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# Exploring the possibilities of magnets when designing a knob

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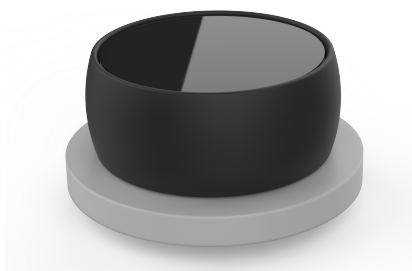
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**W**hat if magnets could replace mechanics? Could that change and improve the way a product feels? This master thesis explores that possibility. The end result is a knob which uses magnets for many of its functions. The product is innovative and will make you re-think the way a knob is designed.

Magnets are fascinating. They attract each other with an invisible force and can be used in many ways. Magnets are used everyday without us even thinking about it. You probably have some on your fridge to hold up your grocery list. But advanced magnets can also be used in hidden places like your smartphone.

Sigma Connectivity had an idea about implementing magnets in one of their products. The product is a knob which is used to select options in several ways. This product had several functions which were investigated, could they be exchanged for magnets? The main areas were a rotating motion with detent feedback and push buttons with feedback. The top must also spring back after being pushed.

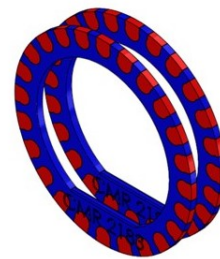


*The knob.*

This master thesis searched for alternatives to the mechanics which solved the problems in the knob today. Through lots of brainstorming and a long phase of concept generation, new ideas were formed. The final concept was chosen by systematically eliminating the concepts which were either too complex or did not fulfill all the needs. The final concept is mainly based on two things: PolyMagnets and magnetic building sticks.

PolyMagnets are a special type of magnets which have very specific properties. The magnetic poles can be totally customized. In the re-designed knob, a pair

of Align PolyMagnets with 24 detents are used. This pair of magnets will together act as detents when they are near each other and one is rotated. This replaced a spring, therefore reducing wear and tear. In addition, these magnets give a new and interesting feedback when the knob is rotated.



*Align PolyMagnets with 24 detents.*

For the push buttons, something as unexpected as children's toys were taken as inspiration. Magnetic building sticks consists of sticks with magnets at the ends which connects to metal balls. When they are laid out flat on the floor, they can be pressed. This gives a clicking feedback. Also, the stick springs back up again due to the magnetic force!



*Magnetic building sticks.*

These interesting features are the basis of the re-designed knob. The conclusions of this master thesis are that these two solutions are tricky to combine due to the unpredictable magnetic fields. However, they were proven to work as intended through working prototypes. These innovative solutions will act as a great source of knowledge when Sigma Connectivity designs their next product.