

V550A CNC Automatic punching/shearing system

A. V550 Automatic punching/shearing system

A.1 Systemdescription

- = Infeedsystem suitable for flat and angle steel with a length up to 12.000 mm and provided with a feedertruck with materialclamping
l
- = Drag chain-transverse transport, erected on the infedsystem
- = Punchingmachine type VPO 1400, punching capacity 140 ton. A very heavy and stiff 0-frame is the basic of the punching machine, which is mounted on preloaded linear guides. The punching machine is executed with 4 punches and a hydraulic clampingunit
- = Horizontal Punching machine type VPH4500, punching capacity 60 ton.
- = Four-Character Hydraulic Numbering Unit type VN-4/36
- = Baseframe for Flat Shear and Angle Shear.
- = Shear for flatsteel type VPS 1800, shearingcapacity 180 ton. The shear is executed with a hydraulic stepless controlled clamping unit

The shear is placed on a rotating frame. Rotation stepless 45° to the left and 45° to the right.

Hydraulic angle shear type VHS 1800, shearingcapacity 180 ton. The shear is executed with a hydraulic stepless controlled clamping unit

- = Outfeed roller conveyer
- Hydraulic unit for the punching machines, shears and the clampingunits

Controlsystem, executed with the VACON 110 computercontrol, erected in a operatorspanel. Included is a communication computer for network connection. Software has the possibility to read in DSTV data. When the machine is producing the operator can programm the machine on the communication computer.

- Heavy Toothed Bar mounted on a heavy steel strip for accurate movement and guidance of the feeder truck
Length of the toothed bar : approx 15 metres

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A2. Description components punching / shearing system Automatic\

infeed system for flat and angle steel consisting of:

- Infeed Roller Conveyor
Length : effective 12.000 mm
Width : 520 mm
Rolls : galvanized heavy steel rolls, 080mm
Rolldistance : 6 x 250 mm, rest 500 mm

type : module 2,5
dimension steel strip : 120 x 20 mm
- Cable guidance : approx 15 metres
- Heavy Feeder Truck
The feeder truck is executed with a frequency controlled drive and electrical operated break.
The eight running wheels and two cog-wheels guarantee a tolerance free moving of the truck.
Power : 1,1 kW
Speed : max. 30 metres/min.
- Pneumatic Material Gripper
The gripper will be mounted on the feeder truck and provided with a pneumatic operated extensible material detector. Advantage of this detector is the possibility for the feeder truck to run to the material on high-speed and slow-down after detecting the material.
Due to the fact that the material is fixed into the gripper, the feeder truck can accelerate and deaccelerate very aggressively.
It is not necessary to change the grippersetting for flat or angle-steel, it is universal for both types of steel
Gripper Capacity : 0-30 mm

- Drag chain-transverse transport

For automatic feeding of material to the roller conveyor.

Due to the material detector system, new material will be positioned in front of the roller conveyor during punching / shearing of the previous one. That saves a lot of time.

For noise reduction the transverse beams are layered with hard wearing synthetic material.

During punching / shearing the transverse system can be operated manually.

Number of beams : 6 pcs

Length of the beams : effective 1.850 mm

- Hydraulic Punching Machine type VP1000

Punch capacity 100 ton.

A very heavy and stiff 0-frame is the basic of the punching machine, which is mounted on preloaded linear guides (Y movement).

By using a 0-frame the weight of the punching machine is far less than a C-frame and also the flexing is reduced to a maximum.

Due to less weight the positioning is quicker and very aggressive and because there is almost no flexing the punching tools can be used longer.

The punching machine is executed with 4 punches. Each punch can be used under full-power conditions (100 ton). Each punch has its own automatic mist-lubrication for punching fed from a central unit.

The punching machine is also executed with a hydraulic clamping unit on top of the material, thus the end products will be straight.

It is not necessary to set the punching machine and the clamping unit at the right height position for the thickness of the material. This will be done automatically through the VACON 110 control-system.

Changing of punches and dies can be done very quick due to the use of the quick change system and easy access.

On both sides of the punching unit horizontal clamping devices are placed to ensure the flat steel and angle steel are positioned against the zero reference line. It is also possible to put marking points on the plates with the punching unit.

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- Horizontal Punching machine VPH 600.
The punching unit is placed on high-loaded linear guides (Z-movement) and provided with horizontal and vertical clamping devices to ensure position against the zero reference line. The unit is provided with an automatic mist lubrication unit and will be controlled by the VACON 110 computer.
- Baseframe for Flat Shear and Angle Shear.
When using a flat shear and an angle shear in one line, both units are placed on a baseframe. The shears are placed on heavy-load linear guides. Selection between angle shear and flat shear will be done automatically through the VACON 110 computer. The transfer of the shears is hydraulic.
- Hydraulic Shearing Unit for Flat steel,
Shearing Capacity 180 ton

The shear is executed with a hydraulic stepless controlled clamping unit. The top and bottom knife of the shear can be used on 4 sides.

- Shear for flat steel rotating +/- 45° type VPS 1800
The shear is placed on a rotating frame and controlled by the VACON 110 computer. Rotation stepless 45° to the left to 45° to the right.
- Hydraulic angle shear type VHS 1800
Capacity 180 ton.
The shear is executed with a hydraulic stepless controlled clamping unit and controlled by the VACON 110 computer.
- Outfeed roller conveyor
Length 9.000 mm , partly motor driven (on-way) provided with a motor operated push off system. The first 1.000 mm is manual liftable.
Including control through the VACON 110 computer.
- Hydraulic unit
For punching machines, shearing units and clamping units, the system complete with solenoid valves, hoses, supporting frame etc, complete connected.

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A3 **Colour Punching / Shearing System**

The system is painted in the following standard colors.

Basic frames	grey	RAL 7011
Protecting plates	red	RAL 3003
Moveable parts	white	RAL 9001

A4 **VACON 110 Computer System**

The VACON 110 system is built in an operators panel.

In this panel is mounted the control system of the whole punching/shearing system and consists of:

- = VACON 110 industrial **Pentium** computer system
- = Industrial Color TFT LCD screen 10,4"
- = Industrial key-board
- = Main switch .
- = Motor protection groups
- = Frequency convertors
- = The necessary control and auxiliairy relays
- = Push buttons and signallamps for automatic and manual operation
- = Input-output control-module for the glass fibre optic cable connection to the field modules (punching machine, shearing unit, infeed system, feeder truck)
- = Software for the automatic punching/shearing

Communication Computer

An industrial communication computer (Pentium) and a second TFT color screen will be placed in the operator's panel.

The communication computer and control computer are connected by means of a Windows NT network. When the machine is producing the operator can programm the machine on the communication computer.

The communication computer can also be placed in the clients network to read DSTV data for the punching/shearing line.

Remark: clients network and cables etc. not included.

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V550A Software

The punching/shearing system is standard provided with following software designed under Voortman's own control.

- The Control Software is suitable for:
 - reading CAD information (DSTV-files)
The generated DSTV files from the drawing system can be read-in and will be automatically changed into NC files. It is also possible to put the parts numbers per profile type in separate directories manually programming of parts
 - reading and eventually changing of partnumbers from the memory of the PC (capacity of the PC almost unlimited)

- Batch Software

With this software module it is possible to collect different part numbers of one type and put them behind each other to produce automatically all these parts out of one or more basic length.
The operator can ask for all part numbers per type of profile (e.g. flatsteel 120 x 15). Then he can select quickly the part numbers he want to produce. On the screen he will get the information how many metres is needed.

- Office Program

The set-up of the office program is identical to the program of the punching/shearing system. This program offers to customers, not in possession of a 3D drawing system, the possibility to prepare the programs for production in the office in stead of locally at the punching/shearing system.
This program can be installed at a normal office PC in the works preparation department or drawing office.

- Fault Diagnostic

When a failure occurs the operator can ask an overview of all inputs of the system; with this list on the screen he can easily locate the failure. For assistance from our works we can log in into the system by modem, when a line is available.

- Graphic Display

In the control software and the office program can be asked for a graphic display of the programmed-parts. In this display is clearly given the punching holes, centering points, numbering of the plates and eventually the mitre shearing.

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A6 **Operating Description**

The chain-transverse transport can be loaded with flat and/or angle steel by the operator. After selecting the right production programs the operator can give the start signal. The material will be positioned automatically on the infeed roller conveyor. The feeder truck is running on high speed to the material and will clamping it after detection. During the infeed into the punching/shearing system the total length of the material will be measured.

The VACON 110 calculate the possible number of products and will produce these products automatically. Dependant of the number of parts required, more than one length can be feeded automatically. When there is not enough material on the chaine-transvers transport the VACON 110 will give a message to the operator. The operator can take actions accordingly.

During the automatic production the system give continuously information to the operator regarding the number of length still required.

The software of the VACON 110 computer system is very user friendly. For operation and programming no experience in computer system is necessary. Standard will all programmed parts graphicly shown on the screen. When additional machining is required on the produced plates (expecially when CAD info is comming directly to the machine) the system will give a message to the operator.

The feeder truck is provided with a powerful pneumatic clamping unit suitable for positioning the material with high accelaration and deaccelaration speed. The standard gripper is suitable for flat steel and angle steel without any changing of the gripper.

Additional advantages of the gripper are:

- Possibility to cut different angles of a plate on one side
- Returning the remaining small material backwards in stead of pushing it between the ready products.

The materialdetector on the feedertruck is designed as a pneumatic operated extendable material detector (extension of aprox 220 mm). Advantage of this way of detecting is the high speed approaching of the material and after clamping, in drawn back position, the short distance to the punch and shear (minimum remaining part left).

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B1 Four-Character Hydraulic Numbering Unit type VN-4/36

This unit is the most effective solution for quick numbering of the parts.

In this unit are four code disks assembled near to each other and can print four characters in one operation.

The code disks are controlled simultaneous from the VACON 110 computer. The unit is placed on preloaded linear guides that gives a free programmable position of the code from

B2 Pulling cylinders on Infeed System

With these additional pulling cylinders it is possible to use for automatic production angle steel which is slightly curved (specially for 12 metres long material).

Each cylinder is controlled separately and will clamp the material till the feeder truck is

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B4 Automatic unloading selection

The automatic unloading system will be placed between the shearing units and the outfeed roller conveyor.

Number of places for collecting bins : 3 pcs
Dimensions of the collecting bins : 1000 x 1000 mm
Positioning speed : 7,5 mtr/min

The collecting bins are at right angles to the infeed direction of the material.

The system consists of:

- frame with double chain drives on which three position plates are erected. On the plates the bins can be placed.

In the software can be programmed which project, part of a project has to be put in which bin. The selection for the unloading is automatically controlled through the VACON 110 computer. On the operator panel is a switch to give the operator the possibility to unload the bins of the selection unit. The bins are running out of line and can be removed /replaced by means of a palletcar.

Included are three bins.

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(". Technical Specification Punching/Shearing system

Material

* flatsteel	length	: 6.000 mm
	width	: 50-500 mm
	thicknes	: 5-30 mm
* angle steel	length	: 12.000 mm
	width	: 50 x 50 — 150 150 mm
	thickness	: max. 15 mm

Punching Machine VPO 1400

Capacity	: 1400 kN (140T)
Punch diameter/material thickness (max):	32 mm/25 mm
Punching in flat- and angle steel	: yes
Number of punches for flat steel	: 4
Number of punches for angle steel	: 1
Hydraulic clamping	: yes
Centring points	: yes
Mist lubrication system	: yes

Shear for Flat Steel VPS 1800

Capacity	: 1800 kN (180 ton)
Width/material thickness (max)	: 500 mm/22 mm
Hydraulic clamping	: yes
Mitreshearing	: +/- 45°

Shear for Angle Steel VHS 1800

Capacity	: 1800 kN (180 ton)
Suitable for Angle	: 50x50x5 up to and included 150x150x15
Hydraulic clamping	: yes

Punching Unit for Angle Flange

Capacity	: 600 kN (60 ton)
Punchdiameter/material thicknes (max.)	: 32 mm / 15 mm

Numbering Unit

Number of disks	: 4 pcs
Number of characters	: 36 pcs
Character hight	: 10 mm
Number of characters per code	: standard max. 16
Inprint	: approx 1 mm

<u>Electrical power</u>	: 3 x 415V AC + N + PE, 50 CPS
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