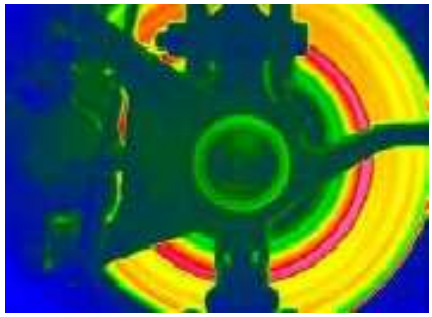
Aerodynamic Brake Disc, AERODISQ®

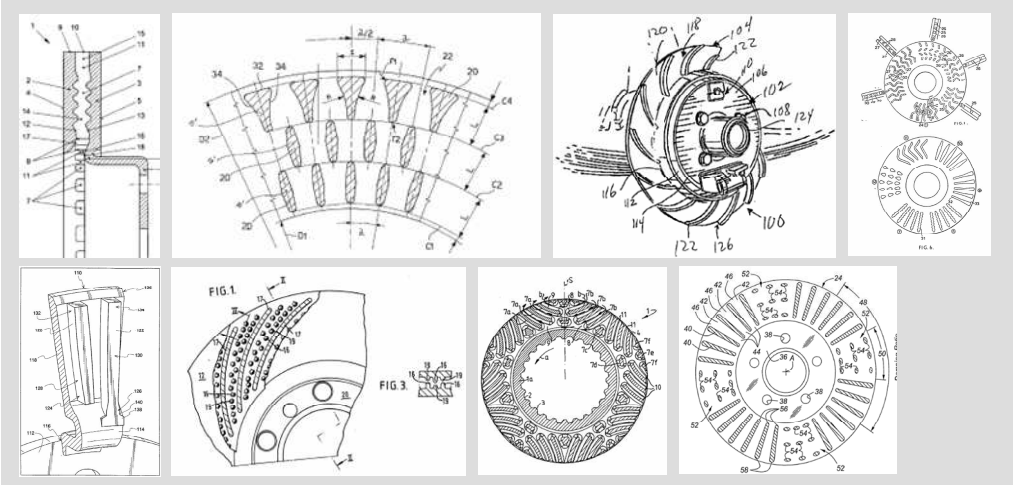


Improving energy efficiency is important for the rail sector, because of the future shortage on fossil fuels, the challenging CO_2-limits and the competitive advantage on the environmental image in comparison to road and air transport. A lot of improvements of energy efficiency have been developed and implemented in the rail sector for the last decades. For example regeneration of braking energy or energy optimised driving. It is a challenge for the rail sector looking for new areas / ideas for energy efficiency.

Based on the long and wide experience in the whole lifecycle of rolling stock, Lloyd's Register Rail Europe is continuously looking for new interesting ideas related to energy reduction, a very recent one being the aerodynamic brake disc, the AERODISQ® .

Regular ventilated brake discs have a high aerodynamic resistance. This resistance could be about 3 to 6 % of the total energy consumption of a train. There seems to be a historical habit, that brake discs need cooling riblets to realise the necessary cooling performance.

Bench tests and simulations have shown that an improved brake disc design can reduce the energy loss (or aerodynamic resistance) by 90% in comparison with regular ventilated brake discs at a running speed of 140 km/h.



This new design, the AERODISQ®, will be based on the following design-elements: maximal use of natural driving wind, designing maximal cooling surface and realisation of the optimal heat distribution in the brake disc.

The technological innovation in this concept will be the combination of achieving sufficient cooling:

1. without a forced air flow through the brake discs;
2. the achievement of sufficient cooling by convection at standstill.

In the next development stage, it is important to optimise the cooling characteristics in relation to the aerodynamic resistance and the reliability and maintainability of the brake disc. The average temperature of the brake disc needs to stay below 400^0 C, the critical temperature of the brake pad material.

A positive side effect in noise (in dB(A)) and weight (in kg) of the brake disc is also to be expected.