

An International Newsletter

ISSN 1350-4789 November 2005
www.worldpumps.com



Sealing Technology

New piston ring material retains springiness at 1100°C

The Cross Manufacturing Company has introduced a range of piston rings that are manufactured using powder metallurgy techniques, and which are capable of operating at temperatures up to 1100°C.

Cross designs and makes seals for use at high temperatures and other difficult conditions, including piston ring type seals for gas turbines. The laws of physics indicate that if you can run things hotter then you can get more power out. Piston ring type seals are often used to contain the hot gases. When the temperatures get to 700°C or more, then alloys that are made by melting begin to relax. This relaxation means that when the piston ring has no more out-spring, the leakage usually increases, often disastrously.

The search has been on for many years to improve the heat resistance of piston ring materials. The best 'melted' alloy has proved to be Waspaloy, which has the very annoying property of rapid grain growth under some conditions. But these large grains – which reduce most useful properties – do help, by giving increased heat resistance.

The alloys made by powder metallurgy have one very important advantage: the particles in the mix which lock the grain boundaries from sliding over each other do not have to be soluble, as

would be the case in a melted alloy. This gives the useful heat-resistant property that can be used to make piston rings that retain their springiness at very high temperatures.

The company has developed techniques to handle such alloys. The two alloys that have been tested are Special Metal Wiggins alloy MA.956 and the Plansee alloy PM.2000. Both have very good corrosion resistance in hot air. Piston rings have been tested up to 1100°C. Although the spring remaining is small, it is sufficient to hold the seals in place against the bore, so that when pressure is applied, they will seal. This has proved to be very important.

Leaf springs have also been tested, and have also been found to retain their spring. These leaf springs can be used to energize other materials, such as carbon and cobalt alloys, that have no springiness of their own at very high temperatures. The ability to make piston ring type seals which work for long periods at very high temperatures is a breakthrough, and it will prove important, especially in upgraded gas turbines.

Contact:

Cross Manufacturing Company (1938) Ltd, Midford Road, Bath BA2 5RR, UK. Tel: +44 1225 837000, Fax: +44 1225 834115, Email: mail@crossmanufacturing.com, Web: www.crossmanufacturing.com