Innovative Rolling Contact development by IMC

Limitations of slip rings

Some 10 years ago, IMC was involved in the development of the V-POD propulsion, with an electric motor + gearbox rotating 360° in a horizontal plane below the ship, with exceptionally good manoeuvrability.

First vessel with V-POD and conventional slipring system

In order to power the electric motor, the generators mounted in the ship need to transfer the electricity to the rotating POD by means of a slipring. A typical example of a slipring is shown below.

Typical slip ring system

Sliprings have a long history in rotating electrical transfer, but also include certain disadvantes. One obvious disadvantage is the wear of the sliding contact, the brushes, as the ring moves below the brushes. Another important disadvantage is that when brushes remain in a fixed position for longer period, they tend to 'weld' to the ring. And finally, small oscillating movements with a few angle degrees, result in an uneven wear pattern and increase the overall wear rapidly.

Development of rolling instead of sliding contacts

Although the main route in rotating electrical contacts is formed by **sliding** contacts, there are also examples of rolling contacts, the most well-known are electrical trains. The electricity is supplied by overhead lines to the sliding pantograph of the train, this often causes sparking / flashes especially visible at night. Next the electricity is 'used' in the train to drive the motors and returned to the rail track, but now by using **rolling** wheel contacts.

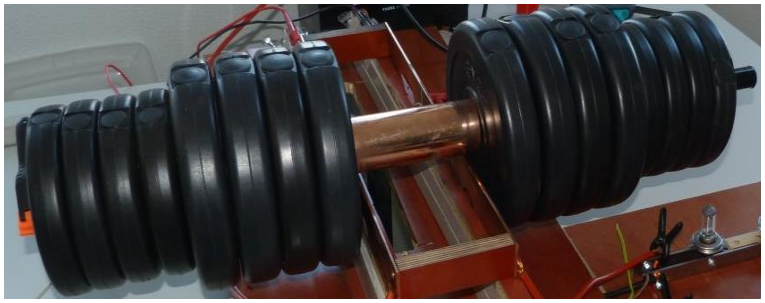
This rolling contact is again a proven solution, but is only used in combination with high wheel loads of trains. When the train wheels roll regularly over the surface a shiny rail surface is achieved, as shown below, which enables excellent electricity transfer.

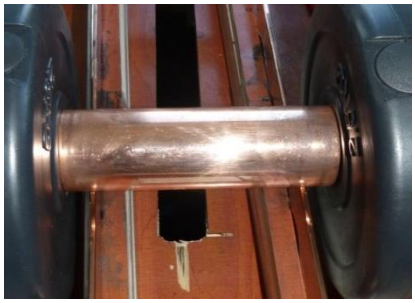
Shiny rail tracks

Train with sliding pantograph and rolling wheels

Investigation in high pressure rolling contacts

IMC has performed various tests with copper and bronze material to investigate and optimize this rolling performance. A simple test set up was used with relatively thin copper rails and heavy weights, see below.

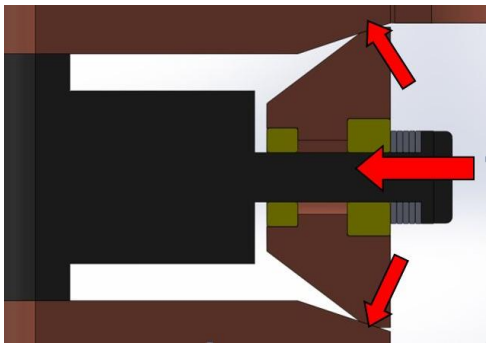


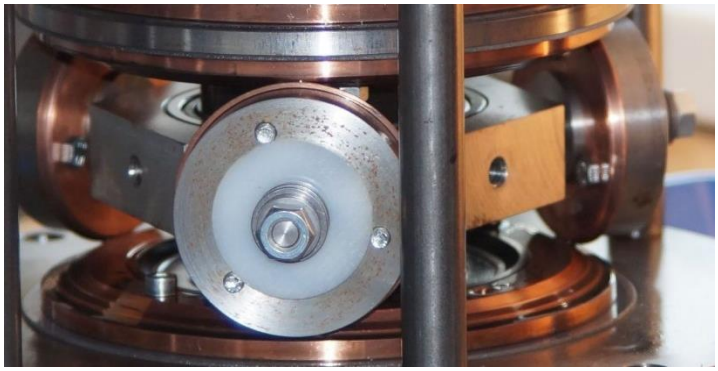


Test set up with high compressive load on contact surfaces

When applying high loads and back and forth motions, the copper surface is rolled and a bright surface is created, similar to steel rail tracks. Interestingly, the electrical resistance drops down to very low levels.

Following these initial tests with heavy loaded rolling 'wheels', another design was investigated with conical wheels pressed towards the rotating centre by an axial spring. Hereby taking advantage of the wedge principle to increasing the contact force. After prolonged and successful inhouse testing, IMC has patented this new and interesting technology.



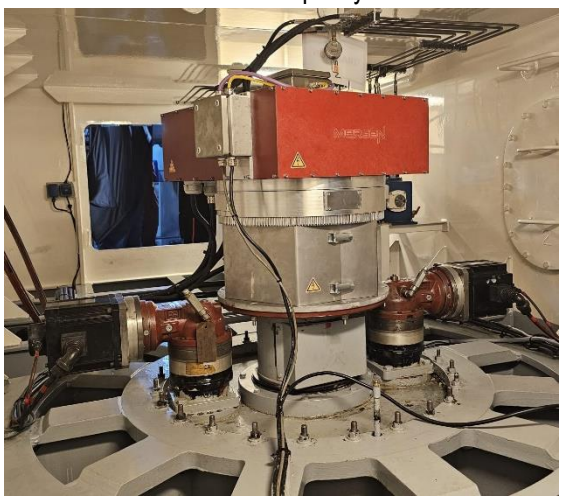


Conical rolling wheels proto IMC

After further prolonged testing, the RoCo system was recently installed on an inland vessel

IMC has licensed this **Ro**lling **Co**ntact technology (via Rotelcon BV), to the international company MERSEN. Mersen has continued extensive testing in their test laboratories in Austria, demonstrating that the system has virtually no wear combined with extremely low electrical resistance.

Recently, the first RoCo system was installed on an inland vessel of 1200 ton capacity.



The vessel is in operation and Rolling Contacts are performing succesfully, demonstrating this new technology in real life conditions.

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