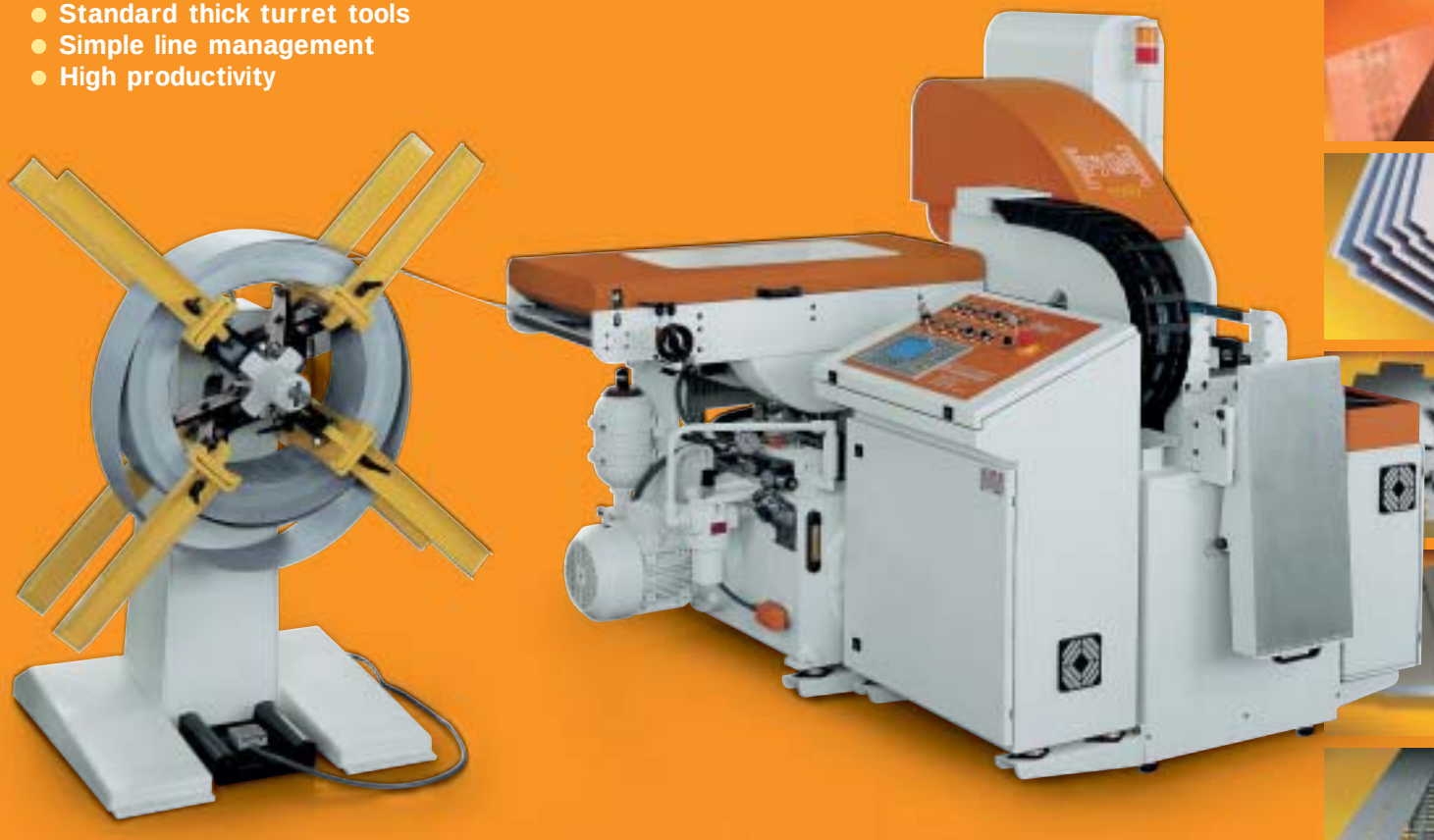
part 2

# The Advantages of the Coil Punching Machine

## Coil punching machine applications

PXN easy

- Optimization of the raw material up to 20%
- Automatic production
- Investment with short payback time
- Compact layout
- Optimized raw material storage
- Standard thick turret tools
- Simple line management
- High productivity









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## Pxn easy: take advantage

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DALCOS
COIL PUNCHING MACHINES

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# THE ADVANTAGES of the Coil Punching Machine

**Following up the part (1)**
**“Choosing the Coil punching machine”.**

**The previous paragraphs were dedicated to the selection of products to be transferred to the machine and to the examination of the coil punching line (picture 25).**

**In this third section we will consider some important advantages in the evaluation of the line.**

**We will particularly examine the economical advantages. Two paragraphs will be dedicated to the management of the raw materials and to the machine, and then the advantages in terms of production speed will be analysed.**

**A section will also be dedicated to the application of the coil punching machine in different industrial sectors.**

Coil punching machine 300mm width with 5 tools

Picture 25

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## Economical advantages

The first economical advantage consists in labour saving.
As examined, in a coil punching machine the decoiler is the automatic loading system of the metal strip. The coil punching line operates automatically and the continuous presence of an operator is not necessary.
Furthermore, the costs of a complete coil system including decoiler, straightener and punching unit are much lower than in a sheet metal punching machine with automatic loading and unloading system.
As far as costs of raw materials are concerned, the use of metal strip materials allows to save from 10% up to 20% of material (the percentages change depending on the type of product). This is for different reasons: first of all - while working with strips there is no need to have a space for the grippers which hold the material in a sheet punching machine (picture 26). Moreover, if the two sides of the coil coincide with those of the piece to produce, there is no need to trim the piece along its edges or leave micro-joints.
The shear cuts the product which does not need to be manually separated from the sheet and this permits a further labour saving.
Another economical advantage is the compact layout of the machine.
The space occupied by a machine can cost from 30 to 40 Euro per square metre per year. Up to few years ago, coil punching machines were systems with large dimensions and for this reason only to big companies could afford them.
As examined, nowadays compact coil punching machines are available. They are the ideal solution for both medium and small companies, and are suitably dimensioned for all workshops (picture 27).

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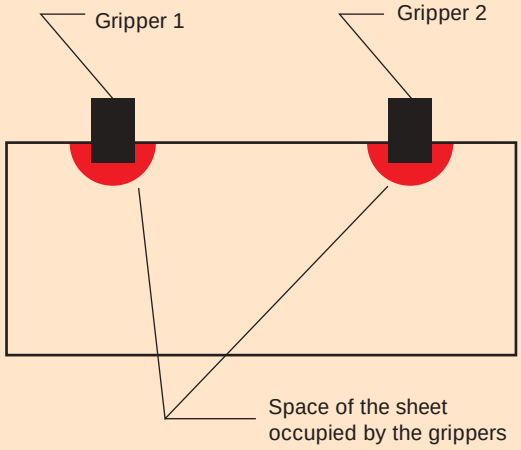


**Picture 26**
Areas occupied by the grippers in a sheet punching machine

**Picture 26A**
Coil punching machines for medium and high thicknesses

26A

**Picture 27**
Plan Layout of a compact coil punching line

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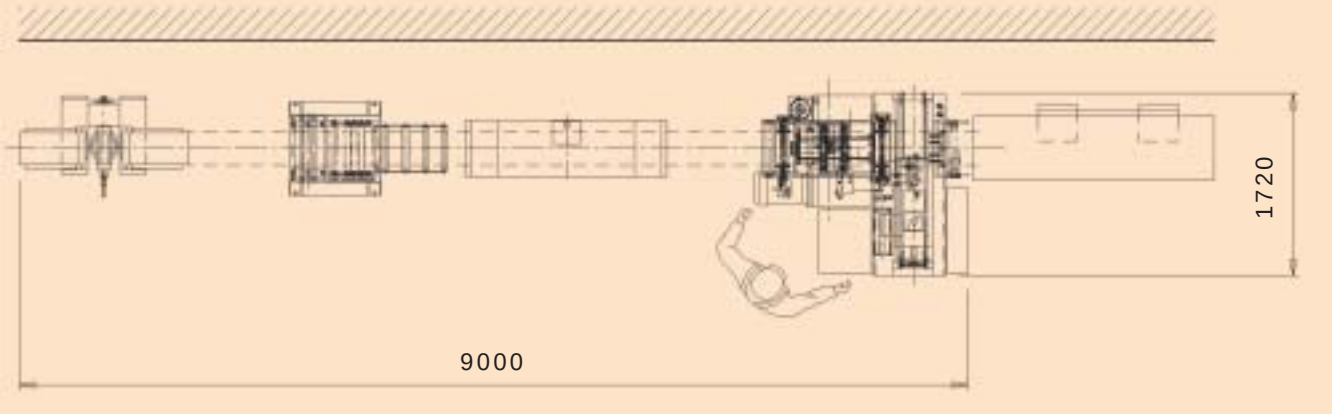
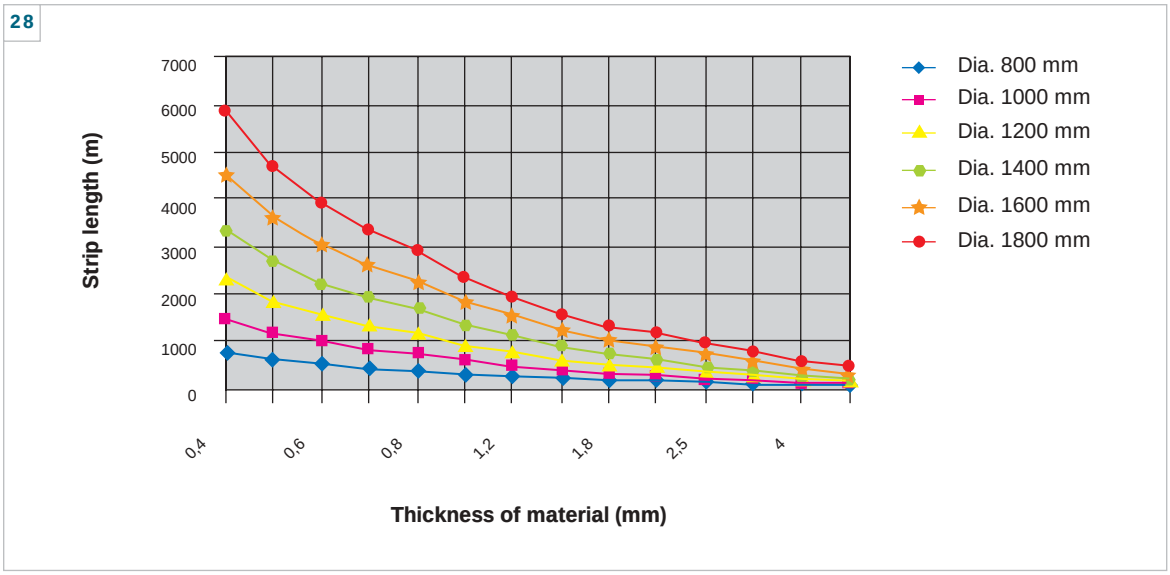


**picture 28**

Coil length calculation chart




The coil punching machine allows an easy management of the sheet metal stocks, which can be reduced. Instead of sheets cut for each width and length of product, it is enough to store one coil for each width of material.

The width of the coil can also be reduced with special longitudinal trimming tools.

The observations regarding the cost of the installation space can be extended to the cost of the area occupied by the warehouse.

The coil change operations, the adjustment of the guides and the introduction of the strip require few minutes.

The duration of the coil depends on the thickness of the material, on the cycle time and on the length of the piece.

The graph in picture 28 shows in X-axis the thickness of the material in mm, and in Y-axis the total length of the strip in metres.

The curves relate to different external diameters of the new coil. The lasting of the coil is calculated dividing the length of the coil by the length of the piece and multiplying the result by the cycle time of a single piece.

The cycle time is calculated with the formula suggested in the following paragraph, which is dedicated to the production speed.

The previous diagram shows that, with a same external diameter of the coil, the length of the strip decreases as the thickness increases.

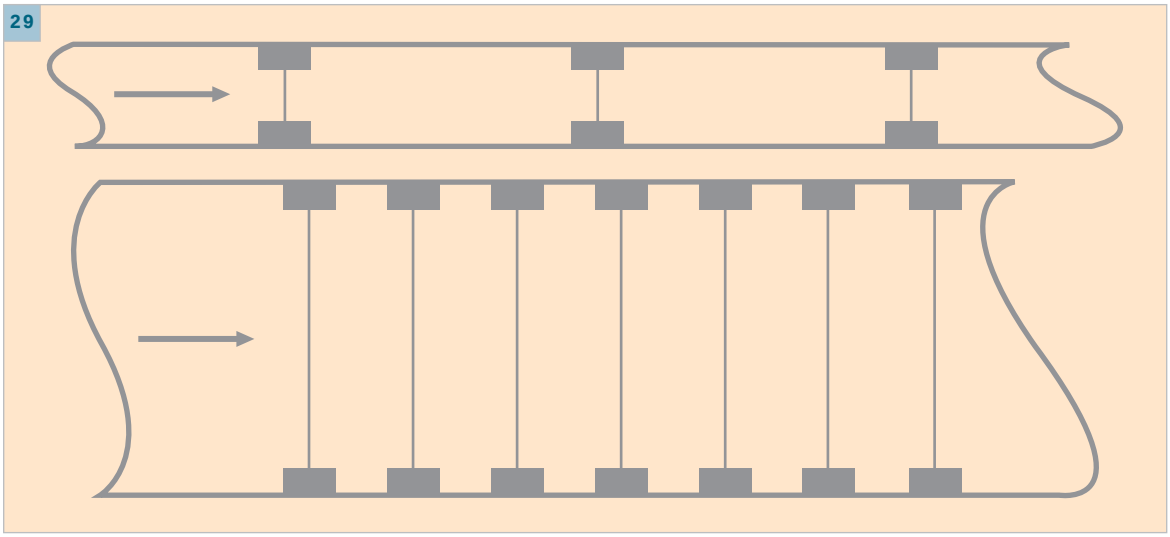
This means that a sheet metal coil of 1 mm thickness lasts 5 times more than a coil of 5 mm. For this reason coils with greater diameters are preferred if the metal strip is thick (3-5 mm).

Another system to increase the duration of a coil is using wide metal strips and process them across their width instead of the usual system (operate across length picture 29).

The maximum advantages in terms of fewer coil changing are achieved with thinner metal strips.

**Picture 29**

Arrangement of the pieces on a metal strip through the width and the length



## Machine management

The user-friendliness of the coil punching machine is strictly connected with the above-mentioned low management costs: once the metal strip has been introduced, the machine produces automatically without the need of a continual supervision.

Tools may need to be changed when changing from one production type to another.

The procedure for this operation depends on the type of adaptors used on the machine. If the machine has a single tool bearing arch, it is necessary to remove it completely from the machine and replace the tool (or tools).

Whereas, if the machine has several small and modular type tool bearing arches (picture 30), it is possible to remove only the required tool bearing arch and leave the others on the machine. In this case just few minutes are needed to replace the tools.

Since the modular tool bearing arches have reduced dimensions and costs, spare arches can be kept by the machine with the tools already installed; in this way the tool replacement requires even less time.

Coil punching machines are suitable for working on one or 3 shifts.

A convenient way to increase production is loading a new coil on the machine at the end of the day and leave the machine completing the production during the night.

Small companies adopt this procedure of system to increase their production without added labour costs. It is convenient to produce at night those pieces with a longer production time.

Once the available stacking height is known, the autonomy of the machine between two pallet changing can be easily calculated.

If the stacking height is 300 mm and the thickness of each piece 1 mm, the machine has an autonomy of 300 pieces. The autonomy of the machine in hours and minutes is obtained by multiplying the number of pieces by the cycle time of one piece.


**Picture 29A**
Single tool bearing unit


**Picture 30**
Modular tool bearing arch and tool changing table

## Production speed

**Figura 31**

Modular tool bearing arches and activation cylinders

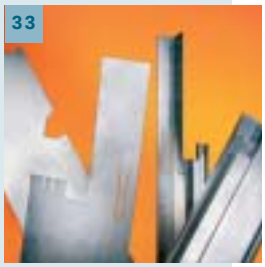

As far as the production speed is concerned, the first and most important time advantage of the coil punching machine comes from the continuous work of the metal strip.
While a sheet punching machine has to stop every sheet-loading and piece-unloading operation, the coil punching machine can save up to 30 seconds of cycle time per piece.
Another very important time saving is obtained when the piece has two sides coinciding with the width of the coil, and therefore it is not necessary to trim the edges of the piece.
In the coil punching machines tools are usually equipped with their own hydraulic activation cylinder: they are always active and the tool which is operating is the closer to the working position (picture 31).
The cycle time of a coil punching machine is calculated with empirical formulas as shown below:

[Cycle time] =
[Number of operations] x A
+ [Length of piece] x B.

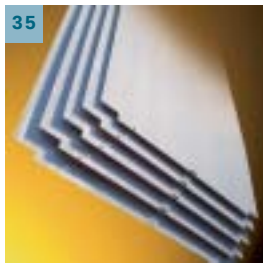
The A and B constants are empirically determined for each type of machine.
This formulation clearly expresses that the working time varies depending on the type of tooling (dedicated, multiple or nibbling tools).

**Figura 32**

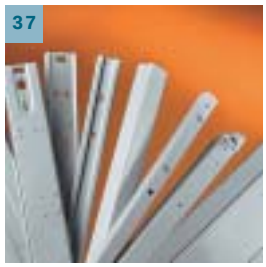
Coil punching machine 800 mm width

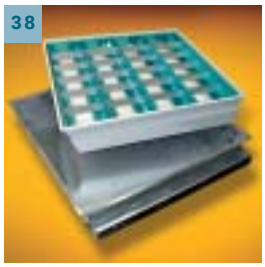





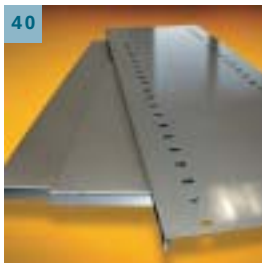















## Applications

In this paragraph we will consider the production sectors that benefit the most from the advantages of coil punching; pictures 33 to 46 illustrate products made with this technology.

Coil punching machines are very common in the notching, punching and shearing of metal strips to manufacture doors and windows frames and sub-frames.

A complete frame (two uprights and a transom) can be produced in less than 1.5 minutes.

They are widely used in the production of panels, fire and security door panels and locks as well. In doors and windows field, -garage doors, sectional doors and industrial doors are also made with coil punching machines.

Punched and cut to length sheet metal products are used for the production of lighting for lighting fittings, perforated and notched panels for tool boxes, mobile doors, metal furniture, post boxes, trays and light steelworks for fan-convectors (fancoil).

Punched and notched panels and uprights are made with the same machine for producing electrical cabinets and shelves, data transmission cabinets, perforated ceiling tiles, stainless steel and galvanised filter frames, ventilating grilles and many more. For thicker materials, pre-punched structure profiles can be produced, taking advantage of the parametric software.

Using a simple folding die, small punched and folded accessories can be produced if the punching machine includes hydraulic folding presses.

Finally, the coil punching machine can be used to produce perforated strips for ventilated roofs, notched strips for stainless steel or copper coverings, guttering, channel brackets and accessories.

Remarkable advantages have also been noticed in the production of long and narrow products which are easily punched with a coil punching machine. A parenthesis about the post processing is noteworthy.

Products deriving from a coil punching line can be folded manually, robotically, on a panelling machine or with all other traditional systems.

Moreover, there is also the possibility to introduce the pre-punched metal strips in a roll forming machine to obtain completely processed and cut to length profiles (picture 47).



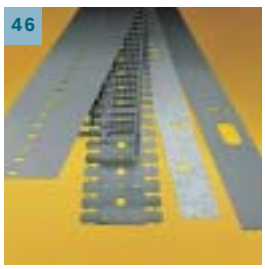




**Figura 33**
Door frames and false frames, container profiles

**Figura 34**
Security door frames

**Figura 35**
Fire doors and safety doors panels

**Figura 36**
Panels for lighting fittings and toolboxes production

**Figura 37**
Profiles for the lighting industry

**Figura 38**
Lighting fittings

**Figura 39**
Mirror-polished aluminium products

**Figura 40**
Uprights, panels and shelves for metal furniture

**Figura 41**
Electrical cabinet uprights, pre-punched structural profiles, elevator guides

**Figura 42**
Ventilation shutters

**Figura 43**
Punched and notched panels; filter boxes

**Figura 44**
Fully punched and bended accessories

**Figura 45**
Perforated metal strips

**Figura 46**
Punched profiles

**Figura 47**
Coil punching machine in line with roll forming machine

## CONCLUSIONS

This article analysed the variables that influence the choice of the coil punching line from a user's point of view, as well as taking into account the productive factors that cause this type of technology to be chosen.
The coil punching line has been divided into the various elements and practical indications have been given concerning the choice of equipment.
The economical and practical advantages gained through the use of a coil punching machine have been examined in a third section: saving on labour and raw materials, low installation costs and the reduced dimensions of the machine. In particular, a paragraph was dedicated to the management of raw materials and the machine.
We looked at the industries which can benefit the most from the coil punching machine, such as doors and windows, lighting, metal furniture, household appliances and tinsmithery.
One of the coil punching machine novelties was the multiple rotating tools and the introduction of the compact coil punching machine onto the market.
As recently as just a few years ago, coil punching machines were substantial machines available to big companies only.
Nowadays the compact coil punching machine allows medium and small companies to start an industrialization process with great development possibilities.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