



# Concave liner carousel

## Safely reducing maintenance time

### Background

When a large South American Copper mine determined that the concave liner replacement was the critical path in their maintenance shutdowns, they contacted FLSmidth for support. Together, FLSmidth and the site initiated a project with the goals of reducing the length of the maintenance shutdowns, increasing the crusher availability, improving safety and minimising costs for the FLSmidth 60 x 113 TC gyratory crusher.

### The solution

The FLSmidth team proposed a solution using three-tiered concave liners. This would both lengthen the liner operational life and shorten the installation process. And, to make installation safer and quicker, we recommended a set of carousels. By using carousels, maintenance personnel can put the concave liners together in order before the shutdown starts.

Then, during the shutdown, each tier of concave liners is lowered as one group on the carousel – instantly putting them into position for a fast installation.

The FLSmidth team proposed reducing the number of concave rows to simplify the installation process. This design change was also packaged with a custom concave installation carousel.

We've been designing carousels and maintenance tooling for close to 50 years. This tooling helps ensure that maintenance can be performed safer and faster. The concave carousels allow staging and installation of the entire row.

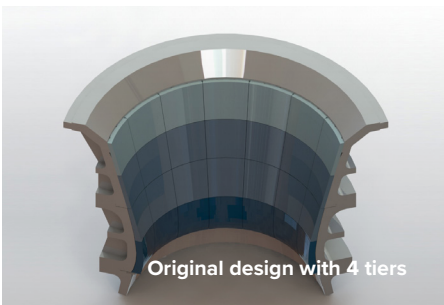
The carousel for this crusher was specifically designed for faster and simpler maintenance using new design features that allow the liners to be installed on this type of curved crusher shell section.

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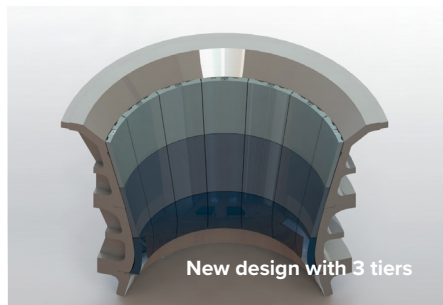
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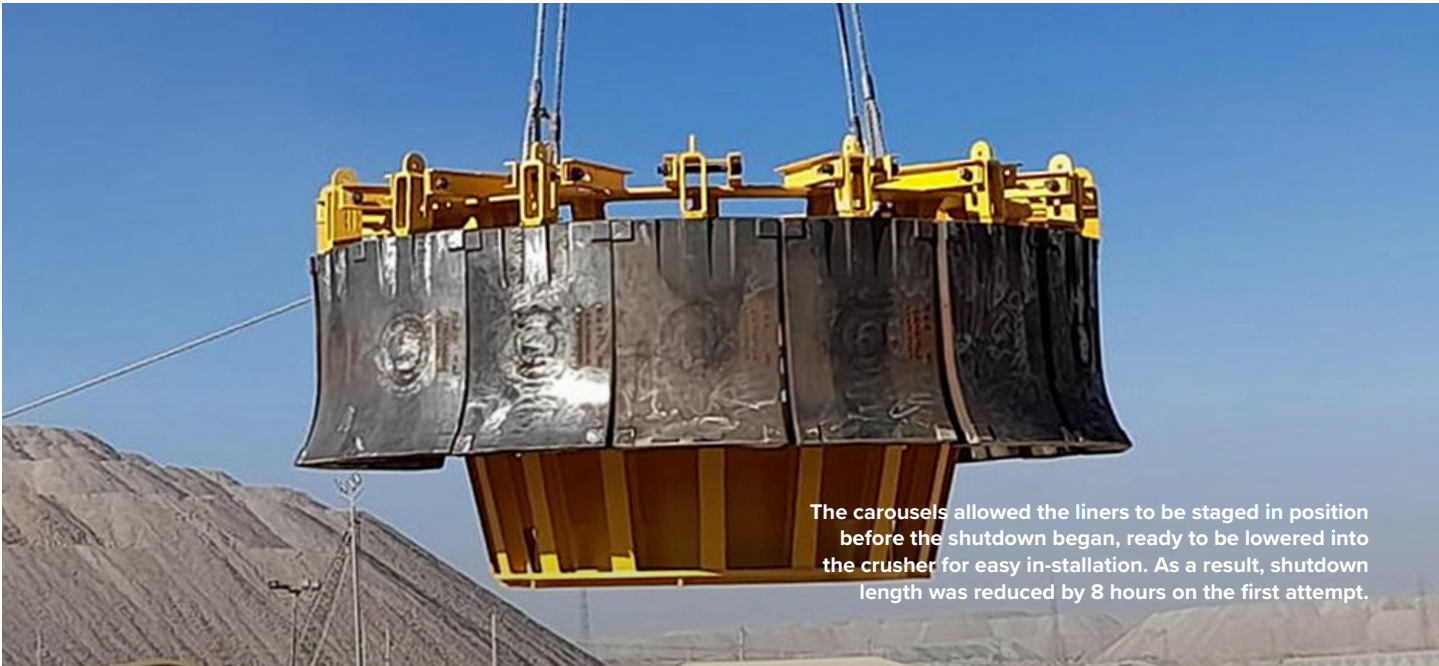
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Original design with 4 tiers



New design with 3 tiers



The carousels allowed the liners to be staged in position before the shutdown began, ready to be lowered into the crusher for easy in-stallation. As a result, shutdown length was reduced by 8 hours on the first attempt.

**The results**

The implementation was a success. The team managed to install the three-tiered concave liners safely and ahead of schedule. The carousels allowed the liners to be staged in position before the shutdown began, ready to be lowered into the crusher for easy installation. As a result, shutdown length was reduced by 8 hours on the first attempt. As the site personnel become more proficient with the new process, it is expected that the installation time will be further reduced without any compromise to safety.



	Small mine	Medium mine	Large mine
<b>Tonnes per hour Application</b>	1500	3000	6000
<b>Changes per year</b>	3	2.5	2
<b>Increased profit (yr)</b>	\$480,000	\$803,000	\$1,285,000
<b>Investment payback</b>	7.5 mo	6 mo	4.5 mo

Return on investment is estimated based on saving 1/2 day per year of downtime, assuming a Cu grade of 0.5%, a recovery of 85%, a Cu price of \$10,000 USD per tonne, and availability on 90%.