salvagnini

TECHNICAL DESCRIPTION

for

P4-2220

Technical description

Further to your request, we have pleasure in submitting you our technical description for a P4-2220 Panel Bender. The P4 is configured as follows:

P4-2220 PANEL BENDER

TL27155C	Scissor table
ADP2715	Feeder-destacker for operation in line
P4-2220	Panel Bender
SFE	Work surfaces with balls
GPA	Asymmetric bending unit
RC	Continuous rotator
LIA	Lower bending blade
LSA	Upper bending blade
CUT.SP22	Option for cutting and removing profiles
SYSCON	Management and control system for P4
PB.U12	Blankholder with automatic length adjustment
T	Mover for auxiliary tools
DL	Panel evacuator
CLA	Auxiliary bending tool command for positive bends
SAP2220.POS	Panel unloader/accumulator
TAE51	Water-air cooler
JOBP4.DIARIO	Software for managing the production and the P4 system

TECHNICAL DESCRIPTION

TL27155C – Scissor table

Motorized scissor-table apt to feed sheet metal packs. It can automatically translate along its own long side to correctly position the pack of sheets against the fixed reference of the destacker.

An autonomous hydraulic power unit ensures the horizontal motion of the table and the automatic adjusting of the drawing height as the sheets are being destacked.

Max dimension of the sheets to be loaded	2700 x 1524	mm
Max height of the pack to be loaded, including pallet	380	mm
Carrying capacity	5000	kg
Vertical stroke	550	mm

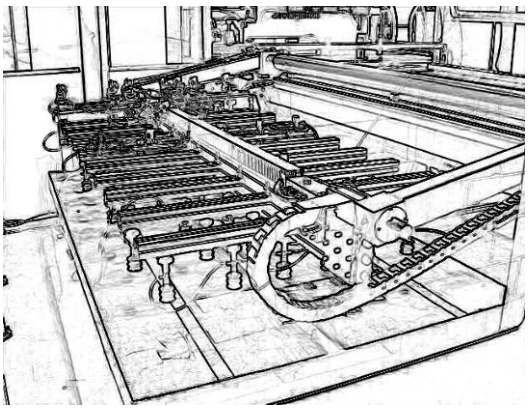
ADP2715 - Feeder-destacker for operation in line

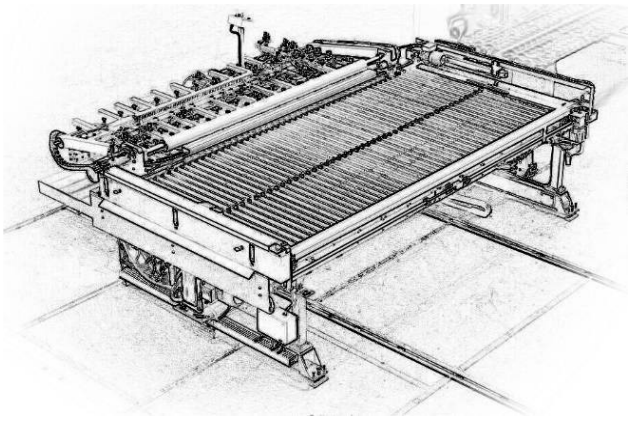
Feeder-destacker assembled to the left of the P4. It permits the sheets to be picked up from a pack of sheets and the panel bender to be fed in masked time, i.e. during the working cycle of the machine. In case of an S4+P4 line, the ADP is able to transfer and center parts coming from the S4 to be fed to the P4. The pack of blanks is placed on a motorized scissor-table.

A device for checking double sheets verifies that the sheet raised is a single sheet; if this is not the case various attempts to separate the sheets are automatically made.

The suction cups are divided in areas which are automatically activated according to the dimensions of the sheet to be picked up. Moreover, the single suction cups can be manually moved to avoid any holes or embossings.

The ADP2715 feeder-destacker is able to feed sheets made of any material and with dimensions compatible with those of the P4 to be fed.





P4-2220 - Panel Bender

Programmable and automatic Panel Bender for the production of sheet metal panels. Numerous upward and downward bends can be made on each side, compatibly with the dimensions of the panel and the features of the machine. The feeding of the punched

sheet, its centering, the bending cycle and the unloading of the finished panel are carried out automatically.
The machine has the following features:

- sheet centering references able to automatically position themselves in masked time;
- ability to produce the first bend on each side at 180 degrees (closed positive and negative safe edge);
- capacity to program the stop of the descending blankholder from 0 to 203 mm in order to obtain, for example, an open safe edge;
- ability to make both up and down bends; the last bend on each side must be an upwards bend; only the last bend on the last side bent can be a down bend;
- ability to process pre-painted sheets or stainless steel, protected by plastic film (however, the quality of the material must be verified according to the application);
- independent closed cooling circuit: cooling unit for maintaining a constant oil temperature in the hydraulic circuit of the machine and of the electrical cabinet.

Operating features

maximum length of incoming notched sheet:	2490	mm
maximum width of incoming notched sheet:	1500	mm
maximum diagonal of rotatable notched sheet:	2400	mm
maximum bending length:	2250	mm
maximum dimension of bends above work surface:	203	mm

SFE - Work surfaces with balls

Work surfaces equipped with idle balls which allow the panel to be moved easily.

GPA - Asymmetric bending unit

- Option for the P4 panel bender that consists of a device, applied to the hydraulic unit of the bladeholder as alternative to the symmetric bending unit. The GPA can be programmed in such a way as to adjust the force in the single cylinders that control the oscillation of the bending blades; it is useful for compensating bending asymmetries with respect to the bladeholder axis or sheet-metal absence along the bending edge and to maintain a great bending precision.

RC - Continuous rotator

Continuous rotating unit for programming non rectangular panels.

LIA – Lower bending blade

Bending blade with reduced angle able to make, in a single step, negative bends up to +125° for thicknesses thinner or equal to 60% of max thickness and from 0° to 90° for all thicknesses admitted.
Maximum thickness of sheet metal with

UTS of 410 N/mm^2	2.00	mm
UTS of 580 N/mm^2	1.20	mm
Minimum thickness of sheet metal	0.50	mm

LSA – Upper bending blade

Bending blade with reduced angle able to make, in a single step, negative bends up to -125° for thicknesses thinner or equal to 60% of max. thickness and from 0° to 90° for all thicknesses admitted.

Maximum thickness of sheet metal with	UTS of 410 N/mm^2	2.00 mm
	UTS of 580 N/mm^2	1.20 mm
Minimum thickness of sheet metal		0.50 mm

CUT.SP22 – Option for cutting and removing profiles

Option for the panel bender which is also equipped with the T option and the SAP**.POS. It is composed of:

- an auxiliary blade, which is as long as the bending blade, positioned in the throat of the bladeholder; this blade is used, in combination with the lower bending blade, to make the separation cut of the bent profile. The CUT option is able to produce one or more profiles starting from a single notched sheet;
- a device for laterally removing the bent profile onto an unloader able to unload the profiles into a dedicated collection bin;
- a cutting tool for the T option, having a fixed composition for the entire bend length; this tool acts as the upper cutting blade.

Characteristics:

Maximum length of profile/incoming sheet:	2100 mm
Maximum thickness of metal (UTS 410 N/mm^2):	1.20 mm
Minimum thickness of metal:	0.50 mm

SYSCON - Management and control system for P4

High-performance control system distributed on 3 levels.

- elaboration unit for managing and supervising the machine (machine diagnostic, operator interface, local data elaboration). The unit is composed of a DIGITAL ALPHA STATION 255/233 workstation, equipped with an ALPHA AXP 64 bit processor with RISC architecture, 233 MHz clock, one 2.1 Gbyte disk, 64 Mbyte RAM, one 3 ½" 1.44 Mbyte floppy disk driver, 16" colour monitor with 2D graphics accelerator and 1024x1280 pixel resolution, two serial ports, two-way parallel port, thin wire and twisted pair ETHERNET interface that can also be used for company integration, Digital UNIX operating system with window type user's interface based on the OSF/Motif standard. This unit communicates with the real time control unit through ETHERNET.
- real time control unit, based on MOTOROLA 68030 processor and real time pSOS+ operating system, completely dedicated to carry out the automation logic of the machine. This unit communicates with the following level through a high-performance proprietary bus.
- interface section towards peripheral devices (hydraulic motors, solenoid valves, sensors ...) that includes advanced functionality of axes control.

The graphic diagnostic on monitor, in real time, allows the following to be displayed: clear indications on the status of the equipment, photo of the interested part, hypertextual help with indications on the solution of the problem, notes that can be added by the customer.

The programming can be made directly from the elaboration unit of the machine or from office stations connected in ETHERNET. The typical programming functions do not require the interruption of the current working cycle.

The language is high level, the defined macroinstructions express geometrical concepts (ANGLE, RADIUS, HEIGHT ...) and are completed by conditional instructions (IF, THEN, ELSEIF ...), by mathematical instructions (SIN, COS, TAN ...) and by instructions for defining the parametric variables.

The post-processor PDE is included. It analyses the syntax and the geometry of the programming macroinstructions, transforming them in data useful to the working cycle of the P4. Furthermore the pro-processor manages the movements of the manipulator, also considering the forming of the sheet metal, it automatically calculates the gripping points and the bending force according to the quality of the material and chooses the unloading modality.
The hardware and software network connection, if needed, with other computers is not included in the supply.
Our interface towards the customer's LAN is usually composed of:
- hardware: IEEE 802.3 ethernet, thinwire, BNC RJ58 connectors;
- software protocol: TCP/IP.

PB.U12 - Blankholder with automatic length adjustment

It is composed of:
- device for automatically adjusting the length of the blankholder tool. The blankholder is able to automatically modify its length according to the bending program;
- a series of tools with front and side grooves for making inward bends.

The length of the blankholder tool can be composed in 5 mm steps.
Characteristics:

Maximum length of the blankholder:	2250	mm
Maximum length of the inward bend on the short side of the blankholder:	50	mm
Maximum length of the inward bend on the long side of the blankholder:	50	mm
Panels with inward bends:		
Minimum clearance between the bends of the panel:	about 111	mm
Minimum length of the panel:	about 400	mm
Panels without inward bends:		
Minimum width of the panel:	about 111	mm
Minimum length of the panel:	about 220	mm

T - Mover for auxiliary tools

Device composed of a pair of hydraulic cylinders linked together for the automatic insertion of a special tool between the blankholder and the counter-blade of the P4, in accordance with the instructions given in the program.
The special tools are not included.

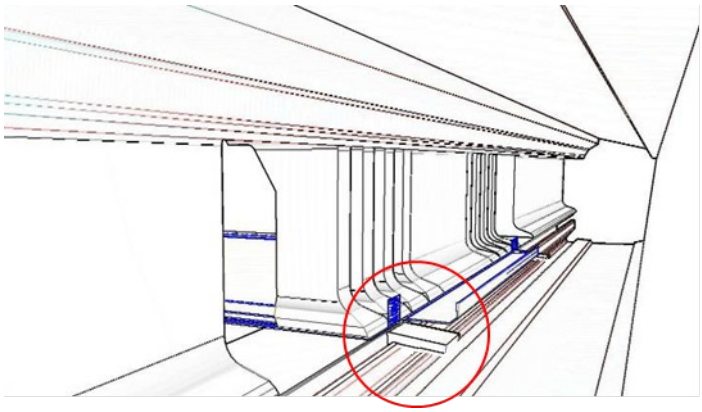
DL - Panel evacuator

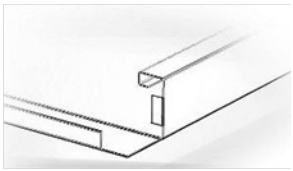
Device composed of a retractable arm which can slide on the counter-blade, commanded by a motorized timing belt; the evacuator is able to automatically push out from the press, onto an appropriate unloader/conveyor, a panel with the last bend downwards.

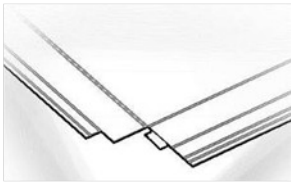
CLA - Auxiliary bending tool command for positive bends

Option for the P4-2200 panel bender composed of an NC device which is able to position auxiliary bending tools along the lower blade and symmetrically to the machine center line, in order to make bends with interrupted bending edge (e.g. welding tabs).
The auxiliary bending tools (set of CLA tools) are not included.
Characteristics:

Maximum thickness of metal with UTS of 410 N/mm^2	1.25	mm
Maximum bend angle in a single step:		90°







The application of this device reduces the maximum bending height which can be carried out by 22 mm

SAP2220.POS - Panel unloader/accumulator

It is composed of a motorized roller-surface placed at the same height as the work-surface and installed immediately to the front right-hand side of the panel bender, and of a tiltable rake orthogonal to the roller surface and equipped with idle rollers.

It is able to receive and accumulate a certain number of panels exiting from the panel bender; the panels, which are received, one at a time, and raised, slide by gravity on the idle rollers along the rake and are stopped, before bumping against its dampened stop, by decreasing the inclination of the rake. In this position the operator in safe working conditions can then remove them.

The removal position is on the operator's side.

Panels with the last bend down, if any, are not accumulated and can be removed laterally.

TAE51 - Water-air cooler

Autonomous, independent closed circuit cooling unit for maintaining a constant temperature in the liquid inside the cooling circuit of the system. Refrigerating yield: 15.1 kW.

JOBP4.DIARIO - Software for managing the production and the P4 system

JOBP4.DIARIO is the set of software packages integrated in the control system, which graphically allows the system to be easily used, managed and supervised by supplying you with all the information required to carry out production.

Furthermore, the information relevant to system operation is collected and arranged in order to make it available for a correct system monitoring.

JOBP4.DIARIO includes the following modules:

Main Console

Main console for an intuitive management of the system which allows you to:

- easily save and find programs thanks to graphic tree structure
- use an editor for a simple correction of the programs
- semi-automatically move parts of the system, by means of a graphic interface, useful to easily use or access the system.

JOBP4

Application used to dynamically schedule daily production; you can create a sequence of programs named "job" or list, on screen. The production can be interrupted and then re-started from where it was interrupted. The programs that require a manual changeover of the system setup must be grouped in separate Jobs.

Salvagnini Compiler

The Salvagnini compiler interprets programming instructions based on geometrical principals (e.g.: finished dimension of the panel, length of the edge to be bent and angle to be obtained on each bend) and defines the production cycle calculating sheet metal handling and cycle time. The compiler supplies the dimensions of the unfolded, information on program integrity and suggestions on wrong info. Moreover, it can simultaneously compile groups of programs arranged in work directories.