

Technical data

Mechanical	
Gauge:	to specification
Wheel-set diameter range (machinable):	540 – 1,400 mm
Wheel-set diameter range (roll-through):	540 – 1,250 mm
Brake disc diameter range (machinable):	300 – 940 mm
Axle lengths:	max. 2,600 mm
Wheel-set weight:	max. 5,000 kg
Tool post feed range:	0.01– 3.5 mm/rev
Tool post speeds:	max. 4,500 mm/min
Cross section of cut per tool:	max. 18 mm ²
Electrical	
Operating voltage:	to specification
Control voltage:	to specification
Main drive output:	approx. 100 kW
Speed range:	5 - 500 m/min
resp. at 1,000 mm dia. wheel:	1.6 – 160 rpm
Dimensions	
Machine weight:	approx. 35,000 kg
Machine height above floor level:	approx. 2,300 mm
Machine dimensions (for 1,435 mm gauge):	length 7,000 mm width 2,700 mm height 3,300 mm
Accuracy	
Diameter difference:	< 0,2 mm
Rotational accuracy:	< 0,1 mm
Lateral wobble:	< 0,2 mm
Profile geometry:	< 0,2 mm
Output	
Wheel-sets per 8 h:	35 – 50 pcs.

Portal Wheel Lathe

Type PN 190



GP 030F VC 05.06 Subject to technical change 27.08.08

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Hegenscheidt MFD

Hegenscheidt-MFD GmbH & Co. KG
Postfach 1652 • D-41806 Erkelenz
Hegenscheidt Platz • D-41812 Erkelenz
Tel.: 0 24 31 / 86-0 • Fax: 0 24 31 / 86-466
E-mail: hegenscheidt.mfd@nshgroup.com
www.hegenscheidt-mfd.de

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Portal Wheel Lathe Type PN190

PN 190 portal wheel lathe

The PN 190 portal wheel lathe represents a pioneering design in the field of wheel-set maintenance. Its combination of the portal frame with the friction roller drive opens up new dimensions in the technology of wheel-set turning in terms of productivity and machining quality.

Portal frame

The portal design is the ideal way of creating sufficient clearance for loading (wheel-set roll-through) and operating the machine. This yields high productivity and economy. In addition, thanks to this design principle, the tool posts are positioned overhead, thus permitting unobstructed swarf removal.

Friction roller drive

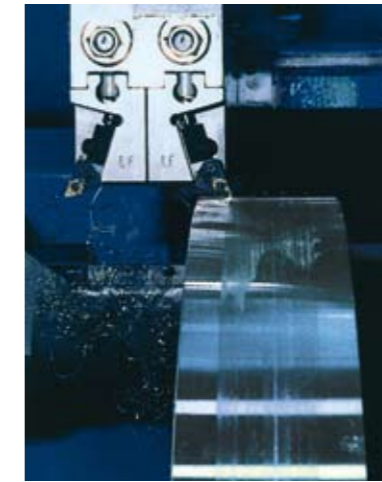
Owing to its design advantages, the friction roller drive ensures a two- to three-fold improvement in rotational accuracy and lateral wobble over conventional machines with clamping. Clamping marks are eliminated. Machining with mounted axle boxes is possible irrespective of their size.



Ancillary equipment

Profiling in relation to axle centre

With the friction drive wheel lathe type PN 190 it is now possible for the first time to machine wheels in relation to axle centre. A special additional measuring device gauges the position of the wheels in relation to axle centre (C dimension). The reference faces at the axle ends and the position of the back tyre faces are measured in this process. Any necessary corrective machining is automatically carried out.



Brake disc turning

The PN 190 friction roller wheel lathe can be equipped for the machining of a wide range of brake discs.

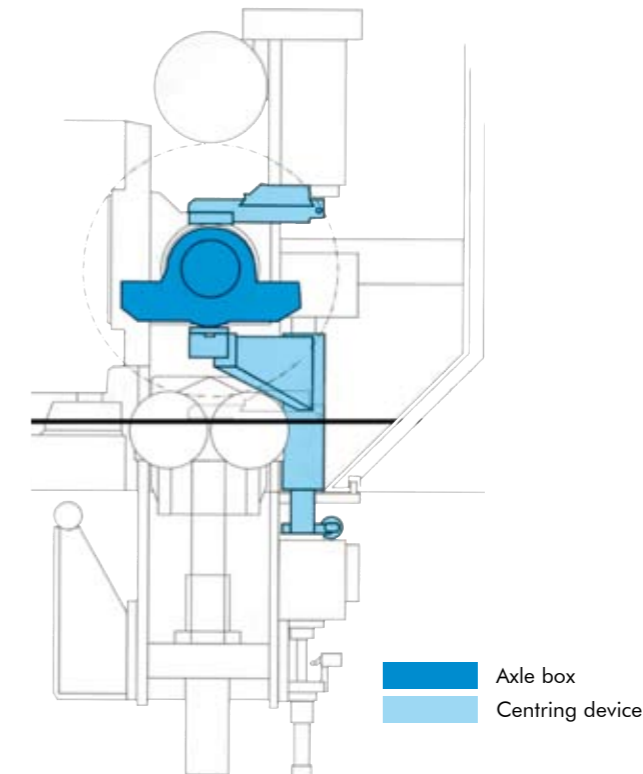
Through the activation of a special measuring device, the wear of the wheel- or axle-mounted brake disc is automatically determined. The simultaneous turning of two brake disc surfaces is performed at a high cutting speed.

Wheel rim turning

The PN 190 is also designed for the turning of wheel rims. With this item of ancillary equipment, the rim is driven by the friction rollers, which ensures that the surface quality is maintained.

Axle box centring

The friction roller drive allows the wheel-set to be clamped and centred with the axle boxes fully closed. Integrated clamping systems positively fix the axle box with adapters. This ancillary equipment renders superfluous the awkward removal and opening of the axle box, and thus creates scope for rationalization in the machine shop.



Axle box centring device

Wheel-sets with external axle boxes and mounted axle boxes can be centred. The axle box centring device is moved into and out of position by a hydraulic cylinder.

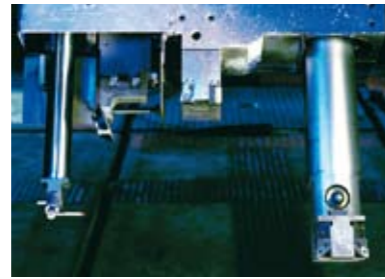
Flexible machine concept for high surface quality and profile accuracy



Flange drive

The friction rollers drive the wheels of the wheel-set on the rim of the flange. This reliably prevents chips being rolled into and thus damaging the wheel tread.

With a tread drive, different wheel profiles may necessitate roller change or adjustment. The patented flange drive boosts productivity as it is independent of the shape of the wheel profile and no retooling is therefore necessary.



Efficient tool systems

The cutting tools employed are of the cassette type with standardized carbide inserts, which permit rapid tool change.

Owing to the large speed range of the main drive, it is possible to use special cutting tools to achieve high cutting speeds and short turning times during the supplementary tasks of turning brake discs or wheel rims.

Machining with high flexibility

If the tool supports are equipped with hydraulically extendable tool rams, a large number of extra turning tasks can be performed in addition to normal wheel profile turning.

The requisite cutting tools and quick-change tool rams are equipped with a tool positioning sensor and coding for tool identification, fitted to the end of the tool ram.

Special measuring and machining programs with operator guidance permit largely automatic tool post positioning relative to the work-pieces.

Positioning and wear measurement

Measuring point 0:

- Determining the back to back dimension (AR dimension)
- Determining the switch point for axially centring the wheel-set
- Positioning the tool posts in relation to the wheel-set

Measuring point 1:

- Measuring wheel flange diameter

Measuring points 1, 2, 5 & 7:

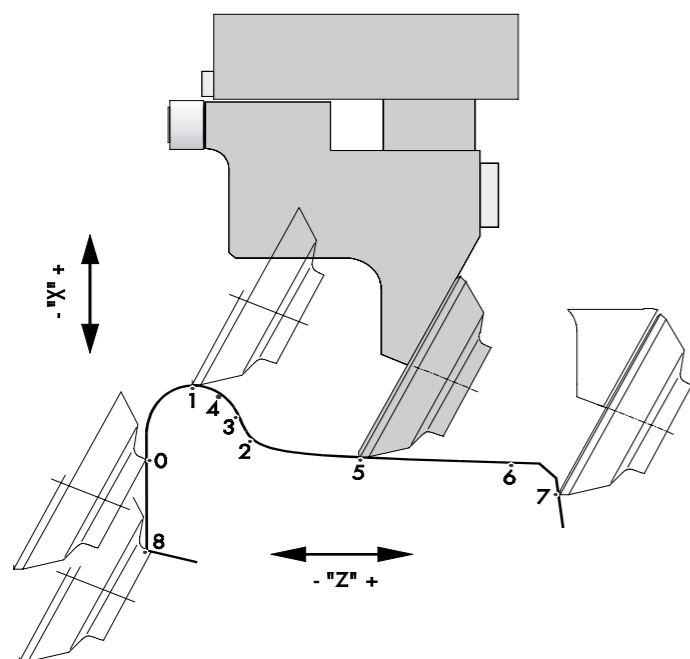
- Measuring the wheel-set wear profile by radially sensing the flange and tread

Measuring points 3,4:

- Measuring the wheel-set wear profile by axially sensing the flange

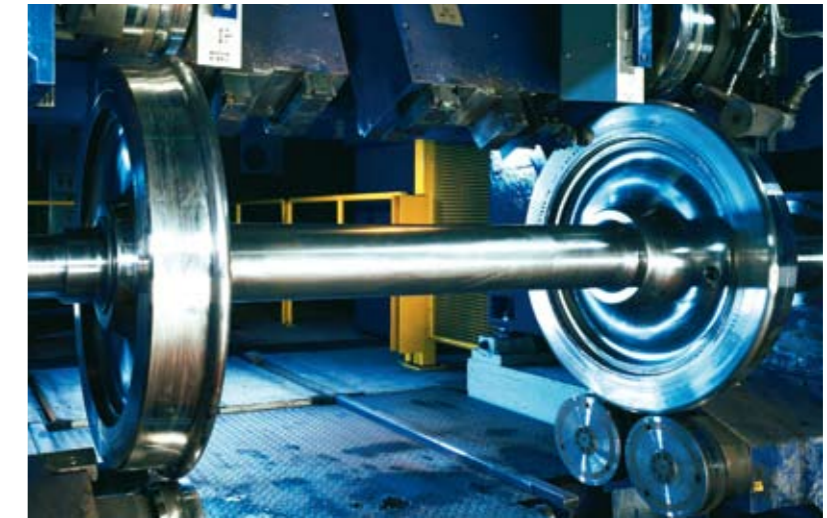
Measuring point 8:

- Determining tyre thickness



Economy

- High degree of automation
- Rapid loading and unloading
- High productivity thanks to an optimized cutting process
- Quick change tooling
- Heavy-duty drive systems
- Long service life



Safety

- No rotating driving elements
- Avoidance of chuck marks
- Tried-and-tested portal design with overhead tool posts
- Large clearance for wheel-set loading and roll-through operation
- Optimum swarf removal via large floor opening and swarf plate
- Optimum operator protection by means of fully enclosed machine

Precision

- High machining precision in terms of rotational accuracy and surface quality
- Minimum resulting force on centres due to optimum arrangement of drive-rollers/tools
- Measuring system for diameter and profile wear
- Measuring system to determine position of wheels on axle
- Measuring system to determine rotational accuracy of axle
- Measuring system for wheel- and axle-mounted brake discs

Versatility

- Reprofiting of all conventional locomotive, coach and wagon wheelsets
- Machining of internal and external faces of re-tyred wheelsets
- Turning of axle- and wheel-mounted (internal/external) brake discs
- Convenient operator guidance
- Use of loading trucks
- Wheel rim turning
- Axle journal turning and burnishing
- Last turning groove functionality



The machine for high productivity, precision and safety



Precision machining for high product reliability and quality

The two wheels of a wheel-set undergoing machining are each driven by three friction rollers acting from the wheel flange. Unlike conventional chuck-type lathes, no chuck marks caused by the clamping of the drivers can occur. In addition, the friction roller drive is insensitive to wheel-set weight, clamping forces and errors in the geometry of the centre barrels and lathe centres, thus facilitating outstanding rotational accuracy of the wheel-set at all times. The resultant improvement in wear behaviour is in turn beneficial to the travel comfort and the wheel-set's service life.

Enhanced production flexibility and output

The portal design of the PN 190 wheel lathe permits wheel-set roll-through with high output. In addition, the friction roller drive improves flexibility in production, since the time-consuming setting of drivers to different clamping diameters, as required on conventional faceplate machines, has been entirely eliminated. This accelerates wheel-set loading and unloading considerably, which in turn boosts productivity.



High safety standard

The PN 190 wheel lathe is distinguished by CE conformity with high operator safety. As a result of the overhead CNC tool posts, unobstructed chip deposition is possible, which, combined with the integrated swarf conveyor, rules out the risk of injury from sharp-edged swarf.

Furthermore, the operator can control the cutting process at eye level. During this process, the entire machine chamber is completely enclosed behind sliding doors and guarding, all moving parts are encapsulated, and the operator is protected from flying swarf.

A camera system permits the remote monitoring of both wheels and enables the operator to react quickly to malfunctions.



Control and monitoring system

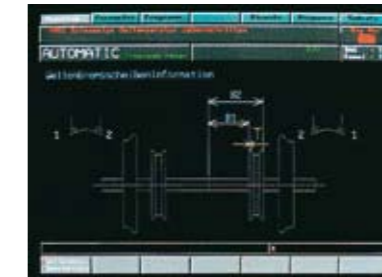


Automatic control and monitoring

Throughout the machining cycle, the various functional processes are fully monitored. After the automatic clamping of the wheel-set, the system performs preliminary measurements and thus determines the parameters for machining. The control system then proposes a machining cycle, which can be manually modified if required. After approval of the finalized procedure, the wheel-set undergoes its machining cycle, the outcome of which can be checked by automatic remeasurement. The wheel-set is subsequently automatically released.

Recording and processing of machining and operating data

All the data are recorded and can be documented in a variety of ways. This applies as much to the entire reprofiling of a wheel-set as to brake disc and wheel rim turning. The machine is equipped with a CNC multi-axis continuous-path system, which records and processes control and measurement data in a PC-compatible format and sorts and manages the specific wheel-set data. This system can be linked to a higher-level computer belonging to shop management



Convenient operator guidance

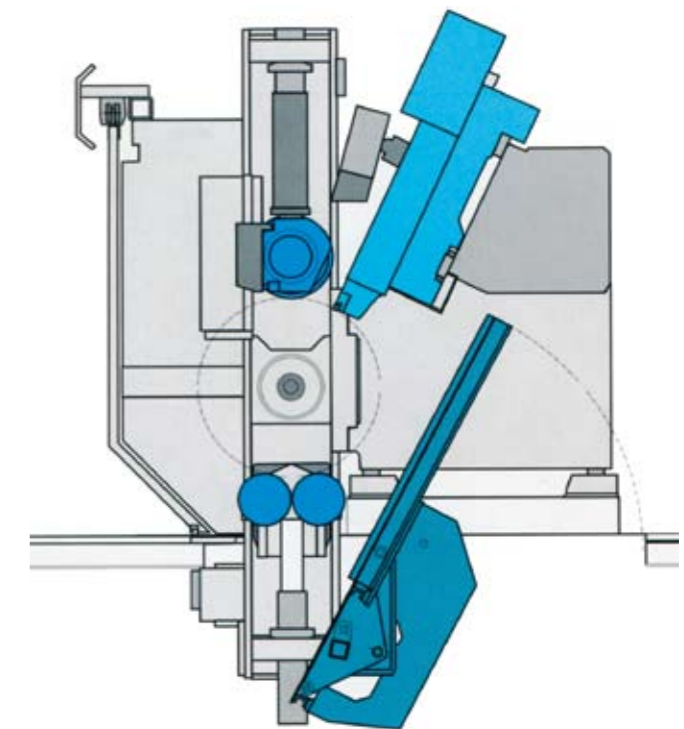
To ensure that the operator is aware of all the necessary wheel-set-related information and machine parameters, he is guided in dialogue with the screen through a sequence of questions concerning the planned work cycles.

After the programmed measurements have been automatically carried out, the machine's control system proposes the wheel-set turning data matching the selected machining strategy.

This convenient and reliable man-machine communication results in extremely economic and precise production results, which are independently logged and processed by the machine's systems.

or to the plant management departments. This data system has the following tasks:

- Extensive wheel-set data capture and management
- Production of graphic wear statistics (profile evaluation)
- Production data recording, order management and accounting
- Machine diagnosis and logging



Friction roller drive system
Overhead tool posts
Wheel-set arresting and ejection device, swarf plate