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The Bi Support Stand – An innovation for bar mills

A new design of bar mill stand which uses tungsten carbide rings instead of grooved rolls offers a low cost, low maintenance stand of high stiffness suitable for rolling both carbon and alloy steels. **By M Zuccato* & M Tomba****

A NEW design of mill stand has been developed by the Italian engineering company Pert Srl to achieve higher yields and more flexible solutions for bar mills but at a lower investment cost than conventional stands.

The goal of the new stand design compared with a conventional stand is a dramatic increase in rolling load, faster production programme changes, significant productivity improvement, lower operating costs, and lower inventory and thus cost of spares.

The new stand, called the 'Bi Support Stand' (BS Stand) represent a formidable innovation in long product technology, thanks to its concept born from Pert's experience in supplying new rolling mills and revamping existing ones.

Experience has shown that the main requests from mill operators are for a mill which will improve product quality and yield, increase the mill available time and to significantly reduce delivery time to install the new stands.

Mechanical Properties

The mechanical properties of the new BS Stand are summarised as:

- Compact and rigid construction of the housing, the result is an extremely stiff stand deforming little as the rod passes through (Fig 1);
- Absence of chocks;
- Use of rings mounted on a shaft to make up the roll instead of a conventional cast iron grooved roll. The shaft is of alloy steel running in multiroller bearings. For the intermediate and finishing stands tungsten carbide rings are used.
- The use of tungsten carbide rings, instead of traditional cast iron grooved rolls, provides high wear resistance. The goal is to achieve better mill performance with a more wear resistant material.
- The radius of the 'roll' neck is increased to minimise stress concentrations.
- The rolling stands facilitate roll changes in 2-3 minutes, minimising changeover time helps boost productivity.

- The rolling stands are built to a common design. All stands with the same ring diameter are identical.
- Due to the fact that horizontal and vertical stands have the same design, the number of spare parts is minimised.
- The BS stands are especially designed for also rolling high alloyed steel grades to very close tolerances, this requires stiff rolling stands with minimum elongation under the roll separating forces.
- Adjustment of the ring centre distance is by means of simultaneous opening/closing of both shafts by screw down gears which directly act on eccentric sleeves. The ring centre distance is controlled by an encoder and displayed at the main control pulpit. Regulation of the ring centre distance is by hydraulic motor with a double worm screw reduction gear to ensure absolute precision.
- Easy access to the stands facilitates ring change, removal of cobbles, maintenance, and adjustment of guides.
- To take up the high separation forces the shaft rings are supported on both shaft necks in heavy self-aligning roller bearings.
- To take up the axial forces, paired bearings are installed. The roll bearings are protected against water and scale infiltration by labyrinth and double-lip seals.
- When the rings have reached a minimum diameter, they are removed and the shaft itself reused. This minimises tool costs.
- The BS stands have a new system of lubrication and water cooling without on board pipes, flexible hoses etc.

Advantages of BS Stands

The smaller overall dimensions of the stands reduces investment costs to build the necessary foundations and requires extreme compactness of the technology (Fig 2). There is also a reduction in the height of overhead cranes (level of rails), the crane capacity needed is less, a shorter installation time can be achieved and a reduction in plant delivery time.



The BS mill stand

All stands are supplied ready to use. That means they are ready to be installed on the foundations. All the assembly work is done in the Pert workshops together with the necessary on board equipment. This philosophy considerably reduces the construction time in the mill.

The new stand design provides an operator-friendly arrangement. Automation of the mill reduces the number of operators needed per shift thus saving labour costs.

In conclusion, the BS stand introduces a new concept of mill equipment for the long product sector. It provides an answer to new and existing mills to reduce production costs and supply to the market a high quality finish product. The stand increases productivity, has rapid set up time, greatly reduced maintenance, cuts workshop activity and number of machines as the use of rolling rings means smaller tools can machine the grooves compared with a grooved roll and also rings reduce the space required in storage. ■

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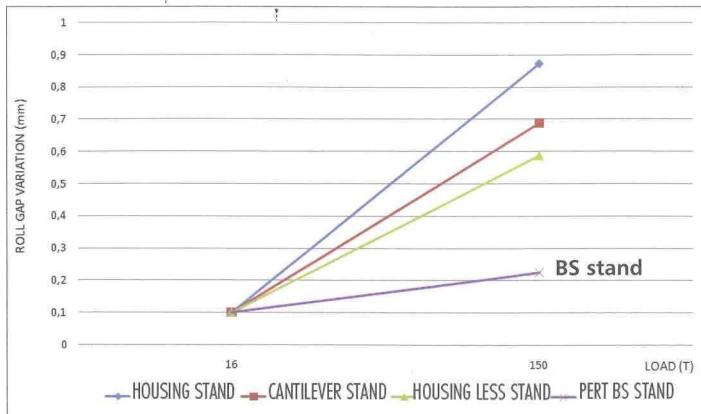


Fig 1 Comparison of stand stiffness for various stand designs

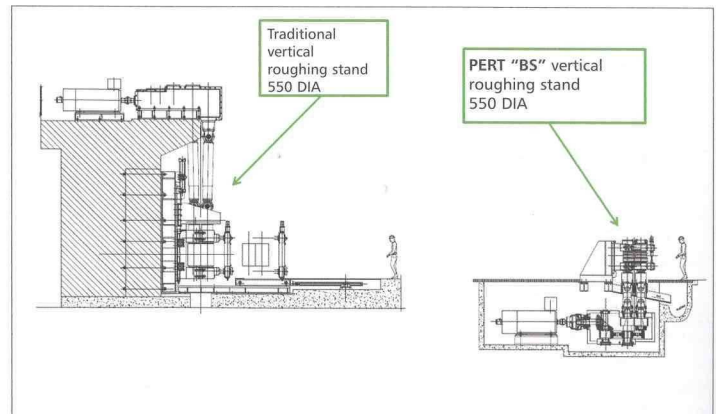


Fig 2 Differences between the BS type and conventional stands in vertical configuration

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