Practical upgrade

Nigel Hendy, Loesche GmbH and Stephan Muetz, Integral Hydraulik GmbH, Germany, explain a simple means of modernising roller mills with mechanical spring loading systems.

The raw coals used in coal-fired power stations today vary dramatically in their qualitative properties and represent a major problem for comminution and combustion systems. Older mills, which use mechanical spring loading systems, can be easily modernised by simple means. The modification can be executed without extensive downtime.

Economic requirements dictate the necessity of using a wide range of coals for the production of electrical power. These in turn demand greater flexibility in grinding techniques.

The marked variations in the quality parameters of the coal mean that roller mills with mechanical spring loading systems increasingly encounter problems

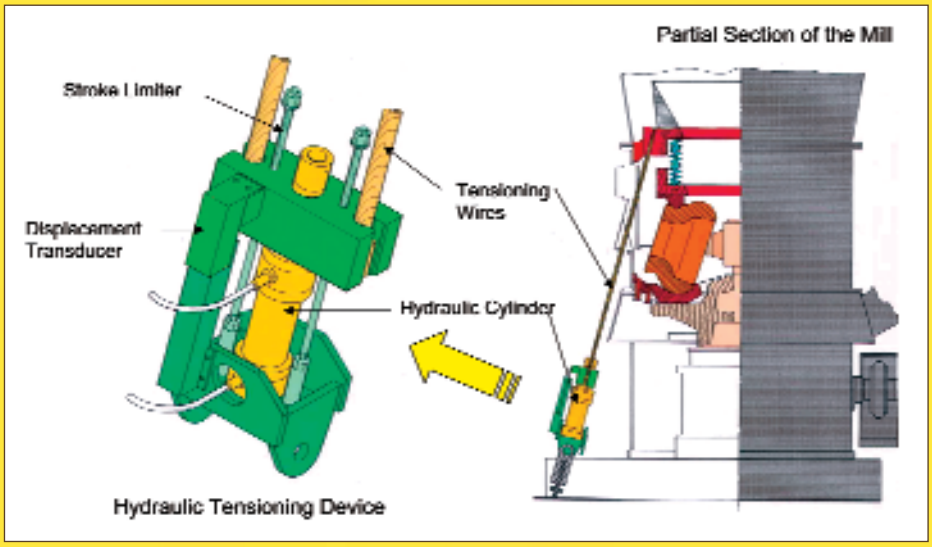

Figure 1. Hydraulic testing.

related to their capacity. These mills utilise a purely mechanical spring loading system for the rollers. The adjustment thereof is carried out before the mill goes into operation. The preset loads rise during operation as a function of the grinding bed thickness. Apart from this, power station owners demand better controllability of the boiler systems in order to produce electricity more economically than their competitors. This means that the roller mills must be optimised with respect to their controllability.

To improve the operational capability of such mills, Loesche and Integral Hydraulik have developed a continuously variable hydraulic tensioning device (Figure 1).

This device has already been installed on MB 19S/60 VKW-Babcock mills in the community power station in Hannover and on MPS 170 Babcock mills in the heating and power station of Reuter West, Berlin.

Modernisation of roller mills

Modification of the VKW-mills type MB 19S/60

The modified spring loading system is shown in Figure 2. The mechanical adjustment system has been replaced with a hydraulically operated cylinder. All three rollers have been equipped with this system, which is connected to a common hydraulic unit installed near the mill.

The grinding force is defined by integrated pressure transducers. The hydraulic system is monitored by an SPS-Controller, which allows an automatic adjustment of the tensioning. The control system continuously compares the desired with the actual position of the cylinder. A closed-loop linear transducer provides the positional information.

Once the desired position of all three systems has been achieved, the hydraulic pump is shut down. The control system is then activated in its automatic mode. The initiation for a load change in the system comes from the coal feeder.

Modification of the Babcock-mills type MPS 170

The original cylinders of the mill were checked for their suitability to work with the new system. After a positive decision, these cylinders were modified according to the new requirements and equipped with linear transducers. A newly developed common hydraulic system for the three cylinders was installed. The regulation and control of the hydraulic systems follows the analogy of the previously described VKW-mill.

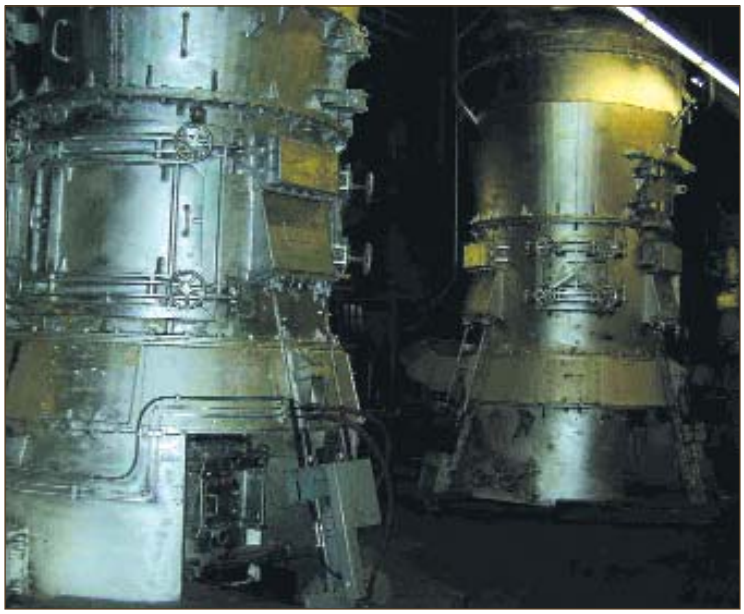

Figure 2a. VKR mills.

Figure 2b. VKR mills.

Modernisation by simple means

The modernisation of mechanical loading systems has many advantages for the operation of mills and boilers. Fundamentally it has been shown that maintenance times can be shortened.

In GKW, Hannover, the mills (type VKW MB 19S/60) are maintained every 1000 hours because of the mill design. Before modification six to eight man-hours were required. After modification only two man-hours were required. For changing the grinding force of the rollers, before modification four man-hours were required, whereas after modification no man-hours were required.

In Reuter West, Berlin, maintenance intervals on the mills (type MPS 170) are planned every 3000 hours. The work content is similar for both systems. For changing the grinding force of the rollers, before modification four man-hours were required and after modification no man-hours were required.

Advantages

The installation of a continuously variable hydraulic tensioning device brings the following advantages for the operation and reduction of maintenance costs:

- Utilisation of globally sourced coal with varying quality parameters such as: the Hardgrove index (°H), the ash content (waf) and the inherent moisture content.

Figure 3a. Hydraulic scheme.

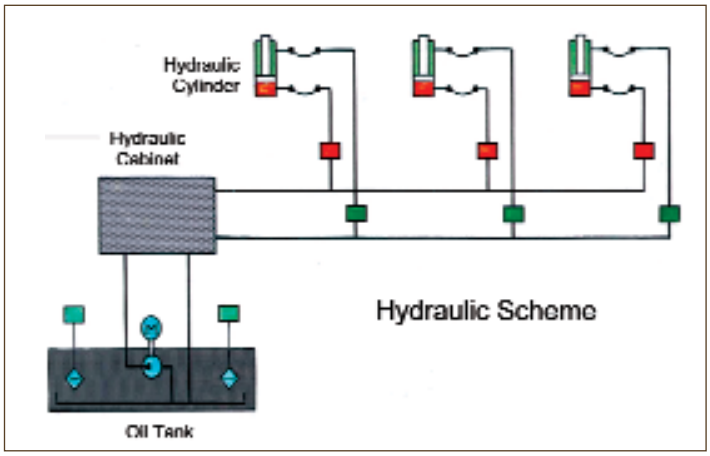

Figure 3b. Hydraulic scheme.

- A continuously variable reduction of grinding force during start and under partial load operation of the mill and a reduction in the required starting torque from 200 to approximately 140% of the maximum operational torque.
- Avoidance of vibration during mill start and partial load operation.
- Avoidance of overgrinding of the product with constant setting of the classifier under partial mill load.
- Reduction of the specific energy requirement (kWh/t) by up to 15% under partial load.
- Increasing the operational load capacity of the mill from 40 to 100%.
- Reduction of the wear on the grinding components (g/t) under partial load by reduction of the grinding force.

Conclusion

Operational experience has been gained from 2001 to this year. All 16 mills have worked with the modified loading system without problems. ■