

DEGASSING SHAFT SOLUTION MAKES COST SAVINGS FOR KOBE ALUMINUM

U.S. company, Kobe Aluminum Automotive Products LLC, based in Bowling Green, Kentucky, currently operates a melting and holding furnace and a continuous casting machine to support its integrated automotive forging operations. In this article, Bill Reinert, Aluminium Sales Engineer, Pyrotek Evansville, Indiana, USA, explains the background to the customer's production situation in its molten metal processing and outlines the Pyrotek solution to boost process and product performance and make cost savings.

CHALLENGE

For metal melting prior to casting, the plant employs a single rotor degassing box of a Kobe, Japan design and the degassing shaft assembly is supplied by a manufacturer in Japan. Both the shaft and rotor are fabricated from Sialon ceramic with a porous refractory gas ring at the bottom. The assembly also requires a complex mounting flange, which must be secured to the shaft and then bolted to the drive motor.

Kobe was looking for a more cost-effective degassing shaft assembly. A brand new Sialon assembly from Japan costs around USD\$20,000, and on average, Kobe uses four assemblies each year.

Depending on the failure mode, Kobe does not always have to purchase new assemblies. However, the cost to rework a shaft can be between USD\$3000–8000. On many occasions, the shafts must be sent back to Japan for rework unless they can be dismantled and repaired in the USA without causing further damage to the assembly.

Apart from the cost of materials and labour, a shipping cost is involved to bring parts in from Japan. Transporting parts between Japan and the U.S. also generates lead-time issues and it can take as long as two months to get a shaft. Given that, Kobe has to hold extra inventory in order to avoid running out of shafts due to unexpected high demand related to breakages. The alternative is to spend extra money to ship shafts via airfreight. Additionally, the company has had occasional issues with breakages on overseas shipments.

Given the customer's usage and the cost involved for new and reworked shafts, Kobe can spend an estimated USD\$35,000 per year on degassing shaft assemblies. This is based on one new shaft and three reworked shafts in this annual period.

SOLUTION

Pyrotek's proposed solution was to use a graphite shaft and rotor fitted with a ceramic sleeve. Based on a projected selling price of the Pyrotek shaft and rotor of around USD\$850, it was necessary to obtain a shaft life of around three to four weeks in order to justify the change. Of course this is based on the low end of the customer's current cost of Sialon and

does not take into consideration shipping and inventory costs.

Pyrotek supplied the initial graphite shafts with MAC (Metallurgical

Advanced Ceramic) sleeves and a porous graphite gas ring instead of the porous ceramic ring. The problem discovered was that the MAC sleeves were prone to cracking and Pyrotek determined that the damage was due to thermal shock. The original plan was to park the shaft over the hole in the degasser lid in order to preheat, but it was concluded that this method did not allow the shaft access to sufficient heat, due both to the size of hole and also because the shaft was not covered. This also allowed heat to escape due to ambient airflow.

Given the failure of the MAC sleeve, Pyrotek changed this to an M-85 wrapped sleeve for future shafts. Even though the original MAC sleeve was cracked and falling off, Kobe was able to obtain about one month of shaft life. Given these results, the life of the M-85 shaft should be at least one month and possibly longer.

Along with the initial operating life results of graphite, Kobe preferred the performance of the porous graphite ring to the porous ceramic ring, and also obtaining improved gas flow through the graphite.

One other change was to install a SHUR-LOK® coupling instead of the original bolt-on connection flange. Kobe reported that they are pleased with the simpler SHUR-LOK coupling supplied by Pyrotek.

SUMMARY

Although still early in the program, preliminary life test results of the graphite shaft are favourable. It appears that the Pyrotek solution will meet or exceed the shaft target life of three to four weeks. In the worst case when an average of one shaft is used every three weeks, Kobe will spend approximately USD\$14,450 per year on assemblies. Given the customer's current estimated cost for Sialon assemblies, they could save around USD\$20,000 per year. A four-week shaft life would increase this savings up to USD\$25,000 per year.

Along with these savings, Kobe has been able to reduce its costs and also avoid the inconvenience of shipping assemblies in from Japan.



Kobe graphite degassing shaft assembly with M-85 wrapped sleeve