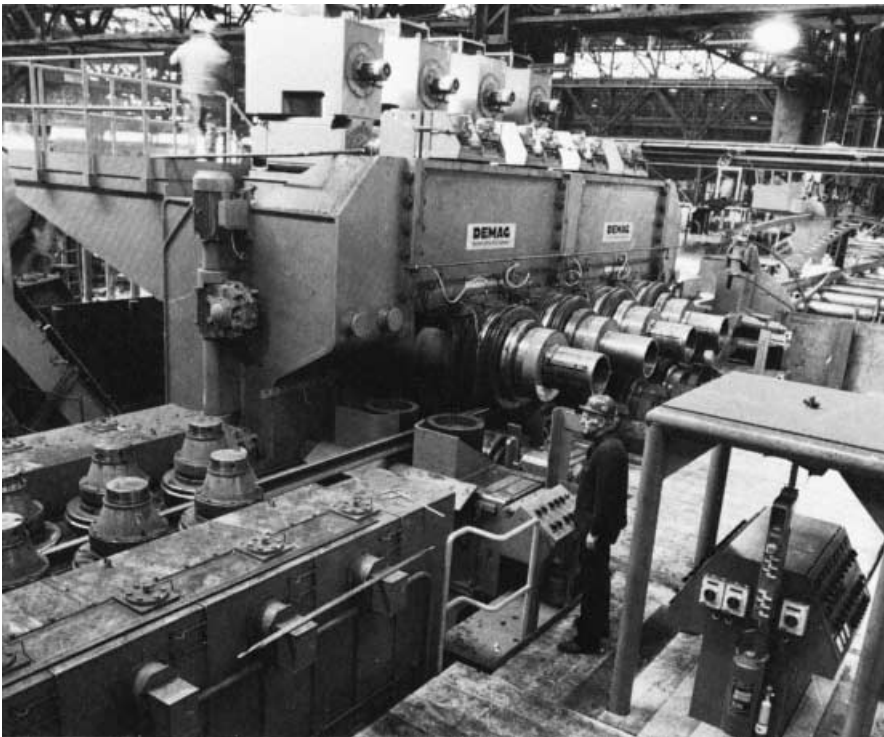


Bearing Rigidity - A Precondition for Straightening of Section Material

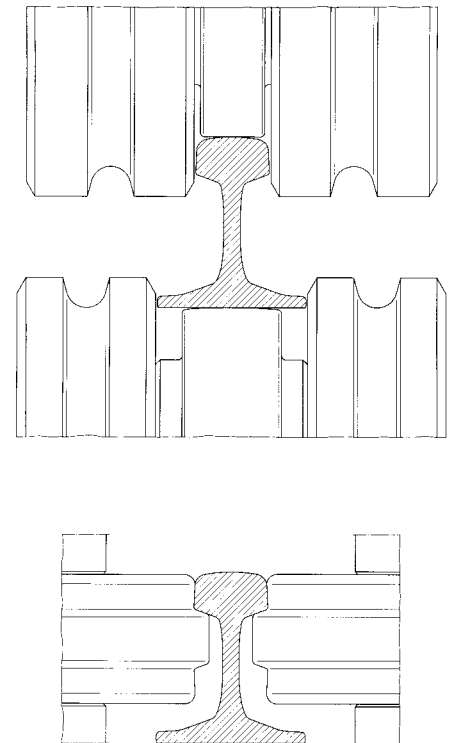


Examples of Application Engineering

Publ. No. WL 17 501 EA



Courtesy: Mannesmann Demag



Rails for railway track systems or for craneways are hot rolled in rolling mills. After rolling the rails cool on cooling beds, but not uniformly, resulting in warping. Therefore the rails must be straightened in straighteners between horizontal and vertical rolls.

The straightener shown was built by Mannesmann Demag Metallverformung. It is installed in the plant Georgsmarienhütte GmbH.

On this machine rails of a length of more than 60 m can be straightened. With the present cross sections each meter rail weighs 70 kg. Apart from rails, round and square material as well as section steel beams can be straightened.

The straightener consists of two machines one installed behind the other. In the first machine the rails run through horizontally arranged rolls. The rolls of the second machine are, however, vertically arranged. Thus the rails are straightened in both planes after having passed the two machines.

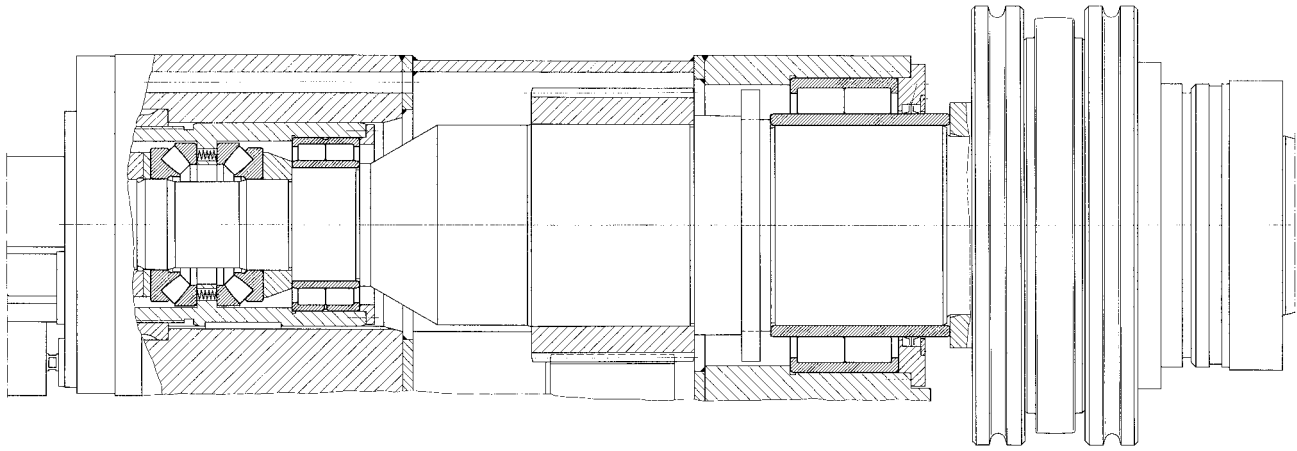
Each machine features nine straightening rolls, four of which being driven. The straightening rolls with diameters of 600 to 1,200 mm form an overhung arrangement in order to allow easy replacement.

Demands on the Bearing Assembly

The mounting space is dictated by the distance of the straightening rolls. In this mounting space bearings had to be accommodated which have such a high load carrying capacity to allow for reasonable running times.

The bearing assembly must have maximum rigidity, since this determines the precision of the rolled stock.

Depending on the position of the rolled stock the roll position must be adjustable. Therefore the bearing assembly had to be designed such to allow for a position change of the shafts and thus the straightening rolls by ± 50 mm.



Horizontal Straightening Rolls

The maximum radial load on the horizontal rolls is 4,200 kN. Depending on the rolled stock thrust loads up to 2,000 kN occur. The speeds vary between 2 to 60 min⁻¹.

For accommodation of the radial loads double row cylindrical roller bearings were provided on account of their high load carrying capacity and rigidity.

The higher loaded cylindrical roller bearing located directly next to the roll, has a bore diameter of 530 mm, an outside diameter of 780 mm, an outer ring width of 285 mm and an inner ring width of 475 mm. The less loaded cylindrical roller bearing has the dimensions 300 x 460 x 180 mm.

The thrust loads are taken up by two spherical roller thrust bearings 29448E.MB (dimensions 240 x 440 x 122 mm). They are spring-adjusted.

During positioning of the straightening rolls, the bearings must compensate for the axial displacement which may amount to ± 50 mm. For the cylindrical roller bearing adjacent to the straightening roll the axial displacement is compen-

sated by an extended inner ring. The inner ring has such a width that the lips of both seals always slide on the inner ring with an axial displacement of ± 50 mm. The second cylindrical roller bearing is seated together with the two spherical roller thrust bearings in a sleeve which is axially displaceable in the hollow cylinder. The position of the straightening rolls as to the rolled stock is adjusted by means of a ball screw.

Vertical Straightening Rolls

The vertical straightening roll bearing arrangement is in principle identical to that of the horizontal straightening rolls. Due to the lower straightening loads smaller bearings could be mounted.

Radial Bearings

Double row, axially displaceable cylindrical roller bearing of the dimensions 340 x 520 x 200/305 mm.

Single row cylindrical roller bearing NU 2244M.C3 of the dimensions 220 x 400 x 108 mm.

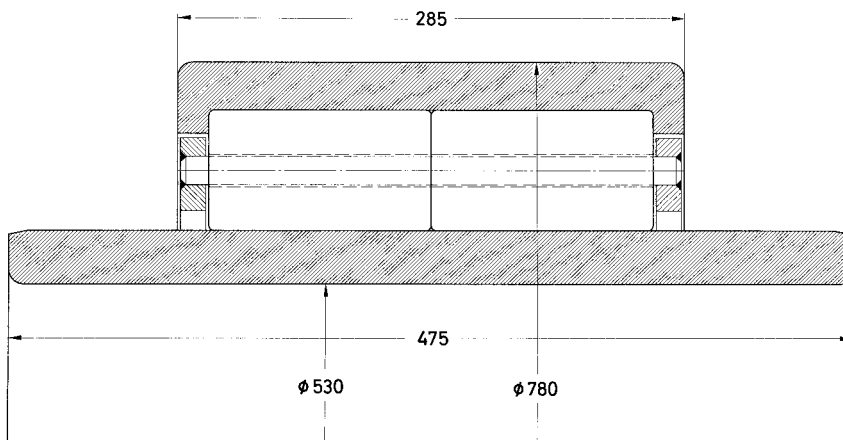
Thrust Bearings

Two spherical roller thrust bearings 29432E of the dimensions 160 x 320 x 95 mm.

Lubrication and Sealing

In spite of the heavy loads and low speeds it would be possible to lubricate the cylindrical roller bearings with grease. The spherical roller thrust bearings must, however, be oil-lubricated. Therefore all bearings are supplied with oil by means of a central lubricating system. Per straightening roll unit about 10 l oil per minute are fed through the bearings. At the spherical roller thrust bearing end the unit is closed by a cover. At the shaft opening in the direction of the straightening roll two laterally reversed grease-lubricated seal rings prevent oil escape and penetration of contaminants into the bearings.

This double row cylindrical roller bearing is the largest of the four radial bearings which were especially developed for support of the straightening rolls. The cylindrical roller bearings have through-bored rollers. The rollers are kept apart by means of pins and cage washers. Since with this design the distance between the rollers may be no matter how small, the maximum number of rollers can be mounted, and, according to the mounting space, the maximum load carrying capacity of the bearing can be obtained.



E-Mail: steel@fag.de