

## Forging and Straightening of Railway Axles



One of the most stressed parts of a train's chassis is the axle. It is forged on both the rotary forging presses and, in the case of smaller production runs, with a higher forging degree on the conventional forging presses.



### Forging Railway Axles

Axles are forged from square billets, which are made from high quality vacuumed steel that is heated to the forging temperature and then an integrated forging set creates the basic shape of the axle. This set consists of a CKNV 1000 forging press (traditional push-down high-pressure design), a QKK 1.5 forging manipulator and a rotary lifting table. The basic axle is a standard forging made on three sizes of the die. This allows for forging within the required parameters of  $\pm 1.5$  mm, with a high degree of forging. High mechanical properties of the axles are achieved thanks to the forged depth of diameter crossings – radial forging. Once the forged axle goes through a computer controlled heat treatment, it achieves optimal mechanical properties. During the heat treatment, however, slight bending and shape deformation occur but this is adjusted with the straightening presses.

ŽDAS, a.s.  
Strojírenská 675/6  
591 01 Žďár nad Sázavou  
Czech Republic  
tel.: +420 566 641 111  
fax: +420 566 642 850  
e-mail: [zdas@zdas.cz](mailto:zdas@zdas.cz)  
[www.zdas.com](http://www.zdas.com)

#### Line parameters:

Forged axle weight	400–1,000 kg
Forged diameter	120–265 mm
Axle length	1,800–2,900 mm
Line capacity	according to customer's needs

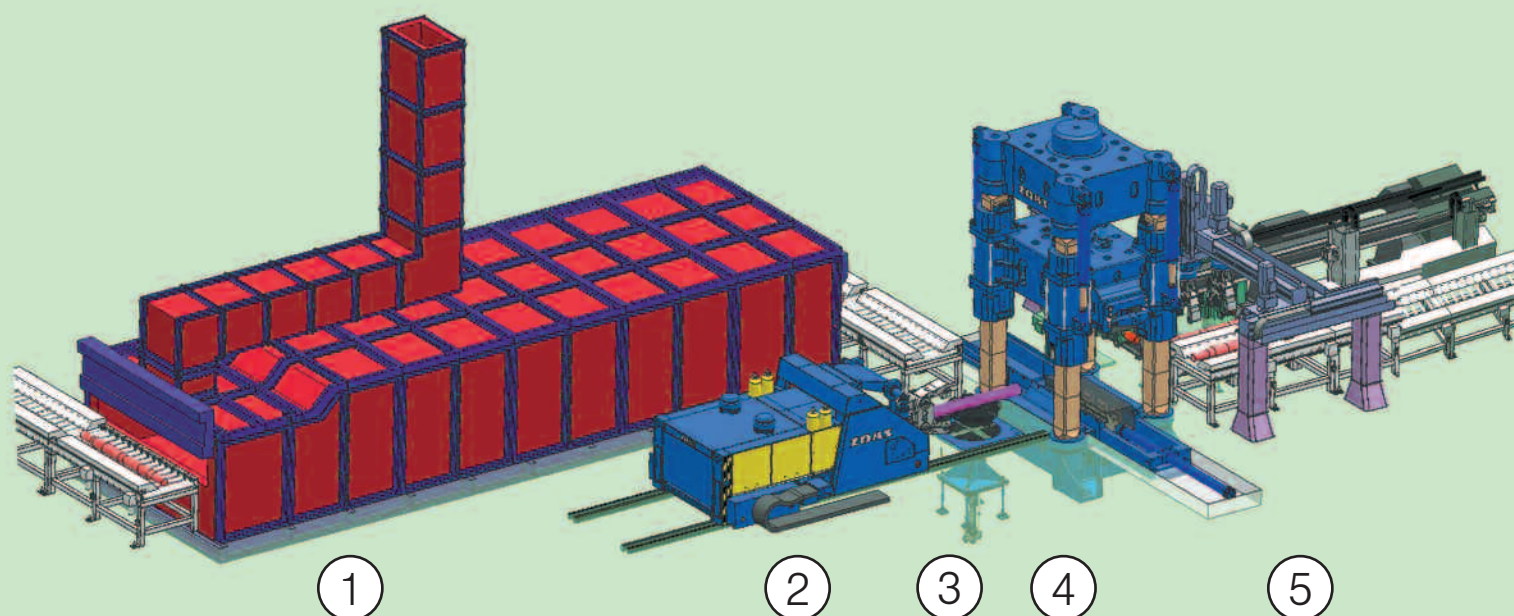


# Straightening and Inspection of Railway Axles

After heat treatment of the forged railway axles, straightening is necessary. The operation returns the semi-finished axle to the required axial straightness and maintains the minimum chip machining allowances. For this operation, ŽDAS offers a complete line which can work independently or in an integrated set with a CKNV forging press. The line is equipped with a hydraulic RL 200 or RL 400 straightening press.

After leaving the heat treatment box, the conveyor transports the axle to the straightening press. Flatness is measured by electronic optics and the force needed for straightening is evaluated by a control program. For higher forging output, productivity is ensured by the arrangement of more straightening presses side by side.

After straightening, the axle is transferred to the cooling conveyor. A distinctive identification system throughout the entire forging and straightening line, as well as archiving of data for each axle, allow for any subsequent review. After the necessary tests to verify dimensional and material characteristics, the axle is released for further processing.



*ŽDAS Integrated Forging*

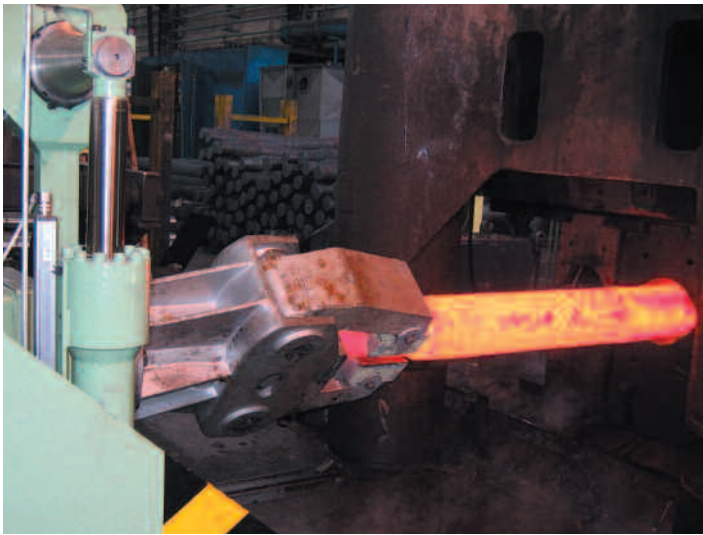


*QKK Forging manipulator*

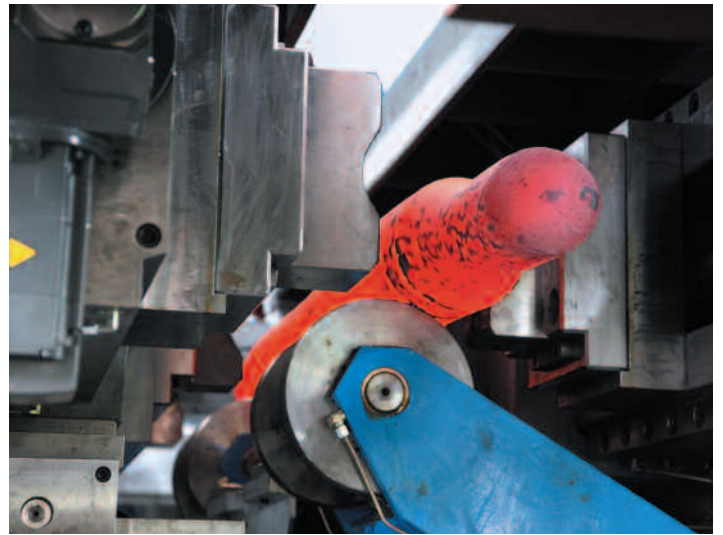


*Railway axle in the straightening press*

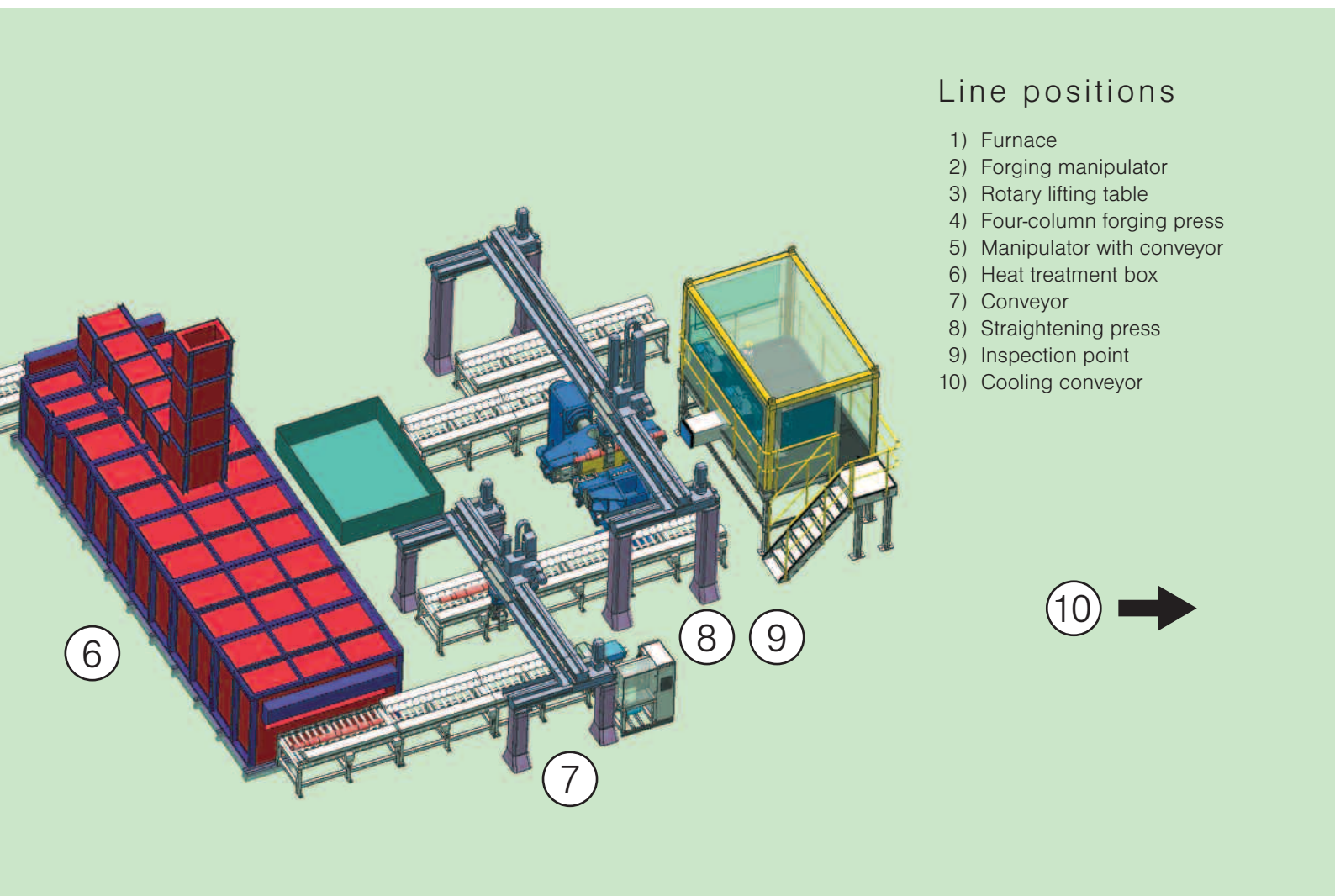




*Forged railway axle between the swages of a CKNV 1000 Press*



*Straightening the axle in a 400 RL Hydraulic Straightening Press*



*Assembled conveyor with manipulator*

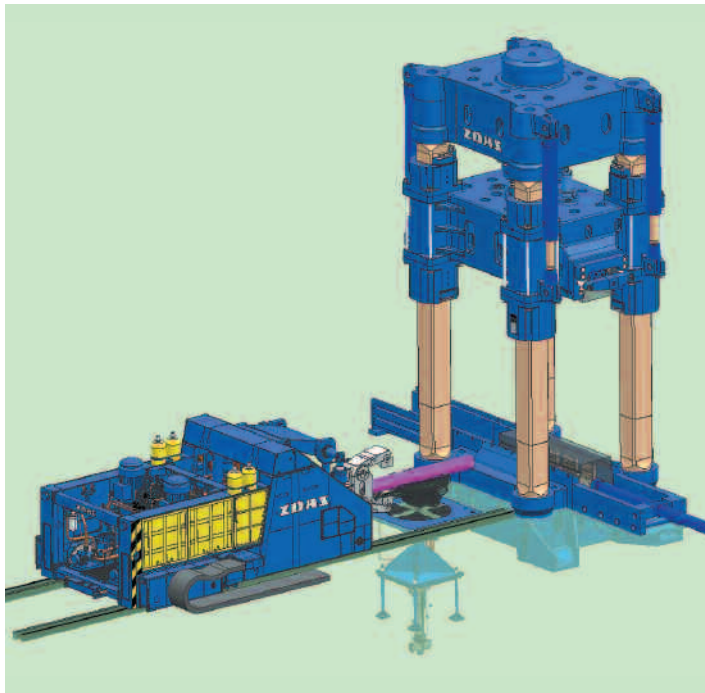


*Cooling conveyor*



*Assembled wheelsets*

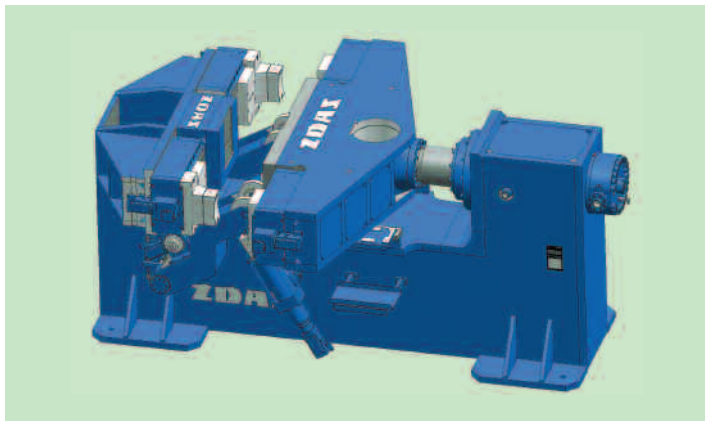




## CKNV 1000 Hydraulic Forging Press

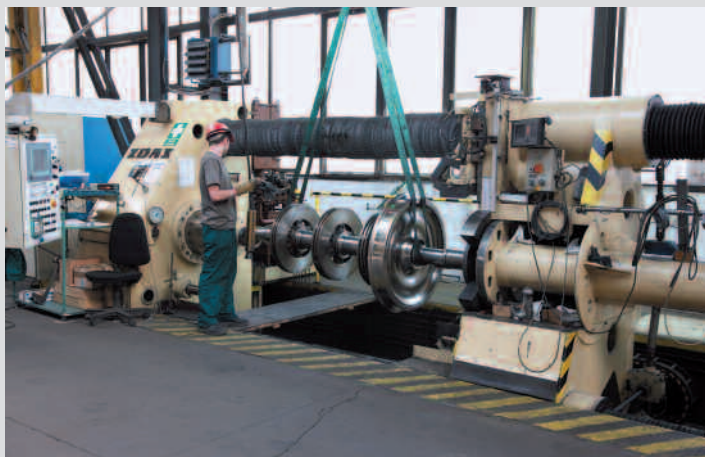
*This is a modified four-column push-down high-pressure press for open die forging with a unit drive. The press is equipped with a special set of swages for forging railway axles within the required parameters. The press is integrated with a rail-bound forging manipulator and rotary lifting table. The forging process data can be stored in the memory of the control system for possible reuse in large production volumes of other pieces – automatic forging.*

Nominal forming force	10 MN press
Forming speed	120 mm/s
Stroke	600 mm
Manipulator weight capacity	1,500 kg
Grasped diameter	80–350 mm
Accuracy of rotation angle	±1 degree



## Straightening Line for Railway Axles

*This fully automatic line is designed for the straightening and cooling of railway axles. It consists of three hydraulic presses with setting via synchronous servo drives, each press is equipped with input and output devices. Moving the hot axle from the presses to the two coolers is provided by conveyers with turning capabilities. Two manipulators load the axle onto the cooling bed and two manipulators are responsible for dispatching. Using the same number of manipulators assures balance.*



## CDR CDRA Presses for the Assembly and Disassembly of Railway Wheelsets

*The CDRA Hydraulic Press is designed for cold pressing of railway axle-wheel sets, without guide bushings, and with axle turning. The apparatus even allows for pressing of components between the wheels. In addition to wheels, the machine also allows the pressing of the drive gear and other components on the axle. The press is horizontal with columnar construction. The press cylinder, located in the stationary crossbeam, applies optimal force on the pressed pieces against the bearing crossbeam. The crossbeam moves along threaded anchors to the preset measured position. The hydraulic centering of the wheel is mounted in the bearing crossbeam while the axle hydraulic centering can be found in the rear stationary crossbeam. The control system assures the control of the press, as well as operational and error diagnostics.*

# ZDAS

