

Journey to Perfecting Manganese Alloys with Induction-Assisted Machining

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Special testing environment was created to check the different induction coils and their ability to heat up the material under different conditions. Proof that it can be heated and by that, improvement in machining can be achieved was provided.

Focus in the research was on creating a new set of knowledge to be used for further development of the machinability of the material of the interest, which is high content manganese steel. It was found when we use high frequency coil we can concentrate the desired magnetic fluxes on depth and area that we need for machining of manganese steel. By that problem that usually appears when traditional machining method used can be avoided, in addition problem with worsening of manganese steel related to the temperatures, which destroy its structure, can be avoided, as the heated material in theory will be removed.

These processes can improve machining performance and further can be used with other materials and machining methods.

For the proper design of the induction coil, area that needs to be heated and how tightly the coil can be constructed to reduce the spread of magnetic fluxes are the two main elements to take into account. During machining (such as milling or turning), the speed at which the workpiece or coil travels should be optimized. When the speed is too slow, the material becomes overheated and becoming weak structurally. On the other hand, if the speed is too high, the heat that is produced could not be enough to soften the material. It is advised to methodically change various input parameters for the best outcomes.

Making a single coil that is ideal for all types of machining is challenging. Different parameters are required for each type of machining. However, we got off to a solid start and discovered some valuable data which is applicable for further studies and overall development of induction assistive machining. As an example, particular high frequency induction coil for turning that was effective in heating up manganese steel was produced. By that some of the input data can be increased to improve efficiency of the machining. It was done by concentrating the heat on the material upper layers. In overall study opened up the possibility to machine new type of reinforced manganese steel, and improve current process of machining of the material that is currently used for production. It will give the possibility to save time required for the production of the final product and in overall give better financial performance, with the use of sustainable technology.