

FINN-POWER

- PUNCHING
- LASER CUTTING
- ▶ **BENDING**
- INTEGRATED PUNCHING & SHEARING
- INTEGRATED PUNCHING & LASER CUTTING
- FLEXIBLE MANUFACTURING SYSTEMS



SERVO ELECTRIC BENDING AUTOMATION

A BREAKTHROUGH IN THE PRODUCTIVITY OF BENDING: SERVO ELECTRIC AUTOMATION BY FINN-POWER

Applications vary, and so do optimum choices in manufacturing technology. As a full range supplier, FINN-POWER provides several different solutions for productive bending of sheet metal components:

SERVO ELECTRIC PRESS BRAKES

HYDRAULIC PRESS BRAKES

SERVO ELECTRIC BENDING CENTERS AND CELLS

In many manufacturing situations automatic bending cells and centres offer benefit and superior advantages in term of:

- Total manufacturing cost reduction
- Step time null
- Excellent component quality
- Flexibility of small series production
- Off-line programming

The first generation of automatic, hydraulic FINN-POWER bending centers was introduced two decades ago. Since then, continuous, innovative development has elaborated the technology, adding further versatility and improving accuracy and flexibility.

A revolutionary step was taken in 2004 on the introduction of a servo electric bending cell. Automation itself means a major reduction in manufacturing cost. Combining automation and the superior bending precision, surface quality and low operating and maintenance cost of servo electric technology, today's Express Bender solutions have revolutionized high-quality bending.

Servo electric bending benefits include:

- Lower bending cost by 50 % savings in energy and 60 % in maintenance cost
- Higher component quality
- Faster and smoother operation
- Shorter set-up times
- Flexibility in small series production
- Off-line programming
- Compatibility with modern environmental thinking

The right configuration for each application



PROCESS BENDING CENTER (BCe)

The operation of FINN-POWER BCe is semiautomatic. It is a productive solution for small batches as well as for serial manufacturing. Total manufacturing time is shortened as the loading operation is simultaneous with the unloading of the ready-bent component.

The BCe configuration consists of a basic unit (bending press and a programmable manipulator with rotator) plus loading table with brush top, a programmable part feeder, and driven rolls in the unloading table, which are the material handling modules.

Applications:

*Single piece production
Kits of components
Fully perforated material
No stackable sheets
Bent components with small minimum dimension*

EXPRESS BENDER (EBe)

Fully automatic in loading as well as in unloading operation, the Express Bender has a loading device with automatically adjustable gripper and a loading table with double sheet detector. A standard unloading table with free rolls allows the operator to remove the ready finished components while remaining in safety area.

Applications:

*Medium to long series manufacturing
Large components
Fully automatic process in
loading as well as in unloading*



EXPRESS BENDER (EBe FM)

Flexible, modular solutions for automated material management are a traditional FINN-POWER strength. The EBe bending cell can be upgraded by a range of options which prolong unmanned operation. As in the stand-alone EBe, the machine is equipped with an automatic loader and an unloading table.

Applications:

*Single piece production
Kits of components
Production of small, medium size
and large component batches
Integration in Flexible Manufacturing Systems*



EXPRESS BENDER: SOLID ENGINEERING AND SOPHISTICATED FEATURES

Operating Principle

Express Bender uses modern NC-controlled electrical servo drive technology, which is the best solution for precise interpolation of several axes.

CNC control exchanges information and synchronization with PLC through digital communication. All main machine functions and all axes involved in the bending process are numerically controlled.

The Express Bender works the edges of the panel. Generally, the process starts at the external edge of the sheet and continues to the inner part of the sheet, working one side after another in sequence until all bends have been completed.

During the bending action, the upper tool of the bending unit holds the required portion of the sheet in the proper position. Two blades, mounted on the C-frame, manipulate the protruding portion of the sheet. The C-frame moves vertically and horizon-

tally. The motion is programmable according to material type and the required bending angle. The bends can be made either upwards or downwards, depending on whether a positive or negative bend is required, without turning over the piece.

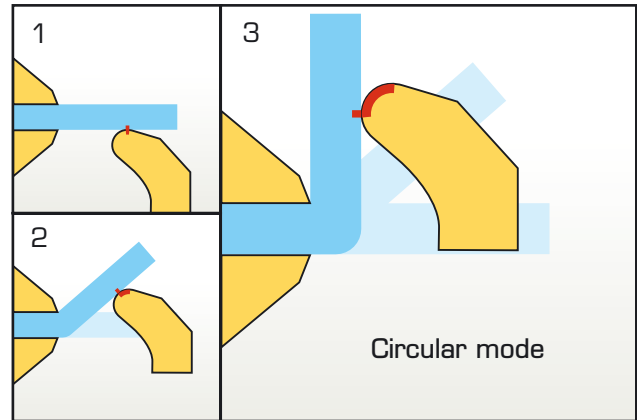
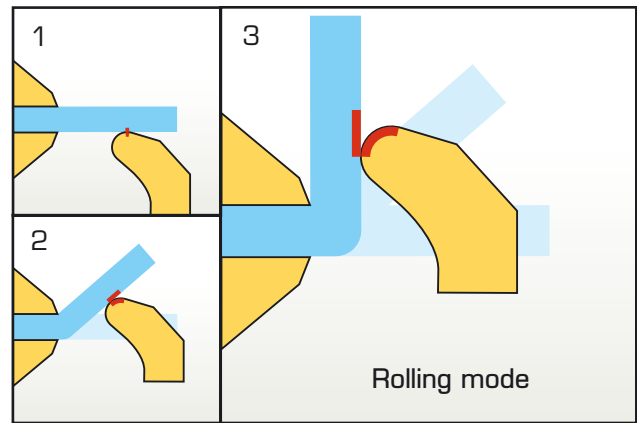


NEW BENDING PRINCIPLE WITH INTERPOLATION OF BLADE MOVEMENTS

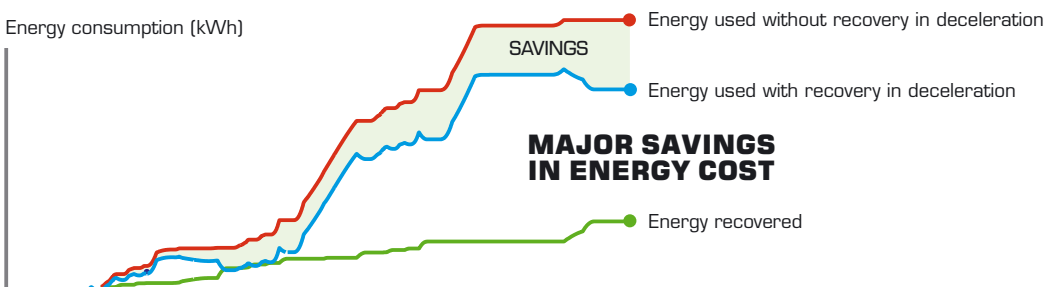
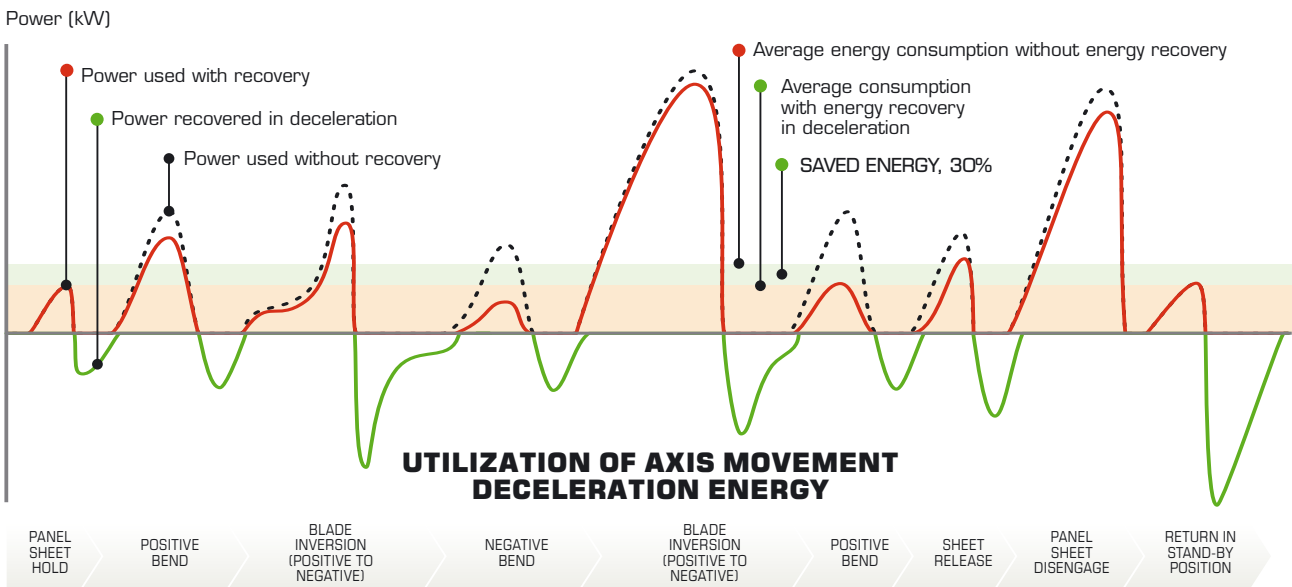
Optimum surface quality is a decisive factor in many bending applications. The FINN-POWER solution offers a choice of two interpolation modes of operating blades.

When the “rolling mode” is used, there is no relative friction between blade and material, which saves the material surface from damages and reduces wear of the blade.

Alternatively, when using the standard “circular mode”, the contact point remains constant whereas the contacting point of the blade changes during the bending movement. The contact line of the blade to the material being bent remains constant. These two modes are achieved by numerically controlled interpolation of the two axes that operate blade movement.



Energy in Efficient Use



STANDARD FEATURES

Frame

The construction has two frames: the stationary main frame (1) and the C frame (2). The main frame is a robust, welded structure that provides the necessary rigidity for withstanding the forces generated during the bending phases. The C-frame mounts within the main frame and supports the upper and lower bending blades.

Upper Tool

The upper tool (3) consists of a bar and segments that can be composed to match the size required by the work piece and to contract for part exit. It is assembled to a welded structure with arms hinged to the rear part of the main frame.

Upper tool movement is performed through eccentric shaft mechanisms, actuated by two NC-managed servo electrical motors, controlled by numerical control.

Lower tool

The fixed lower tool (4) holds the work piece in position during the bending procedure. It consists of a single element that is fitted to base beam screw it to the main frame.

Bending Blades

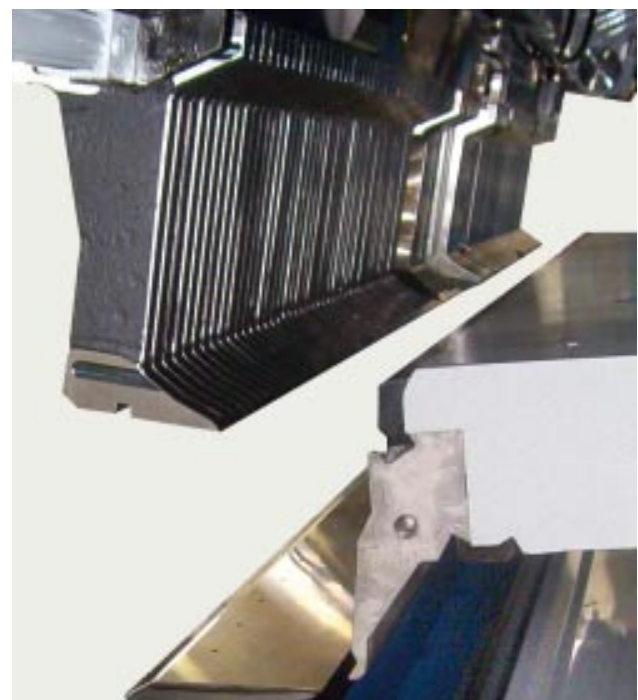
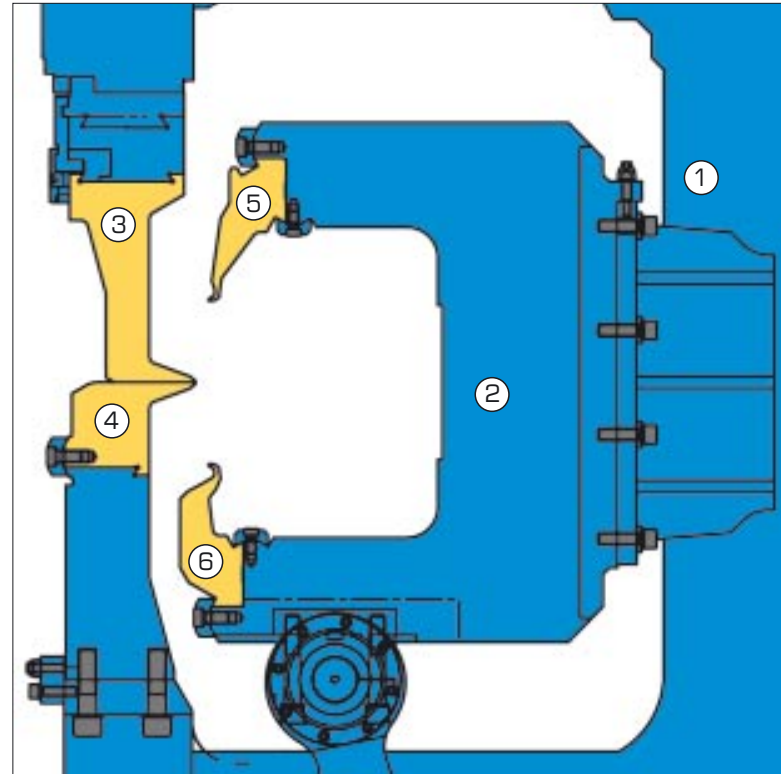
The C frame is moved horizontally and vertically by two crankshafts and a connecting rod mechanism managed by servo electrical motors controlled by numerical control.

There are two bending blades, the upper one (5) to make negative (downward) bends and the lower one (6) to make positive (upward) bends.

Bending Tools plus HTC (hydraulic tools clamping)

The Express Bender is equipped with a standard set of tooling, with which the majority of bending requirements can be met. Changing upper tool dimensions is facilitated and made faster by the HTC device.

The upper tools are hydraulically clamped to the tool-holding bar. A holder clip is included in each tool segment for secure fastening. In order to change the upper tool dimension, the operator



simply unlocks the hydraulic clamp and presses a clip to move the segment into the new required position. Average tool change time without the ATC option is approximately five minutes.

Programmable upper tool crowning device

The movements of this device are actuated by proportionally controlled hydraulic cylinders. The mechanism can flex the upper tool structure and, consequently, the tools. It is used for correcting the straightness when bending thick material or long bends.

Work piece positioning pins

The two positioning pin units support two pins each (main and secondary) and they are used at the beginning of the cycle to square the new part correctly. They are mounted on the lower tool bar support frame and are individually controlled by 3 CNC axes. The left unit is moved in X, Y directions by two NC axes, the right only in Y direction.

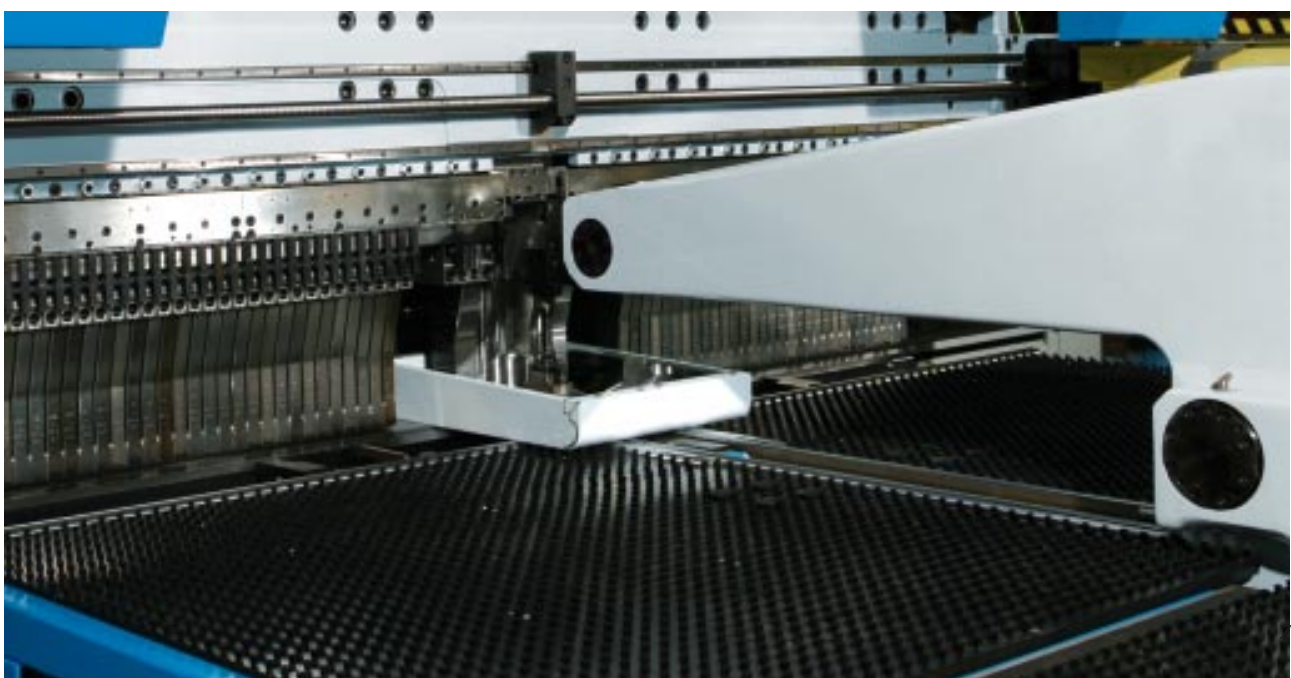
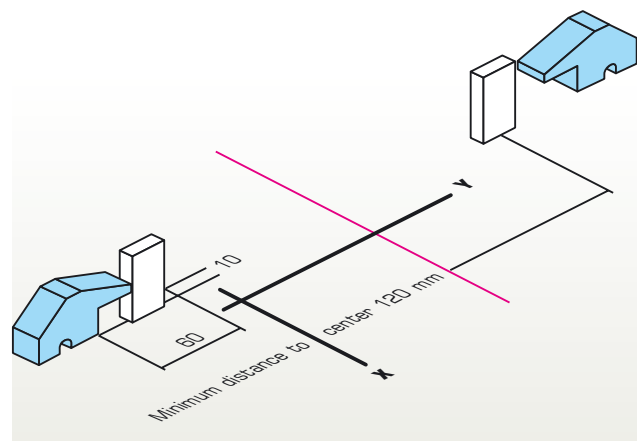
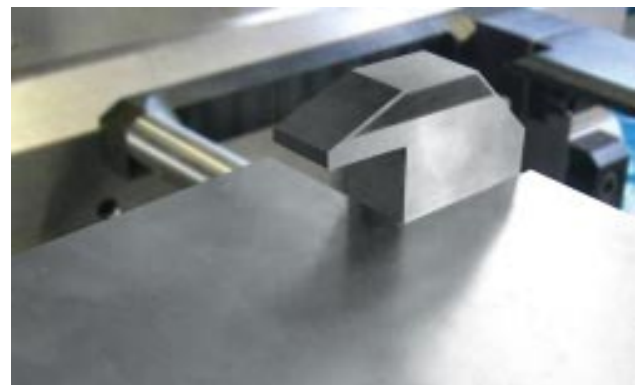
Brush Table Tops

The Express Bender worktable is equipped with brush tabletops for better material support, noise reduction and minimal surface scratches.

Manipulator

The manipulator performs all sheet movements once the sheet has been loaded onto the machine table, i.e. positioning, rotation and all progressive movements for bending.

Automatic panel positioning is accomplished by use of retractable positioning pins and by a pneumatic CNC pusher cylinder. The manipulator, driven by a CNC controlled axis, consists of a carriage mounted on linear guides and is operated by a ball screw. One arm, with a rotating CNC device, is mounted on the carriage of the manipulator to move and rotate the piece during the bending procedure. The rotator reaches any angle necessary through the 360° (0.1 degree steps).



STANDARD FEATURES



Hydraulic Unit

A small hydraulic unit (less than 90 litres of oil) is necessary for the remaining hydraulic movements. It is integrated (but easily accessible) in the manipulator table area.

Unloading Conveyor and Unloading Table

The belt conveyor in the working table unloads the finished piece from the working table onto a free roll table of the unloading station. The belt conveyor feeds the part onto an inclined table with free rolls, from which the operator removes it.

Safety devices

Depending on the model chosen each machine is equipped with safety equipment fulfilling CE requirements. This ergonomical protection separates the operative area of the machine, and prevents anyone from entering the danger area during machine operation.

CCC Control Cabin Cooler

Acceptable electrical cabinet temperature can be maintained by a cooling unit (standard). With the cabinet cooler the ambient temperature allowed for the machine is max. 45°C (100°F). Max. relative air humidity is from 20 % ...75 %, temporary max. 90 %.

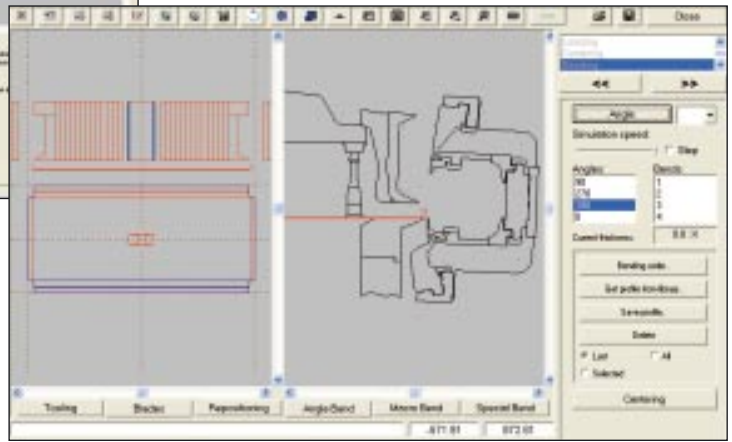
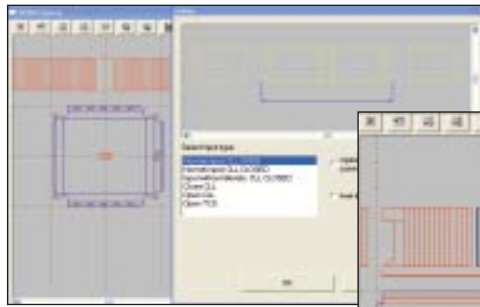


Control Unit, CNC.

An on-board PC and a colour display provide an ergonomic machine operator interface.

The numerical control system consists of NC control and programmable logic, controlling the functions of both the bending unit and its peripherals by digital communication. The CN and PLC system with its electrical components are mounted in an electric panel.





BendExpress

BendExpress is a Windows® based application, which runs on PC. It is a graphical machine user interface on a Windows® XP Personal Computer.

FINN-POWER TELESERVICE



Teleservice

The machine is equipped with Teleservice as standard. If the customer provides a direct telephone line or internet connection to bending machine by one modem router installed in the electrical cabinet, FINN-POWER can support the operator in problem cases. Further, the software can be updated via Teleservice

EXPRESS BENDER BY FINN-POWER: THE OPTIMUM COMBINATION

Force – applied gently

Precision plus speed

Flexibility with automation

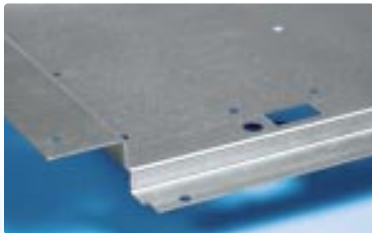
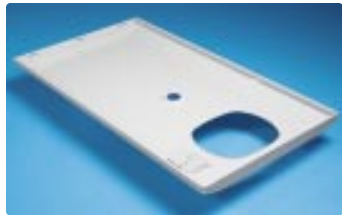
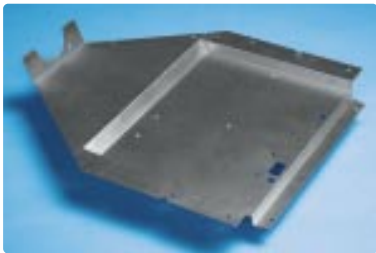
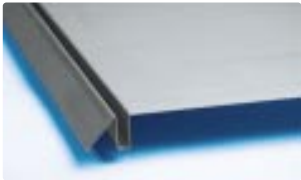
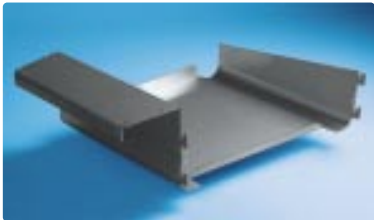
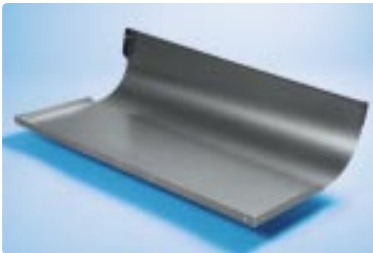
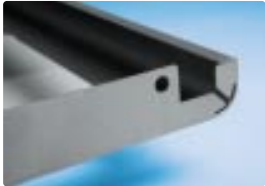
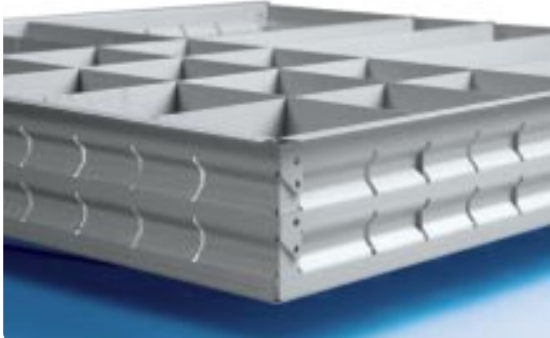
High productivity – low operating and maintenance cost

Open programmability with user-friendly operator interface

High reliability with lower maintenance requirement



**The optimum
bending result
in every
application**





FINN-POWER IN BRIEF

FINN-POWER Oy and its worldwide network of subsidiaries and representatives specialize in advanced sheet metal working technology. The company was established in 1969.

Following the introduction of its first hydraulic turret punch press in 1983 FINN-POWER has developed a modular product range for punching, laser cutting and bending, for solutions integrating right angle shearing and laser cutting with punching, and for automation of the entire material flow of your sheet metal working process.

Flexibly yours®



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