000	0,7	0,4	0,7	2,9
D50-F08S-06	7429-560-09	P0083	P0053	P0014	E8794	A8322	P0097	7	A	9	75000	4,0	2,0	4,0	15,8
D50-F08T-05	7429-560-09	P0083	P0053	P0014	A0563	E2090	P0097	7	A	7	75000	3,1	1,5	3,1	12,3

D50-F08T-06	7429-560-09	P0083	P0053	P0014	A0563	E2090	P0097	7	A	2	75000	0,9	0,4	0,9	3,5
D50-F08U-06	7429-560-09	P0083	P0053	P0014	B4180	A9875	P0097	7	A	2	75000	0,9	0,4	0,9	3,5
D50-F08V-07	7429-560-09	P0083	P0053	P0014	B4180	A9875	P0097	7	A	13	75000	5,7	2,9	5,7	22,9
D50-U133-04	6900-561-24	T0950	E8795	B1855	D3159	E3145	C2478	7	B2	8	69000	3,8	3,8	3,8	7,7
D50-C0JC-02	7429-565-09	P0097						7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E025-03	7429-565-09	P0014	B3084	P0083	D6759	E2525	P0097	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E063-04	7429-565-09	P0014	B3084	P0083	E0896	P0097		7	B2	3	84000	1,2	1,2	1,2	2,4
D50-E07D-04	7429-565-09	E8903	E9185	B5484	T0960	P0097		7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0B6-05	7429-565-09	E8002	E3582	E8902	B0361	E1853	C4425	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0B9-05	7429-565-09	P0014	B3084	P0083	E3140	D9272	P0097	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0B9-06	7429-565-09	P0014	B3084	P0083	E4352	E0476	P0097	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0CN-03	7429-565-09	A0570	A0482	B5484	B5484	P0097		7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0CN-04	7429-565-09	A0571	A0146	B5483	B5484	C5075	P0097	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0EY-05	7429-565-09	A0567	A0141	B1082	E5590	E0310	E0471	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0EZ-04	7429-565-09	P0014	B3084	P0083	D9968	E0768	D7308	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0FC-06	7429-565-09	B2234	B0293	A0085	B0330	B0055	C4425	7	B2	3	84000	1,2	1,2	1,2	2,4
D50-E0FQ-02	7429-565-09	A0153	A0613	A3483	A9977	A8886	A7292	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0L6-04	7429-565-09	P0014	B3084	P0083	C7526	D9256	P0097	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0L8-04	7429-565-09	P0014	B3084	P0083	E4582	E2181	P0097	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0LN-02	7429-565-09	P0014	B3084	P0083	A2986	D9272	P0097	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0LN-03	7429-565-09	P0014	B3084	P0083	A3498	E0476	P0097	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0TX-01	7429-565-09	P0014	E0126	E1865	D6116	A8463	E1542	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0U1-01	7429-565-09	E8793	A2502	P0014	B3084	P0083	C4425	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0V7-01	7429-565-09	P0014	B3084	P0083	E3202	C4425		7	B2	2	84000	0,8	0,8	0,8	1,6

D50-E0VP-01	7429-565-09	P0014	B3084	P0083	A8102	D9256	P0097	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E131-05	7429-565-09	P0014	B3084	P0083	A0849	D9256	P0097	7	B2	4	84000	1,6	1,6	1,6	3,1
D50-E192-03	7429-565-09	P0014	P0053	P0083	A7259	P0097		7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E288-02	7429-565-09	P0014	P0053	P0083	B0464	P0097		7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E298-02	7429-565-09	P0014	B0464	P0083	A0934	P0097		7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E339-05	7429-565-09	P0014	B3084	P0083	A1025	A8743	P0097	7	B2	3	84000	1,2	1,2	1,2	2,4
D50-E342-05	7429-565-09	P0014	B3084	P0083	A3044	E8904	P0097	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E347-05	7429-565-09	P0014	A1065	C6629	P0097			7	B2	3	84000	1,2	1,2	1,2	2,4
D50-E418-06	7429-565-09	P0014	B3084	P0083	A0590	D9256	P0097	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E894-07	7429-565-09	P0014	B3084	P0083	A8959	D9256	P0097	7	B2	12	84000	4,7	4,7	4,7	9,4
D50-E895-05	7429-565-09	P0014	B3084	P0083	A8045	D9256	P0097	7	B2	7	84000	2,8	2,8	2,8	5,5
D50-E896-05	7429-565-09	P0014	B3084	P0083	E4716	D9256	P0097	7	B2	5	84000	2,0	2,0	2,0	3,9
D50-E897-05	7429-565-09	P0014	B3084	P0083	B4271	D9256	P0097	7	B2	5	84000	2,0	2,0	2,0	3,9
D50-E898-05	7429-565-09	P0014	B3084	P0083	C1039	D9256	P0097	7	B2	3	84000	1,2	1,2	1,2	2,4
D50-EE06-06	7429-565-09	D1100	D0290	A8684	P0097			7	B2	2	84000	0,8	0,8	0,8	1,6
DJP-E0XJ-01	7429-565-09	P0014	B3084	P0083	D0883	D9256	P0097	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E07S-08	7429-565-09	P0014	A9828	E6062	D9602	D8226	P0097	7	B2	5	84000	2,0	2,0	2,0	3,9
D50-E09A-06	7429-565-09	P0014	B3084	P0083	E6245	D9780	D9254	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0ST-03	7429-565-09	P0014	B3084	P0083	A8580	A8914	P0097	7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E578-09	7429-565-09	P0014	B3084	P0083	E5149	D9381		7	B2	32	84000	12,6	12,6	12,6	25,1
D50-E985-04	7429-565-09	P0014	P0053	P0083	C3790	P0097		7	B2	2	84000	0,8	0,8	0,8	1,6
D50-C0U9-04	7124-565-09	A0135	A0195	A9999	A8395			7	B2	2	84000	0,8	0,8	0,8	1,6
D50-E0LE-04	6933-565-09	T0950	E8327	B3084	P0083	E0095	E1342	7	B2	6	75000	2,6	2,6	2,6	5,3
D50-E775-04	6933-565-09	T0950	A1028	A2658	B0163	P0097		7	B2	2	75000	0,9	0,9	0,9	1,8

DJP-E0X1-01	6933-565-09	T0950	P0014	B3084	P0083	E8328	D9256	7	B2	3	75000	1,3	1,3	1,3	2,6
D50-C0ZM-07	7124-565-09	E8300	A4364	E5215	E3127	P0097		7	B2	4	84000	1,6	1,6	1,6	3,1
D50-C19E-01	7124-565-09	A0987	A9903	C3804	E0503	P0097		7	B2	2	84000	0,8	0,8	0,8	1,6
D50-C477-03	7124-565-09	A1001	A0689	A1272	A8683	A6035		7	B2	8	84000	3,1	3,1	3,1	6,3
D50-D896-05	7124-565-09	A0614	B0606	A6043	P0097			7	B2	3	84000	1,2	1,2	1,2	2,4
DJP-C1B9-01	7124-565-09	A0598	E3506	E2847	D7333			7	B2	3	84000	1,2	1,2	1,2	2,4
D50-F0EL-01	7429-565-09	P0083	P0053	P0014	C5494	D1955		7	B2	3	84000	1,2	1,2	1,2	2,4
D50-F0GA-01	7429-565-09	P0083	P0053	P0014	A9010	P0097		7	B2	2	84000	0,8	0,8	0,8	1,6
D50-F0GB-01	7429-565-09	P0083	P0053	P0014	C0495	P0097		7	B2	2	84000	0,8	0,8	0,8	1,6
D50-F0GC-01	7429-565-09	P0083	P0053	P0014	A1567	P0097		7	B2	2	84000	0,8	0,8	0,8	1,6
D50-V054-07	4544-567-14	P0014	A9096	D0258	C9644	C3791		7	B1	57	75000	25,1	25,1	25,1	50,2
D50-V066-06	4544-567-14	P0014	B3084	P0083	C3721	C3244		7	B1	22	75000	9,7	9,7	9,7	19,4
D50-C303-02	7124-582-07	A8946	E4185	E0425				6	B1	2	75000	0,9	0,9	0,9	1,8
D50-C13N-02	7124-582-07	D0246	E0651	A8657	P0097			6	B1	5	75000	2,2	2,2	2,2	4,4
D50-C295-02	7124-582-07	A8579	E3680	C9642	D9831			6	B1	4	75000	1,8	1,8	1,8	3,5
D50-D902-05	7124-582-07	D0246	E0651	A8657	P0097			6	B1	11	75000	4,8	4,8	4,8	9,7
D50-C06U-02	7124-630-09	A2971	P0123	T2180	T6175			6	B1	10	52000	6,3	6,3	6,3	12,7
D50-C0K0-03	7124-630-09	E5251	A9165	B7645	A5178			6	B1	3	52000	1,9	1,9	1,9	3,8
D50-C0K2-03	7124-630-09	B4752	A9165	E5251	A5178			6	B1	2	52000	1,3	1,3	1,3	2,5
D50-C0TS-04	7124-630-09	C8480	B5424	E4197	A9201	B0206		6	B1	2	52000	1,3	1,3	1,3	2,5
D50-C0YP-02	7124-630-09	A0578	A1850	E3680	A5178			6	B1	3	52000	1,9	1,9	1,9	3,8
D50-C0ZQ-03	7124-630-09	E6860	E4719	A8632	P0097			6	B1	2	52000	1,3	1,3	1,3	2,5
D50-C15S-02	7124-630-09	A3599	A5404	A9359	A9688			6	B1	13	52000	8,3	8,3	8,3	16,5
D50-D397-03	7124-630-09	E3660	E3753	A8629	A2320			6	B1	2	52000	1,3	1,3	1,3	2,5

D50-D777-03	7124-630-09	A1635	A7959	T6921	P0097			6	B1	11	52000	7,0	7,0	7,0	14,0
D50-D791-04	7124-630-09	E8784	A0621	E1344	B0606			6	B1	2	52000	1,3	1,3	1,3	2,5
DJP-C1A5-01	7124-630-09	A3929	E8791	A9878	E0848	D0156		6	B1	9	52000	5,7	5,7	5,7	11,4
D50-C0J7-02	6832-810-01	P0097						4	A	2	21000	3,1	1,6	3,1	12,6
D50-C17D-01	6832-810-01	A1585	A4317	E3704	D7053	P0097		4	A	2	21000	3,1	1,6	3,1	12,6
D50-C17U-01	6832-810-01	A4738	A9821	A8961	E1790	P0097		4	A	0	21000	0,0	0,0	0,0	0,0
D50-C19H-01	6832-810-01	B4220	D1178	C2031	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
DJP-C1AR-01	6832-810-01	E8887	A0459	E4281	E1878	P0097		4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0BK-04	6832-810-07	A3082	B1220	A7248	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0J7-01	6832-810-07	P0097						4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0LZ-02	6832-810-07	A0957	E2124	A5955	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0ST-01	6832-810-07	E8995	A5053	A3381	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0SU-02	6832-810-07	P0134	A4515	B0017	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C12X-02	6832-810-07	D7535	D0246	C3137				4	A	2	21000	3,1	1,6	3,1	12,6
D50-C12Z-02	6832-810-07	D7535	D0246	C3137				4	A	2	21000	3,1	1,6	3,1	12,6
D50-C351-03	6832-810-07	D2165	C4981	C9298	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C517-03	6832-810-07	A1973	A8407	P0097				4	A	2	21000	3,1	1,6	3,1	12,6
D50-C753-03	6832-810-07	A2827	D0500	C7678	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C821-04	6832-810-07	A1023	A0203	B0035	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C887-04	6832-810-07	P0353	T6924	T4398	T6929			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C898-02	6832-810-07	E8303	B1815	A9904	D9669			4	A	2	21000	3,1	1,6	3,1	12,6
D50-D079-04	6832-810-07	T6923	T6929	P0097				4	A	2	21000	3,1	1,6	3,1	12,6
D50-D092-06	6832-810-07	P0368	A5198	P0097				4	A	2	21000	3,1	1,6	3,1	12,6
D50-D802-01	6832-810-07	A2066	P0199	C3756	P0097			4	A	2	21000	3,1	1,6	3,1	12,6

D50-D837-02	6832-810-07	U7508	A1129	A5156	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-D887-04	6832-810-07	A1585	D0246	C3137				4	A	2	21000	3,1	1,6	3,1	12,6
D50-D949-04	6832-810-07	P1345	A3659	A8044	A5491			4	A	2	21000	3,1	1,6	3,1	12,6
D50-D974-04	6832-810-07	C9642	P0097					4	A	2	21000	3,1	1,6	3,1	12,6
D50-D975-04	6832-810-07	A5504	P0097					4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0RM-05	6832-810-32	A1581	A3925	E3469	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0RN-05	6832-810-32	A5431	A9295	E3469	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0X8-01	6832-810-32	A9165	E0209					4	A	2	21000	3,1	1,6	3,1	12,6
D50-C216-10	6832-810-32	E4298	A7755	C9685	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C826-04	6832-810-32	A6516	E1315					4	A	2	21000	3,1	1,6	3,1	12,6
D50-D425-06	6832-810-32	E6282	A7925	E1195	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C05C-01	6832-810-38	P0012	E0767	A8488	E1396			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C07T-02	6832-810-38	P0151	T4342	T0409	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0B2-03	6832-810-38	A0465	E5260	A0293	C3879			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0JA-01	6832-810-38	P0097						4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0JF-05	6832-810-38	E4193	E3231	A8961	E0504			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0NX-03	6832-810-38	U3945	A8953	D6933	E0496			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0RM-06	6832-810-38	A1581	A3925	E3469	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0RN-06	6832-810-38	A5431	A9295	E3469	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0Z0-01	6832-810-38	A1973	B0552	P0097				4	A	2	21000	3,1	1,6	3,1	12,6
D50-C13X-03	6832-810-38	U3945	A8953	D6933	E0496			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C17A-01	6832-810-38	E6318	E4613	E2778	A9233	E1627		4	A	2	21000	3,1	1,6	3,1	12,6
D50-C211-07	6832-810-38	A0578	A8953	B0368	E1287			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C283-03	6832-810-38	P0116	P0137	P0356	P0097			4	A	2	21000	3,1	1,6	3,1	12,6

D50-C515-03	6832-810-38	P0121	P0137	T0409	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C582-05	6832-810-38	A1001	A0689	A1272	A8683	A6035		4	A	2	21000	3,1	1,6	3,1	12,6
D50-C672-02	6832-810-38	P0120	T0101	P1605	P3435			4	A	2	21000	3,1	1,6	3,1	12,6
D50-D038-05	6832-810-38	A0578	A5314	A8953	E1287			4	A	2	21000	3,1	1,6	3,1	12,6
D50-D311-03	6832-810-38	A0563	A8960	E2124	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-D548-03	6832-810-38	A7927	E0861					4	A	2	21000	3,1	1,6	3,1	12,6
D50-D660-04	6832-810-38	B0367	D5645	C6064	P0097			4	A	2	21000	3,1	1,6	3,1	12,6
D50-D883-02	6832-810-38	A0578	A8953	E1287	E0440			4	A	2	21000	3,1	1,6	3,1	12,6
D50-D951-03	6832-810-38	A0153	A2538	A8760	A1348			4	A	2	21000	3,1	1,6	3,1	12,6
D50-E0RV-02	6918-810-38	P0014	B3084	P0083	C6079	D9256	P0097	4	B2	2	21000	3,1	3,1	3,1	6,3
D50-E259-03	6918-810-38	P0014	P0053	P0083	A9049	D9259		4	B2	2	21000	3,1	3,1	3,1	6,3
D50-E628-03	6918-810-38	P0014	B1832	P0083	A5564	D9259		4	B2	2	21000	3,1	3,1	3,1	6,3
D50-E741-02	6918-810-38	P0014	P0053	P0083	A0563	D9259		4	B2	2	21000	3,1	3,1	3,1	6,3
DJP-E0XH-01	6918-810-38	P0014	B3084	P0083	E4717	D9256	P0097	4	B2	2	21000	3,1	3,1	3,1	6,3
D50-C06J-05	7029-810-07	A9822	D1158	C7527	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C071-03	7029-810-07	A0456	A8406	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C07Z-04	7029-810-07	A0939	A1439	A9232	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C082-03	7029-810-07	A2962	A8605	E4779	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C083-03	7029-810-07	U7423	A8605	C1616	P0097			4	A	3	28000	3,5	1,8	3,5	14,1
D50-C0AM-01	7029-810-07	P0097						4	A	7	28000	8,3	4,1	8,3	33,0
D50-C0B0-01	7029-810-07	D2016	U2747					4	A	2	28000	2,4	1,2	2,4	9,4
D50-C0BE-02	7029-810-07	A1973	A3924	P0532	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C0DE-01	7029-810-07	A1850	A5188	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C0GX-03	7029-810-07	A1980	A1476	A3306	P0097			4	A	2	28000	2,4	1,2	2,4	9,4

D50-C0HB-01	7029-810-07	A1575	A4128	T6175	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C0HS-03	7029-810-07	A1728	A8416	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C0K8-02	7029-810-07	P2985	T4399	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C0KN-01	7029-810-07	P0097						4	A	3	28000	3,5	1,8	3,5	14,1
D50-C0PJ-02	7029-810-07	A1973	A1609	A9090	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C0U4-02	7029-810-07	P7401	B1797	D9689	A5214			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C0VX-01	7029-810-07	A0965	C8163	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C109-02	7029-810-07	A7442	A5467	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C10T-01	7029-810-07	E0647	E0748	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C135-01	7029-810-07	A2114	C7493	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C13Y-04	7029-810-07	A8605	D7804	C5389	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C153-02	7029-810-07	A0613	P0097					4	A	3	28000	3,5	1,8	3,5	14,1
D50-C156-02	7029-810-07	A1973	B1847	E3624	A5276			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C164-05	7029-810-07	A0938	A8607	A5276				4	A	4	28000	4,7	2,4	4,7	18,9
D50-C16P-01	7029-810-07	A8605	D0852	D6904	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C173-03	7029-810-07	A8607	A3694	A5276				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C188-01	7029-810-07	A0562	C9977	U0662	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C18C-01	7029-810-07	B7138	C5550					4	A	2	28000	2,4	1,2	2,4	9,4
D50-C18D-01	7029-810-07	B6841	B7139	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C18G-01	7029-810-07	A0562	E1088	U0662				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C18H-01	7029-810-07	D0926	C5550	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C18L-01	7029-810-07	A0562	D0926	C5550				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C18M-01	7029-810-07	C8696						4	A	2	28000	2,4	1,2	2,4	9,4
D50-C190-03	7029-810-07	A2366	A4363	A7960	P0097			4	A	2	28000	2,4	1,2	2,4	9,4

D50-C19D-01	7029-810-07	E6932	E0277	E0500				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C222-05	7029-810-07	A8630	C4374	C5552	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C227-02	7029-810-07	D4263	C7172	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C296-01	7029-810-07	A4515	A4993	A5164	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C382-03	7029-810-07	A1973	D3967	E0670	C5550			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C407-02	7029-810-07	D4210	D1287	C7678	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C408-02	7029-810-07	D9575	T4408	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C534-02	7029-810-07	A1573	E0833	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-C539-03	7029-810-07	A0092	D8857	C6064	P0097			4	A	3	28000	3,5	1,8	3,5	14,1
D50-C602-02	7029-810-07	A4553	P0097					4	A	2	28000	2,4	1,2	2,4	9,4
D50-C851-03	7029-810-07	A8580	C8600	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-CC12-02	7029-810-07	C8696						4	A	2	28000	2,4	1,2	2,4	9,4
D50-D181-02	7029-810-07	A9849	E4593	E0874	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-D264-02	7029-810-07	P1787	P0354	T4411	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-D276-02	7029-810-07	T5967	P0031	T4399				4	A	5	28000	5,9	2,9	5,9	23,6
D50-D319-02	7029-810-07	P0097						4	A	2	28000	2,4	1,2	2,4	9,4
D50-D378-03	7029-810-07	P0116	P1585	T5142	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-D452-02	7029-810-07	P0468	P0697	P5825	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-D619-02	7029-810-07	T0653	P0202	T6149	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-D651-02	7029-810-07	D1228	C5070	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-D713-01	7029-810-07	E8314	D1192	U2747	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-D716-02	7029-810-07	E8304	A5105	P0097				4	A	2	28000	2,4	1,2	2,4	9,4
D50-D728-03	7029-810-07	A1086	A8605	B4980	P0097			4	A	5	28000	5,9	2,9	5,9	23,6
D50-D775-01	7029-810-07	P2985	P0368	T4394				4	A	6	28000	7,1	3,5	7,1	28,3

D50-D893-02	7029-810-07	D5139	C9754	P0097				4	A	4	28000	4,7	2,4	4,7	18,9
D50-D952-04	7029-810-07	D7896	A8605	D5440	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-C0Y2-04	6832-810-07	A3967	P1787	C5550	C9047			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0ZK-05	6832-810-07	D2785	P1787	C9047	C5550			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0ZL-06	6832-810-07	C0516	P1787	C9047	C5550			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C101-05	6832-810-07	A1566	P1787	C9047	C5550			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C102-05	6832-810-07	E3628	P1787	C9047	C5550			4	A	2	21000	3,1	1,6	3,1	12,6
D50-C108-04	6832-810-07	P1787	C9047	C5550				4	A	2	21000	3,1	1,6	3,1	12,6
D50-C0AG-02	7029-810-07	E8378	A3601	A5376	P0097			4	A	2	28000	2,4	1,2	2,4	9,4
D50-F0GE-01	7429-810-07	P0083	P0053	P0014	E3491	A0006	P0097	4	B2	2	21000	3,1	3,1	3,1	6,3
D50-C18U-01	6832-813-07	A0836	A9903	D9795	P0097			5	A	4	25600	5,2	2,6	5,2	20,6
D50-C18V-01	6832-813-07	A0836	A2827	D9795	P0097			5	A	7	25600	9,0	4,5	9,0	36,1
D50-C0SX-04	6832-813-28	A0293	A4317	E1839	U0662			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0XK-03	6832-813-28	A8477	P0097					5	A	2	25600	2,6	1,3	2,6	10,3
D50-C12D-03	6832-813-28	A0972	A4380	U0361	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C12F-03	6832-813-28	P1385	B0654	E1829	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-CC03-03	6832-813-28	A4396	E1368	P0097				5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0VG-02	6832-813-48	A4655	A7895	B0367	U0356			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0VJ-02	6832-813-48	A0452	E6819	C7212	U0356			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0YZ-02	6832-813-48	E8308	A8488	A7087	A5994			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C002-03	6832-813-51	A8631	A0703	E3258	C6064			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C068-02	6832-813-51	P0097						5	A	2	25600	2,6	1,3	2,6	10,3
D50-C08G-01	6832-813-51	A2517	A7895	E2124	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C09L-06	6832-813-51	A0458	A2962	A9198	A5129			5	A	2	25600	2,6	1,3	2,6	10,3

D50-C0BC-03	6832-813-51	A5593	A6697	C8696	A7690			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0CH-02	6832-813-51	E8931	B3632	B3664	E3702	A7233		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0QS-02	6832-813-51	A0062	B1220	P0097				5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0QT-02	6832-813-51	E8404	A1081	A9128	A8415			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0S7-03	6832-813-51	A7452	A9876	B0524	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0XH-01	6832-813-51	A8633	P0097					5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0XZ-01	6832-813-51	A0973	A0254	A5364	E1627			5	A	3	25600	3,9	1,9	3,9	15,5
D50-C0YE-01	6832-813-51	A8633	C8696	D9250				5	A	2	25600	2,6	1,3	2,6	10,3
D50-C15B-01	6832-813-51	A8953	P0097					5	A	2	25600	2,6	1,3	2,6	10,3
D50-C16S-01	6832-813-51	A0092	A4347	A9903	E1396			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C16T-01	6832-813-51	A0092	A4347	D0974	E1396			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C18Q-01	6832-813-51	E8337	A9880	A8406	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C18R-01	6832-813-51	E8337	A9880	B3183	A8406	P0097		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C18S-02	6832-813-51	E8317	P0097					5	A	3	25600	3,9	1,9	3,9	15,5
D50-C18T-02	6832-813-51	E8317	E0125	P0097				5	A	2	25600	2,6	1,3	2,6	10,3
D50-C18Y-01	6832-813-51	E8987	A7384	E6885	E3896	D7333		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C192-01	6832-813-51	A0833	A7384	A1485	A0737	A5178		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C19G-01	6832-813-51	P0097						5	A	2	25600	2,6	1,3	2,6	10,3
D50-C213-04	6832-813-51	A0836	A6144	B3265	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C234-03	6832-813-51	A0577	A6192	A8631	E2137	P0097		5	A	2	25600	2,6	1,3	2,6	10,3
D50-D088-03	6832-813-51	A1610	E6318	A6748	A4254			5	A	2	25600	2,6	1,3	2,6	10,3
D50-D754-04	6832-813-51	A0952	A4348	A5538	E0848			5	A	2	25600	2,6	1,3	2,6	10,3
D50-D770-06	6832-813-51	A2539	A0254	P0200	E3019			5	A	2	25600	2,6	1,3	2,6	10,3
D50-D828-04	6832-813-51	A2499	A4347	E3140	D9319			5	A	2	25600	2,6	1,3	2,6	10,3

D50-C00O-02	6832-813-53	A0974	E3814	B2369	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C00P-01	6832-813-53	B2369	E3259	P0097				5	A	2	25600	2,6	1,3	2,6	10,3
D50-C00R-02	6832-813-53	A0974	E3814	P0097				5	A	2	25600	2,6	1,3	2,6	10,3
D50-C00S-02	6832-813-53	E3814	A7784	P0097				5	A	2	25600	2,6	1,3	2,6	10,3
D50-C00T-01	6832-813-53	A9128	P0097					5	A	2	25600	2,6	1,3	2,6	10,3
D50-C00U-01	6832-813-53	A1581	E3814	P0097				5	A	2	25600	2,6	1,3	2,6	10,3
D50-C00V-02	6832-813-53	A5584	B0334	D5428	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C019-02	6832-813-53	A0563	A5561	E3263	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C01A-02	6832-813-53	A5584	A8483	E3263	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C01B-01	6832-813-53	A0107	A9092	E0863	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C01C-02	6832-813-53	A3925	A8679	E0862	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C03J-01	6832-813-53	A0563	A8603	E4715	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0F7-02	6832-813-53	A2010	E4734	E1368	A8424			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0FT-02	6832-813-53	A0107	A2858	A0864	U1545			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0KT-04	6832-813-53	P0097						5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0RG-03	6832-813-53	A4380	E1368	E8490	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0RK-02	6832-813-53	D1683	E8490	P0097				5	A	2	25600	2,6	1,3	2,6	10,3
D50-C10Q-01	6832-813-53	B7139	A9953	E1370	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C10R-01	6832-813-53	A3594	A9953	E1370	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C11E-01	6832-813-53	A5584	E3814	P0097				5	A	2	25600	2,6	1,3	2,6	10,3
D50-C145-01	6832-813-53	A9165	P0097					5	A	2	25600	2,6	1,3	2,6	10,3
D50-C464-04	6832-813-53	U7501	A0664	A4254	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C465-06	6832-813-53	A2010	A3609	E4734	A8424			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C471-05	6832-813-53	A2010	B9832	E4734	A8424			5	A	2	25600	2,6	1,3	2,6	10,3

D50-CC01-03	6832-813-53	P0097						5	A	2	25600	2,6	1,3	2,6	10,3
D50-CZZG-04	6832-813-53	A5584	E3814	P0097				5	A	2	25600	2,6	1,3	2,6	10,3
D50-CZZU-01	6832-813-53	A2962	A6169	A8953	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-D826-06	6832-813-53	E0901	A9295	C8696	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-D983-04	6832-813-53	A5328	C8163	D9333				5	A	2	25600	2,6	1,3	2,6	10,3
D50-D986-04	6832-813-53	A1439	C8163	D9333				5	A	2	25600	2,6	1,3	2,6	10,3
D50-C07P-04	7029-813-07	A0100	P0031	E4225	A2119	P0097		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0X4-01	7029-813-07	A0458	A7435	A3659	E1525			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0Z6-04	7029-813-07	E0849	C5684					5	A	2	25600	2,6	1,3	2,6	10,3
D50-C13Z-01	7029-813-07	A0948	C2899	A8630	B2858			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0HQ-05	7029-813-48	A1994	A0987	P0031	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0RS-10	7029-813-48	A0561	P0031	D0246	E4225	P0097		5	A	37	25600	47,7	23,8	47,7	190,8
D50-C0XB-06	7029-813-48	A0561	P0031	A9358	D0246	P0097		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C136-07	7029-813-48	A0561	P0031	D0246	A3717	P0097		5	A	3	25600	3,9	1,9	3,9	15,5
D50-C18B-02	7029-813-48	P7401	A0563	A0142	P0031	P0097		5	A	5	25600	6,4	3,2	6,4	25,8
D50-C19F-01	7029-813-48	P0097						5	A	2	25600	2,6	1,3	2,6	10,3
D50-C08E-03	7029-813-51	A2028	A1043	A9129	E0848			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C095-04	7029-813-51	A0592	A9198	A4117	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0C5-01	7029-813-51	P0097						5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0CF-04	7029-813-51	A0556	A7956	P0368	A3413			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0FR-05	7029-813-51	A1974	A0713	A7959	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0FR-06	7029-813-51	A1974	A0713	A7959	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0FX-01	7029-813-51	A1573	A8578	E1839	C6119			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0FY-03	7029-813-51	A1573	A8578	E1839	C6119			5	A	2	25600	2,6	1,3	2,6	10,3

D50-C0H0-04	7029-813-51	A0556	A7956	A6002				5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0J6-03	7029-813-51	E6257	E4649	A7765	E1418			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0J9-01	7029-813-51	A1729	E5228	A8606	E0861			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0KC-06	7029-813-51	D1935	A9824	D0974	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0PU-04	7029-813-51	A2994	A7430	E1313	E8676	P0097		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0QC-04	7029-813-51	E8317	A9824	E3704	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0TD-03	7029-813-51	E5585	A1729	A8953	E1194			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0TF-01	7029-813-51	A1000	A0579	E3656	A1786			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0U8-05	7029-813-51	A0713	E3469	A7959	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0UK-05	7029-813-51	E8917	A8633	C9982	E0767	P0097		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C0VB-02	7029-813-51	A0986	A3659	A8467	E0905			5	A	3	25600	3,9	1,9	3,9	15,5
D50-C13A-02	7029-813-51	E6257	A0825	A8953	E3144	E1829		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C13B-02	7029-813-51	A1573	A0825	A8953	E3144	C6119		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C13C-02	7029-813-51	A0825	A8953	E3144	A3644	A6002		5	A	3	25600	3,9	1,9	3,9	15,5
D50-C13D-02	7029-813-51	A1573	A0825	A8953	E3144	C6119		5	A	3	25600	3,9	1,9	3,9	15,5
D50-C13E-02	7029-813-51	E4690	A0825	A8953	E3144	E0456		5	A	7	25600	9,0	4,5	9,0	36,1
D50-C13F-02	7029-813-51	A3040	A0825	A8953	E3144	B1222		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C13G-02	7029-813-51	A1000	A0825	A8953	E3144	A1786		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C140-03	7029-813-51	A0153	E6319	E6745	D9795	P0097		5	A	3	25600	3,9	1,9	3,9	15,5
D50-C15U-03	7029-813-51	E8784	A0563	A8633	E0767	A0418		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C178-01	7029-813-51	A0960	E8357	C9234				5	A	2	25600	2,6	1,3	2,6	10,3
D50-C179-01	7029-813-51	A0960	E8357	B0336	P0097			5	A	2	25600	2,6	1,3	2,6	10,3
D50-C189-01	7029-813-51	E6318	A7771	E3702	E0439	P0097		5	A	2	25600	2,6	1,3	2,6	10,3
D50-C943-05	7029-813-51	E4690	A1729	A8953	E0456			5	A	6	25600	7,7	3,9	7,7	30,9

D50-C969-04	7029-813-51	E4715	A0579	A3644	A6002			5	A	2	25600	2,6	1,3	2,6	10,3
D50-CC50-03	7029-813-51	P1215	A9878	D0223	C8669			5	A	2	25600	2,6	1,3	2,6	10,3
DJP-C19Z-01	7029-813-51	E8917	A1850	A8633	E0767	P0097		5	A	2	25600	2,6	1,3	2,6	10,3
DJP-C1BC-01	7029-813-51	E8784	A2405	A8633	E0767	P0133		5	A	2	25600	2,6	1,3	2,6	10,3
DJP-C1BD-01	7029-813-51	A0972	A2424	A9233	E2124	A2320		5	A	2	25600	2,6	1,3	2,6	10,3
D50-F01X-03	7429-813-07	P0083	P0053	P0014	E1881	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F0D0-01	7429-813-07	P0083	P0053	P0014	A0560	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F0D2-01	7429-813-07	P0083	P0053	P0014	A9876	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F0D3-01	7429-813-07	P0083	P0053	P0014	A5261	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F0D4-01	7429-813-07	P0083	P0053	P0014	A8498	E0288	P0097	5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F0D5-01	7429-813-07	P0083	P0053	P0014	A8498	C3701	P0097	5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F029-03	7429-813-28	P0053	P0014	A8954	B0200	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F01N-03	7429-813-51	P0083	P0053	P0014	B7338	A3446		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F025-06	7429-813-51	P0083	P0053	P0014	A9166	A4364	P0097	5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F026-05	7429-813-51	P0083	P0053	P0014	C7578	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F02B-09	7429-813-51	P0083	P0053	P0014	A7338	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F032-05	7429-813-51	P0083	P0053	P0014	A0255	A9265	P0097	5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F033-05	7429-813-51	P0083	P0053	P0014	A0255	E1881	P0097	5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F035-06	7429-813-51	P0083	P0053	P0014	A0255	A6515	P0097	5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F037-02	7429-813-51	P0083	P0053	P0014	C7554	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F038-03	7429-813-51	P0083	P0053	P0014	C9530	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F03G-06	7429-813-51	P0083	P0053	P0014	C6579	A8861	P0097	5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F03S-08	7429-813-51	P0083	P0053	P0014	A4364	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F043-04	7429-813-51	P0083	P0053	P0014	A3446	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2

D50-F04A-06	7429-813-51	P0083	P0053	P0014	A9166	A8607	P0097	5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F04B-08	7429-813-51	P0083	P0053	P0014	A9166	A0994	P0097	5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F04F-04	7429-813-51	P0083	P0053	P0014	P0097			5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F04G-05	7429-813-51	P0083	P0053	P0014	A9673	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F04J-06	7429-813-51	P0083	P0053	P0014	A0255	D0017	P0097	5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F04T-10	7429-813-51	P0083	P0053	P0014	E1804	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F09D-03	7429-813-51	P0083	P0053	P0014	A3446	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F0AZ-02	7429-813-51	P0083	P0053	P0014	A2798	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F0EN-03	7429-813-51	P0083	P0053	P0014	E3491	A0006	P0097	5	B1	3	25600	3,9	3,9	3,9	7,7
D50-F0G0-01	7429-813-51	P0083	P0053	P0014	E6246	A9907	P0097	5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F0G1-02	7429-813-51	P0083	P0053	P0014	E6246	A5540	P0097	5	B1	2	25600	2,6	2,6	2,6	5,2
DJP-F0HA-01	7429-813-51	P0083	P0053	P0014	E1232	A9166	P0097	5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F01H-07	7429-813-53	P0083	P0053	P0014	E0863	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F021-04	7429-813-53	P0083	P0053	P0014	A5561	D9770		5	B1	3	25600	3,9	3,9	3,9	7,7
D50-F02A-05	7429-813-53	P0083	P0053	P0014	A0094	D9770		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F02E-03	7429-813-53	P0083	P0053	P0014	C7104	P0097		5	B1	3	25600	3,9	3,9	3,9	7,7
D50-F02L-04	7429-813-53	P0083	P0053	P0014	A9267	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F042-05	7429-813-53	P0083	P0053	P0014	A0563	D9770		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F044-08	7429-813-53	P0083	P0053	P0014	C6629	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F046-05	7429-813-53	P0083	P0053	P0014	C6629	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F049-05	7429-813-53	P0083	P0053	P0014	A4748	P0097		5	B1	5	25600	6,4	6,4	6,4	12,9
D50-F04D-04	7429-813-53	P0083	P0053	P0014	A9875	D9770		5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F04E-05	7429-813-53	P0083	P0053	P0014	P0097			5	B1	2	25600	2,6	2,6	2,6	5,2
D50-F04K-05	7429-813-53	P0083	P0053	P0014	A7192	P0097		5	B1	2	25600	2,6	2,6	2,6	5,2

D50-F09J-02	7482-813-61	P0053	P0014	B1281	A0101	P0097		5	B2	6	25600	7,7	7,7	7,7	15,5
D50-F09K-02	7482-813-61	P0053	P0014	B1281	E4647	P0097		5	B2	6	25600	7,7	7,7	7,7	15,5
Total												**2338,1**	**1613,8**	**2338,1**	**7573,0**

8.2 Appendix B Co-printing Summary Simulation 1

SKU	Printing Method	Nr Of Rolls	Design Set-ups/week	A,B1,B2	Scrap	Actual Nr of Rolls	Average Batch Size	Comments
6611-230-09	R	4	6	A	0,38	3,63	0,60	
7429-350-29	R/FP	18,38	15	A	0,00	18,38	1,23	Small orders (24/34 are 2 or 3 webs)
7124-350-29	F	21	24	A	0,00	21,00	0,88	Small orders (51/61 are 2 or 3 webs),many colours
7028-460-07	F	0,29	0	A	0,29	0,00		
7028-460-29	F	3,86	4	A	0,00	3,86	0,96	
7028-465-09	F	41,63	54	A	0,00	41,63	0,77	Colours, small order size
7124-465-07	F	8,13	8	A	0,00	8,13	1,02	
7124-465-09	F	15,75	19	A	2,75	13,00	0,68	Colours
7429-465-07	FP	1,00	1	A	0,50	0,50	0,50	6 Colours

7429-465-09	R/FP	83,75	74	A	3,88	79,88	1,08	
7482-465-09	R/FP	2,38	3	A	0,00	2,38	0,79	
6832-813-07	F	4,60	2	A	0,00	4,60	2,30	
6832-813-28	F	2,60	3	A	0,40	2,20	0,73	
6832-813-48	F	1,20	0	A	1,20	0,00		Colours, small orders
6832-813-51	F	13,80	12	A	2,80	11,00	0,92	24 (28) have 2 webs
6832-813-53	F	14,00	13	A	0,00	14,00	1,08	
7029-813-07	F	2,40	2	A	0,40	2,00	1,00	
7029-813-48	F	20,80	4	A	0,00	20,80	5,20	
7029-813-51	F	25,40	17	A	4,40	21,00	1,24	23 (37) have 2 webs
6832-810-01	F	2,00	3	A	0,00	2,00	0,67	
6832-810-07	F	13,50	12	A	0,00	13,50	1,13	All have 2 webs
6832-810-32	F	3,00	3	A	0,00	3,00	1,00	
6832-810-38	F	11,00	13	A	0,00	11,00	0,85	
7029-810-07	F	36,25	31	A	0,00	36,25	1,17	
7028-560-09	F	10,00	8	A	2,57	7,43	0,93	
7124-560-09	F	10,71	7	A	0,86	9,86	1,41	
7429-560-09	R/FP	17,43	16	A	1,14	16,29	1,02	
7430-560-09	F	0,29	0	A	0,29	0,00		
7482-560-09	R/FP	2,29	0	A	2,29	0,00		Many colours, only 2 web Demand
6011-230-09	F	18	3	B1	0,00	18,00	6,00	
6003-230-05	F	0,33	0	B1	0,33	0,00		
7028-350-29	F	3,5	7	B1	0,00	3,50	0,50	Many colours, small orders
7482-350-29	FP	3,63	3	B1	0,00	3,63	1,21	Many colours
7124-420-82	F	1,67	1	B1	0,67	1,00	1,00	Colours, small batch sizes

7429-460-29	R/FP	2,57	3	B1	0,00	2,57	0,86	
7124-460-29	F	4,43	5	B1	0,00	4,43	0,89	
6070-465-09	R	20,27	5	B1	0,00	20,27	4,05	
7429-813-07	FP	2,60	3	B1	0,40	2,20	0,73	
7429-813-28	FP	0,40	0	B1	0,40	0,00		
7429-813-51	FP	12,20	13	B1	0,00	12,20	0,94	
7429-813-53	FP	9,60	6	B1	0,00	9,60	1,60	
7124-630-09	F	7,17	6	B1	1,33	5,83	0,97	Many different spot, small orders
7124-582-07	F	3,33	3	B1	0,00	3,33	1,11	Less orders
4544-567-14	R	11,00	2	B1	0,00	11,00	5,50	
Total		492,10	414		27,26	464,84	1,12	

WEEK 2

6611-230-09	R	4	6	A	0,38	3,63	0,60	
7429-350-29	R/FP	18,38	15	A	0,00	18,38	1,23	Small orders (24/34 are 2 or 3 webs)
7124-350-29	F	21	24	A	0,00	21,00	0,88	Small orders (51/61 are 2 or 3 webs),many colours
7028-460-07	F	0,29	0	A	0,29	0,00		
7028-460-29	F	3,86	4	A	0,00	3,86	0,96	
7028-465-09	F	41,63	54	A	0,00	41,63	0,77	Colours, small order size
7124-465-07	F	8,13	8	A	0,00	8,13	1,02	
7124-465-09	F	15,75	19	A	2,75	13,00	0,68	Colours
7429-465-07	FP	1,00	1	A	0,50	0,50	0,50	6 Colours
7429-465-09	R/FP	83,75	74	A	3,88	79,88	1,08	
7482-465-09	R/FP	2,38	3	A	0,00	2,38	0,79	
6832-813-07	F	4,60	2	A	0,00	4,60	2,30	

6832-813-28	F	2,60	3	A	0,40	2,20	0,73	
6832-813-48	F	1,20	0	A	1,20	0,00		Colours, small orders
6832-813-51	F	13,80	12	A	2,80	11,00	0,92	24 (28) have 2 webs
6832-813-53	F	14,00	13	A	0,00	14,00	1,08	
7029-813-07	F	2,40	2	A	0,40	2,00	1,00	
7029-813-48	F	20,80	4	A	0,00	20,80	5,20	
7029-813-51	F	25,40	17	A	4,40	21,00	1,24	23 (37) have 2 webs
6832-810-01	F	2,00	3	A	0,00	2,00	0,67	
6832-810-07	F	13,50	12	A	0,00	13,50	1,13	All have 2 webs
6832-810-32	F	3,00	3	A	0,00	3,00	1,00	
6832-810-38	F	11,00	13	A	0,00	11,00	0,85	
7029-810-07	F	36,25	31	A	0,00	36,25	1,17	
7028-560-09	F	10,00	8	A	2,57	7,43	0,93	
7124-560-09	F	10,71	7	A	0,86	9,86	1,41	
7429-560-09	R/FP	17,43	16	A	1,14	16,29	1,02	
7430-560-09	F	0,29	0	A	0,29	0,00		
7482-560-09	R/FP	2,29	0	A	2,29	0,00		Many colours, only 2 web Demand
6050-460-25	F	13,57	14	B2	0,00	13,57	0,97	Colours
6050-460-29	F	67,14	27	B2	0,00	67,14	2,49	
6050-465-03	F	0,25	0	B2	0,25	0,00		
6050-465-09	F	10,88	4	B2	0,00	10,88	2,72	
6933-465-09	R MF	8,25	5	B2	1,88	6,38	1,28	Majority has 6 colours
6900-470-09	R MF	20,71	7	B2	0,00	20,71	2,96	
7060-470-09	R MF	19,57	9	B2	0,00	19,57	2,17	Colours
6050-477-09	F	1,86	2	B2	0,00	1,86	0,93	

7482-813-61	FP	5,60	2	B2	0,00	5,60	2,80	
6918-810-38	R	2,50	3	B2	0,00	2,50	0,83	
7429-810-07	FP	0,50	1	B2	0,00	0,50	0,50	
6933-565-09	R	1,71	1	B2	0,71	1,00	1,00	
7124-565-09	F	3,43	2	B2	1,43	2,00	1,00	
7429-565-09	R/FP	23,86	12	B2	8,57	15,29	1,27	Many colours, 7 web
6900-561-24	R	1,57	1	B2	0,00	1,57	1,57	
6933-560-09	R	1,86	1	B2	0,00	1,86	1,86	
Total		**574,7**	**445**		**36,97**	**537,70**	**1,21**	

Result of Simulation 1

Total Nr of set-ups/month:	[redacted]
Total volume/month (rolls)	[redacted]
Average batch size (rolls/batch)	**1,2**
Scrap (Rolls):	64,2

Printing method	Total nr setup	Printed number rolls	ABS
R/FP, R, R MF	[redacted]	[redacted]	1,2
F	[redacted]	[redacted]	1,1

8.3 Appendix C Co-printing Summary Simulation 2

WEEK 1

	Printing Method	Nr Of Rolls	Design Set-ups/week	A, B1, B2	Scrap	Nr of Printed Rolls	Average Batch Size
6611-230-09	R	4	3	A	0,00	4,00	1,33
7429-350-29	R/FP	18,38	8	A	0,00	18,38	2,30
7124-350-29	F	21	8	A	0,00	21,00	2,63
7028-460-07	F	0,29	1	A	0,00	0,29	0,29
7028-460-29	F	3,86	2	A	0,00	3,86	1,93
7028-465-09	F	41,63	20	A	0,00	41,63	2,08
7124-465-07	F	8,13	5	A	0,00	8,13	1,63
7124-465-09	F	15,75	8	A	0,00	15,75	1,97
7429-465-07	FP	1,00	1	A	0,00	1,00	1,00
7429-465-09	R/FP	83,75	26	A	0,00	83,75	3,22
7482-465-09	R/FP	2,38	2	A	0,00	2,38	1,19
6832-813-07	F	4,6	1	A	0,00	4,60	4,60
6832-813-28	F	2,6	2	A	0,00	2,60	1,30

6832-813-48	F	1,2	1	A	0,00	1,20	1,20
6832-813-51	F	13,8	7	A	0,00	13,80	1,97
6832-813-53	F	14	7	A	0,00	14,00	2,00
7029-813-07	F	2,40	2	A	0,00	2,40	1,20
7029-813-48	F	20,80	4	A	0,00	20,80	5,20
7029-813-51	F	25,40	9	A	0,00	25,40	2,82
6832-810-01	F	2,00	1	A	0,00	2,00	2,00
6832-810-07	F	13,50	7	A	0,00	13,50	1,93
6832-810-32	F	3,00	2	A	0,00	3,00	1,50
6832-810-38	F	11,00	6	A	0,00	11,00	1,83
7029-810-07	F	36,25	17	A	0,00	36,25	2,13
7028-560-09	F	10,00	5	A	0,00	10,00	2,00
7124-560-09	F	10,71	4	A	0,00	10,71	2,68
7429-560-09	R/FP	17,43	7	A	0,00	17,43	2,49
7430-560-09	F	0,29	1	A	0,00	0,29	0,29
7482-560-09	R/FP	2,29	2	A	0,00	2,29	1,14
6011-230-09	F	18	2	B1	0,00	18,00	9,00
6003-230-05	F	0,33	1	B1	0,00	0,33	0,33
7028-350-29	F	3,5	3	B1	0,00	3,50	1,17
7482-350-29	FP	3,63	1	B1	0,00	3,63	3,63
7124-420-82	F	1,67	2	B1	0,00	1,67	0,83
7429-460-29	R/FP	2,57	2	B1	0,00	2,57	1,29
7124-460-29	F	4,43	3	B1	0,00	4,43	1,48
6070-465-09	R	20,63	1	B1	0,00	20,63	20,63
7429-813-07	FP	2,6	2	B1	0,00	2,60	1,30

7429-813-28	FP	0,40	1	B1	0,00	0,40	0,40
7429-813-51	FP	12,2	5	B1	0,00	12,20	2,44
7429-813-53	FP	9,6	3	B1	0,00	9,60	3,20
7124-630-09	F	7,17	3	B1	0,00	7,17	2,39
7124-582-07	F	3,33	2	B1	0,00	3,33	1,67
4544-567-14	R	11,00	1	B1	0,00	11,00	11,00
Total		**492,46**	**201**			**492,46**	**2,450**

WEEK 2

6611-230-09	R	4	3	A	0,00	4,00	1,33
7429-350-29	R/FP	18,38	8	A	0,00	18,38	2,30
7124-350-29	F	21	8	A	0,00	21,00	2,63
7028-460-07	F	0,29	1	A	0,00	0,29	0,29
7028-460-29	F	3,86	2	A	0,00	3,86	1,93
7028-465-09	F	41,63	20	A	0,00	41,63	2,08
7124-465-07	F	8,13	5	A	0,00	8,13	1,63
7124-465-09	F	15,75	8	A	0,00	15,75	1,97
7429-465-07	FP	1,00	1	A	0,00	1,00	1,00
7429-465-09	R/FP	83,75	26	A	0,00	83,75	3,22
7482-465-09	R/FP	2,38	2	A	0,00	2,38	1,19
6832-813-07	F	4,6	1	A	0,00	4,60	4,60
6832-813-28	F	2,6	2	A	0,00	2,60	1,30
6832-813-48	F	1,2	1	A	0,00	1,20	1,20
6832-813-51	F	13,8	7	A	0,00	13,80	1,97
6832-813-53	F	14	7	A	0,00	14,00	2,00

7029-813-07	F	2,4	2	A	0,00	2,40	1,20
7029-813-48	F	20,80	4	A	0,00	20,80	5,20
7029-813-51	F	25,40	9	A	0,00	25,40	2,82
6832-810-01	F	2,00	1	A	0,00	2,00	2,00
6832-810-07	F	13,50	7	A	0,00	13,50	1,93
6832-810-32	F	3,00	2	A	0,00	3,00	1,50
6832-810-38	F	11,00	6	A	0,00	11,00	1,83
7029-810-07	F	36,25	17	A	0,00	36,25	2,13
7028-560-09	F	10,00	5	A	0,00	10,00	2,00
7124-560-09	F	10,71	4	A	0,00	10,71	2,68
7429-560-09	R/FP	17,43	7	A	0,00	17,43	2,49
7430-560-09	F	0,29	1	A	0,00	0,29	0,29
7482-560-09	R/FP	2,29	2	A	0,00	2,29	1,14
6050-460-25	F	13,57	6	B2	0,00	13,57	2,26
6050-460-29	F	67,14	5	B2	0,00	67,14	13,43
6050-465-03	F	0,25	1	B2	0,00	0,25	0,25
6050-465-09	F	10,88	2	B2	0,00	10,88	5,44
6933-465-09	R MF	8,25	3	B2	0,00	8,25	2,75
6900-470-09	R MF	20,71	1	B2	0,00	20,71	20,71
7060-470-09	R MF	19,57	5	B2	0,00	19,57	3,91
6050-477-09	F	1,86	1	B2	0,00	1,86	1,86
7482-813-61	FP	5,6	1	B2	0,00	5,60	5,60
6918-810-38	R	2,50	2	B2	0,00	2,50	1,25
7429-810-07	FP	0,50	1	B2	0,00	0,50	0,50
6933-565-09	R	1,71	1	B2	0,00	1,71	1,71

7124-565-09	F	3,43	2	B2	0,00	3,43	1,71
7429-565-09	R/FP	23,86	9	B2	0,00	23,86	2,65
6900-561-24	R	1,57	1	B2	0,00	1,57	1,57
6933-560-09	R	1,86	1	B2	0,00	1,86	1,86
Total		**574,7**	**211**			**574,67**	**2,724**

Result of Simulation 2

Total Nr of set-ups/month:	824
Total volume/month (rolls)	2134,25
Average batch size (rolls/batch)	**2,6**

8.4 Appendix D Inventory Reduction

	Today	Simulation 2	SS for Simulation 2	Total Simulation 2	Reduction	Total Reduction (%)
Pallets	6000	1614	724	2338	3662	61
COFG/pallet (Yen)	[redacted]					
Tied up capital (Yen)	[redacted]					61
Interest rate	[redacted]					
Cost of capital (Yen)	[redacted]					**61**

External Warehouse

Capacity of internal warehouse	2000
Storage Charge (JPY/pallet/day)	[redacted]
Average Inv days	25,0
In/out handling charge (JPY/pallet/handling)	[redacted]
Truck cost to Ext WH (JPY/truck)	[redacted]

Days/year	365
Reduction in external warehouses (pallets)	3662
Rolls/truck	15
Change of inventory	15
In/out handling charge (JPY/year)	[redacted]
Reduction of truck cost (JPY/year)	
Reduction in storage charge/year	
Total reduction	
Today	
Pallets	4000
In/out handling charge (JPY/year)	[redacted]
Truck cost (JPY/year)	
Storage charge/year	
Reduction(%)	**92**

8.5 Appendix E Reduction of Minimum Order Size

Average Reduction in Minimum Order Size

Number QSV	Maximum webs	MOS today (web)	MOS Future (web)	Reduction (web)
7	4	2	2	0
13	5	2.5	2	2.6
5	6	3	2	1.7

20	7	3.5	2	8.6
15	8	4	2	7.5
60				**20.3**

Average reduction in MOS / QSV	**20.3/60=0.34**