4-way rail straightening machine

NRS

Technical description

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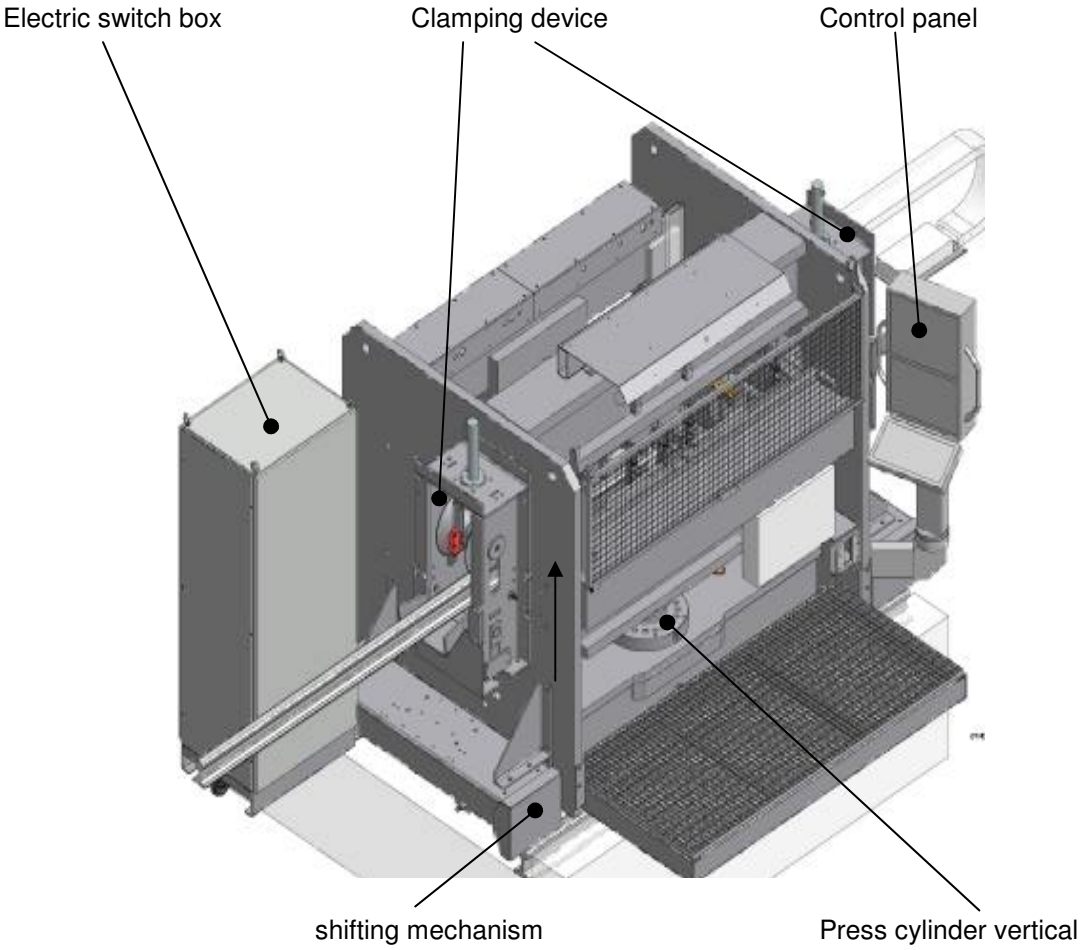
1. Purpose of the machine

The hydraulic press is used in rail welding or repair plants for straightening of rail profiles after the welding in horizontal and vertical direction.

Various types of rail profiles can be straightening by using the relevant exchangeable press tools.

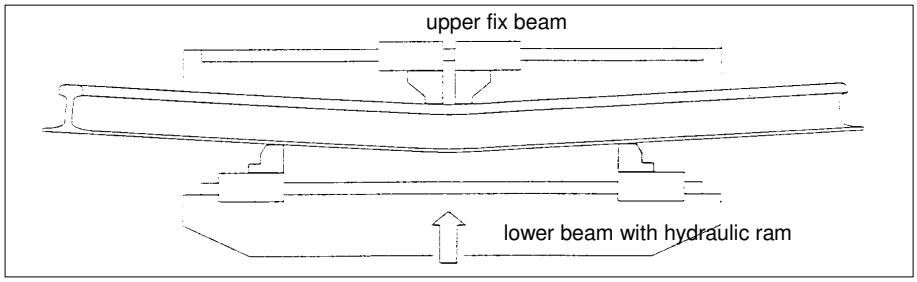
The straightening process is initiated manually by actuating the corresponding control elements on the control panel. Thanks to the help of the integrated laser measuring and monitoring system, the operator can check the straightness before and after the straightening process.

2. Main Components

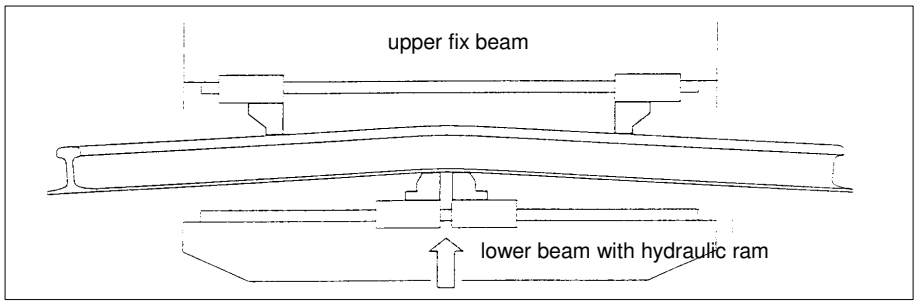


3. The straightening process

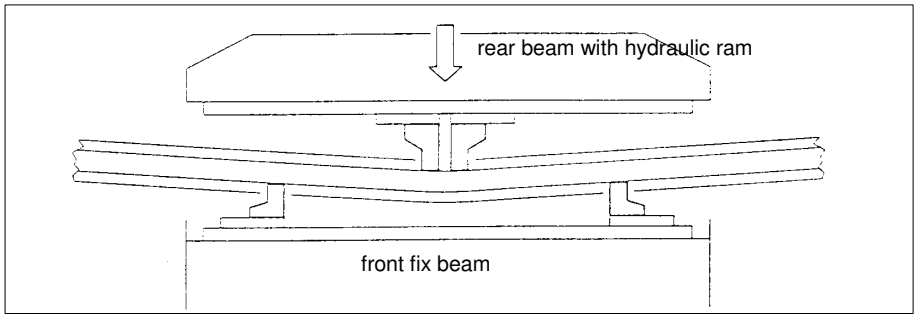
Vertical straightening downwards



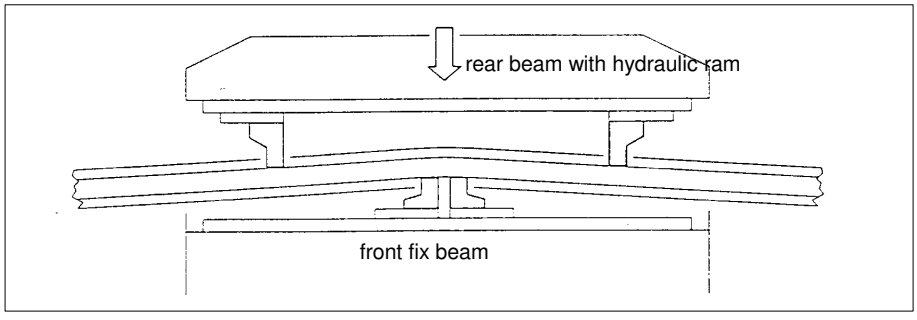
Vertical straightening upwards



Horizontal straightening forwards



Horizontal straightening backwards



4. Machine components

4.1. Machine rack

The machines body is a robust steel construction. On the bottom of the machine is placed the hydraulic cylinder which moves the lower beam with the press tools. On the back side of the machine is placed a hydraulic cylinder with rear beam with the press tools. In front and on the top are positioned the fixed beams with the press tools.

On the in- and outlet side are clamping units in order to fix the rail during the straightening process.

4.2. Shifting mechanism

The straightening press stands on 4 wheels and can be moved by means of a gear motor on guide rails on the floor. The direction of travel can be selected with a pushbutton on the control panel. The machine is positioned in order to place the welded joint in its the centre.

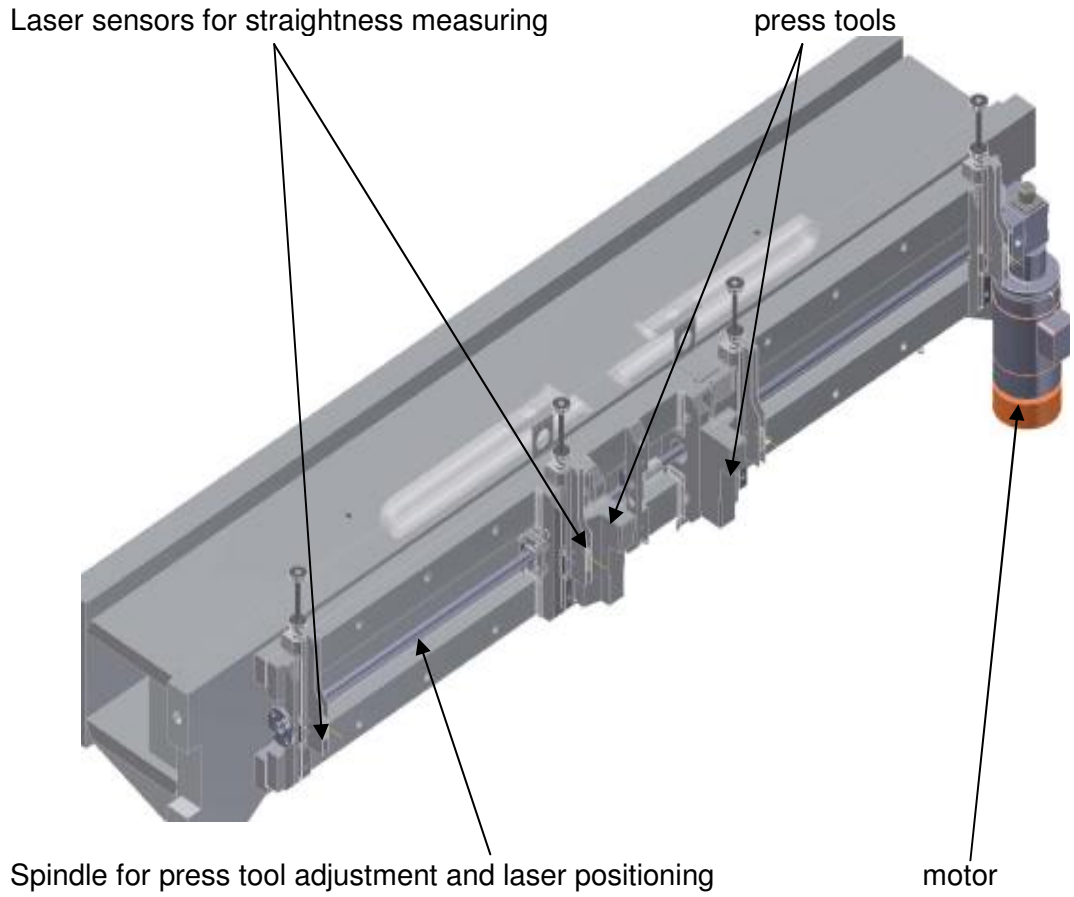
4.3. Hydraulic unit

The machine is equipped with a state of the art hydraulic. The main elements are:

- Electric load sensing motor pump unit with oil reservoir, valve block with electrical control valves
- Double- acting hydraulic cylinders with hard-chrome plated piston rods and attached way measuring units are used for the load application
- The required operating pressure is adjustable through pressure valves. Each loading device can achieve synchronized loading and also can be loaded separately. The loading speed can be adjusted.
- A relief valve protects the system against overload. An oil cooler controls the oil temperature.

4.4. Straightening mode vertical / horizontal

The change of the straightening mode vertically upwards or downwards, horizontally forward or backwards is selected with pushbuttons on the control panel. After actuation of the relevant button, the press tools are adjusted automatically. The control system allows the straightening process only when the final positions of the press tools are reached.



4.5. Manual press tool correction

For fine adjustments, the press tools can be shifted with the help of a turn switch from the external positions towards the centre of the machine and reverse. A big advantage of the straightening press is the maximum distance of 1.5 m between the press tools. This allows a fast and structure preserving straightening.

4.6. Straightening

By lifting up the safety ring on the joy-sticks (vertical and horizontal), the selected function is mechanically released and the straightening can be proportionally controlled. In order to change the straightening mode, the press tools must be moved to the external positions first.

4.7. Electric control

With the PLC control supported by an industrial computer running under Windows XP, all functions of the straightening and measuring process are controlled. Thanks to the touch screen it is very user friendly to operate the machine. The PLC includes an error diagnosis system as well.

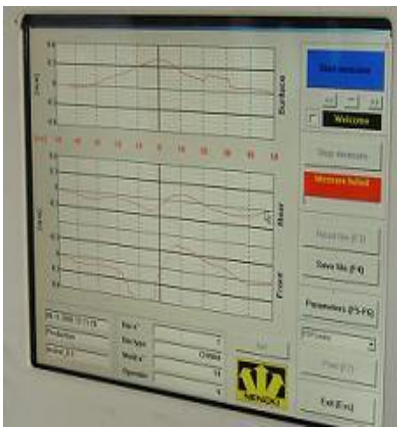
With the joystick the customer's conveyors, in order to feed the grinding machine or in order to forward the rails to the next process, can be activated.

For countries with high temperature or high humidity an optional air condition for the switch box is recommend.

4.8. The laser measuring system

The measuring device is designed to measure and record simultaneously the geometric straightness of the rail section close to the welded joint on the surface and also on the side of the railhead.

The measurement is prosecuted on a length of 1.5 meter. The 3-point laser measuring system is a quality control tool which is used to check that the section measured is within the limits of the dimensional tolerances associated with the production.



The measuring device consists totally 6 lasers, 2 from the top, 2 from behind, 2 from the front. This system allows a fast measuring process for a distance of 1.2m. The position of the press tools is showed on the graphic as well.

The measuring is triggered by single pushbutton control and is graphically displayed on a 15'' screen which permits instant evaluation of conformity.

The computer can actuate an alarm when the permitted tolerance is exceeded. The recording of the measurements may be done on the hard disk of the control system.

4.9. Interface to the line control of the other machine in the welding process

The machine is normally integrated in the line control of the complete welding facilities. Together with the foundation plan NENCKI deliver a description of the necessary electrical interfaces.

4.10. Safety precautions

- The machine is produced according to the international EN 89/392 and CE norms
- The machine is equipped with an emergency stop
- Overload valve controlling the hydraulic power

4.11. Necessary infrastructure

- Special foundation with 2 guiding rails to be prepared by the customer according to the foundation plan
- Electric power supply 3 x 400 Volts, 50 Hz , 1 x 230 Volt
- Roller conveyor on in- and outlet side of the machine
- Internet connection via LAN, broadband or ADSL modem to allow remote control from manufacturer's premises in case of maintenance

4.12. Operation of the machine

One operator is necessary. He should have experience in operating a machine tool and operating a PC.

5. Technical data 4-way straightening machine NRS

Possible rail profiles	
All standard rails between 35kg / m with h = 125 mm and 80 kg / m (corresponding to the USA standard 155 lbs / yd) with h = 203 mm	Up to UIC 68

Processing time	
For 1 weld	3 – 4 Minutes

Vertical straightening	
Press force	2'100 kN
Stroke	100 mm
Approaching speed idle	approx. 18 mm/s
Operating (pressing) speed	approx. 1.2 mm/s
Reversing speed	approx. 27 mm/s

Horizontal straightening	
Press force	1'200 kN
Stroke	180 mm
Approaching speed idle	approx. 30 mm/s
Operating speed	approx. 2 mm/s
Reversing speed	approx. 40 mm/s

Press tools	
On lower beam	fix, same for all rail profiles
Top, front and rear	exchangeable without special tools
Press tool distance	max. 1'500 mm min.100 mm
Adjusting time	approx. 6 s
Adjusting motor	0.75 kW, 1'500 rpm, 3 x 400V / 50Hz

Hydraulic	
Radial piston pump	for vertical and horizontal straightening
Supply	71 cm^3/U
Displacement	100 l/min at 30 bar 6 l/min at 260 bar
Pump motor	5.5 kW, 1'500 rpm 3 x 400V / 50 Hz
Oil reservoir	250 l Hydraulic oil

Machines dimension	
Machine incl. clamping units L x W x H	4200 x 2500 x 2200mm
Weight complete machine incl. extractor	13'500 kg
Dimension for packing L x W x H in cm	422 x 210 x 220 cm

Machine's and components colour	To be specified

Power supply	
Voltage, Frequency	3 x 400 V AC / 50 Hz 1 x 230 V
Power consumption	10 kW
Control voltage	24 V DC