

Quick and easy ***maintenance***



Mike Hamby, Gundlach Equipment Corp., US, gives an insight into maintenance-friendly design.

In today's business environment, downtime for a major piece of capital equipment in a production environment can be anywhere from expensive to catastrophic. From his first day as a young design engineer at Gundlach Equipment Corp., this author learned that when a crusher goes down, whether for routine maintenance or in an emergency, time is crucial.

It is during times like this, for example, when you are faced with changing a damaged crusher roll in the middle of the night, that you realise how important maintainability is to your core business. At this point, you know that the ability to return a machine to reliable operation in the shortest amount of time should be a make or break decision for anyone considering the purchase of a new crusher.

Maintenance-friendly design means putting together the components that will

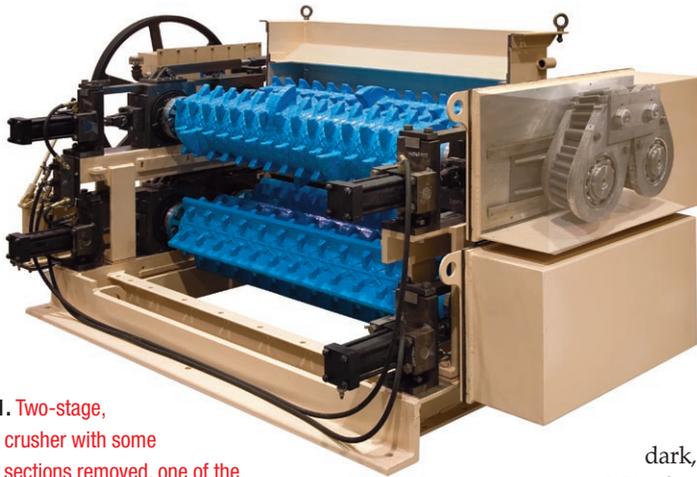


Figure 1. Two-stage, four-roll crusher with some housing sections removed, one of the maintenance-friendly design features that speeds up routine maintenance.



Figure 2. Roll crusher housing splits into sections for easy roll removal and maintenance.

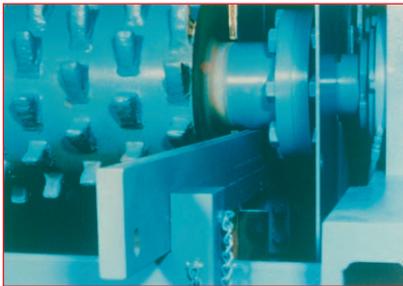


Figure 3. Coupling-mounted roll, on roll removal rail.

need servicing so that you do not need special tools to get them apart. It means that, when a crusher goes into service, you do not need to take apart a lot of extra items to get at the piece that has to be replaced. It means designing so there is no back breaking lifting to change parts that will require routine maintenance and replacement.

This maintenance-friendly design philosophy is drilled into every engineer on arrival at Gundlach. The company's engineers know what it is like to work on equipment in the cold,

in the dark, at 2 AM in the morning, in the rain or snow. They know it has to be quick and easy. And it has to be done without special tools.

Maintenance-friendly roll crushers

At the very beginning of the design process, engineers need to keep in mind the items that will wear: they have to calculate which parts will need routine maintenance and which components might be compromised during other-than-normal use. Then they have to devise designs that make it easy for crusher users to replace worn parts or repair damaged components.

In the case of roll crushers these routine maintenance items include rolls, bearings, shafts and the connection of the unit to feed chutes and discharge chutes. When the rolls have worn down, they need to be changed out quickly. Gundlach crushers are engineered so that rolls can be removed via a coupling mounted design without disturbing bearings and drives.

Older and harder-to-operate-on designs use through shafts or rolls that are integral to the shafts. Segmented rolls might help overcome this maintainability shortcoming, but the cost makes them a questionable alternative to a good roll removal design.

The simpler and cheaper way to make a roll crusher maintenance-friendly is to design the housing so that it can be split (Figures 1 and 2). With the split housing design, the crusher elements that need to be removed can be moved without disturbing the feed or discharge chute connections. Then, using a coupling-mounted roll design (Figure 3), where the shaft couples to

the roll, these connections can be easily unbolted and the crusher rolls removed.

Gundlach also supplies a roll removal rail for crusher rolls (Figure 4). The housing removal, roll removal and replacement are all done without the need to disturb the main bearings or drives. With this maintenance friendly crusher design, a normal roll change-out can be done in 4 – 8 hours, depending on operator experience and size of unit.

Cage mills designed for maintenance

In designing Gundlach's Cage Paktor cage mill, the company focused on making it easier to access and remove the cages (the actual crushing element). The standard cage mill incorporates a drive on each side of the machine. This typical design requires the removal of one of the drives to get to the cages – so you have a required maintenance item, the removal of which entails major disassembly.

Gundlach's original cage mill designs (an opposed shaft model and A model) were designed like this. But then, more than 30 years ago, the company developed a B model cage mill that addresses this maintainability shortcoming. The B model cage mill moved both drives to one side of the machine using a revolutionary shaft-within-a-shaft design. This unique design feature leaves one side of the mill fully exposed for easy maintenance of the cages and the housing liners, the only wearing areas of the machine.

The maintenance-friendly cage mill model has a full-size hinged door that can be swung out of the way to provide full access to the interior of the mill. With this unique access system, hours of drive removal, realignment and set up time are eliminated.

The cage mill door, which is secured to the feed chute and the housing via wedges, simply requires the removal of the wedges and a good tug to swing it open. One man, using no special tools, can easily open the cage mill.

The maintenance-friendly cage mill solution is further enhanced with an integral cage jack that is fitted to the unit (Figure 5). We've found this simple feature to be a real time saver in the field because your maintenance people don't have to go find the jack when it's time to change the cages. You can't lose

it, and it was made to fit the cages with ease. It was even designed so that if you have multiple units you can move the cage jack from one Cage Paktor to the other with minimal effort.

The integral cage mill jack, together with Gundlach's easy access design, allow cages to be changed-out in 4 hours or less, depending on operator experience and size of unit.

Maintainability part of the purchase equation

Maintenance-friendly design sounds straightforward and obvious; sadly, too often the end of the equation seems to be forgotten. Calculating the cost of a crusher naturally starts with capital cost. But the equation is not complete until its ability to do the job for the next 30 years is considered. And, while it is not all that hard to design maintenance-friendly equipment, it does take a level of awareness and commitment that seems to be missing with some manufacturers. 

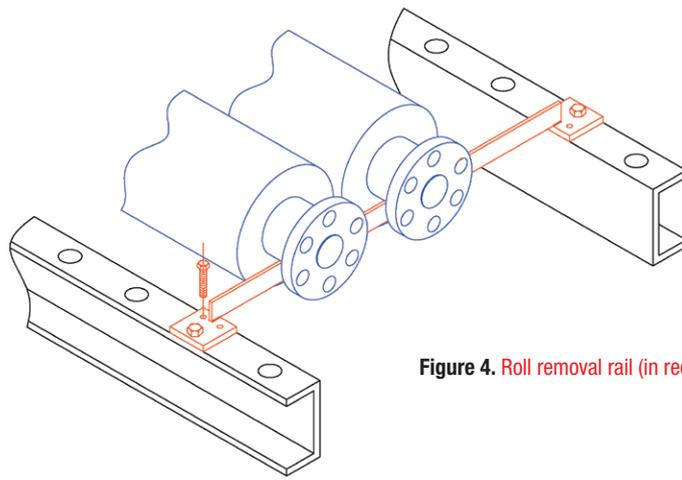


Figure 4. Roll removal rail (in red).



Figure 5. The Cage-Paktor cage mill has an onboard jack that swings into position to remove cages for repair without the need of overhead cranes or extra help.