



**S4**

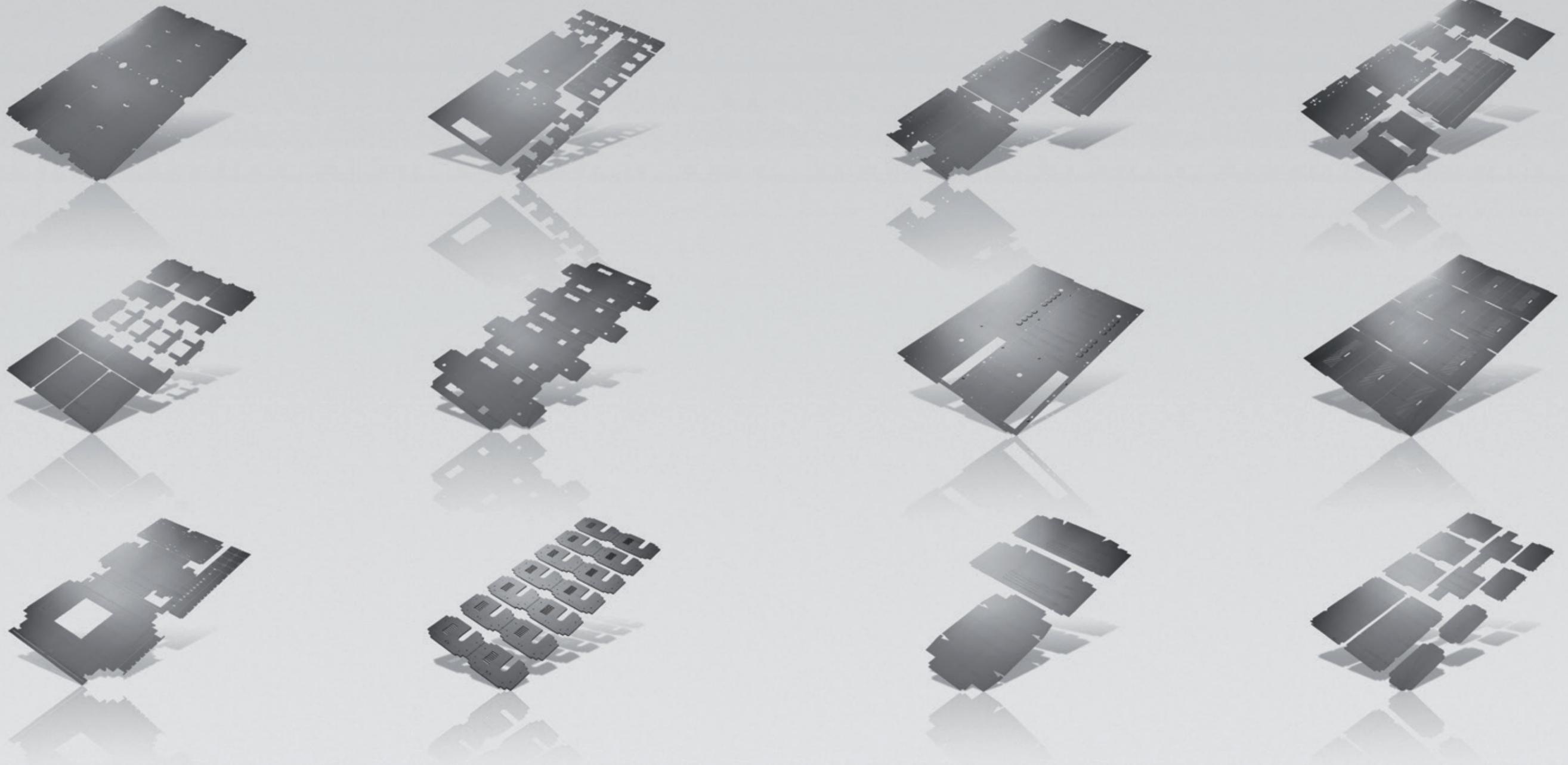


***Punching-shearing center.  
Accuracy and responsiveness  
for 4.0 manufacturing.***

**salvagnini**

# A technology-packed solution for Industry 4.0.

The S4 integrated punching-shearing center, invented by **Guido Salvagnini in 1978**, is designed for quick, flexible and automatic cutting and separating of kits and parts starting from blanks **without retooling or operator intervention**.



The S4 is a technology-packed solution that delivers high productivity and process efficiency, processing single parts, multiples or nesting, and reducing waste to a minimum. In line with the panel benders, this is a popular solution in lights-out factories in numerous industries, such as HVAC, refrigeration, lifts, metal furniture, catering, doors, household appliances, etc.

# A winning tool for the factories of the future.

## Productivity to the power of three

*Punching, cutting and separating operations are automatic; feeding, sorting and unloading cycles, which are also automatic, run in masked time; tools are always available and do not require set-up.*

## Zero waste

*In nesting, the blank is divided into parts of any size without punch-cutting or pincer-holding scrap.*

## Precision and accuracy

*The sophisticated **digital** control cycles allow for quick, accurate movements during the work process, **resulting in amazing product quality.***

## Efficiency and responsiveness

*The S4 punching-shearing center ensures **responsiveness and efficiency** while operating with different production strategies, such as JIT, kit or batch-one processing or medium runs, thanks to its unique, original architecture, which does not entail machine downtime.*

## Versatility and modularity

*Multiple loading/unloading devices allow the machine to be **configured** for working stand-alone or in-line or to be integrated into a flexible manufacturing cell or an automated factory.*



Productivity



Zero waste



Precision



Responsiveness



Versatility

# Multi-press head: tools always available for individual or multiple productions.

The multi-press head consists of a die-structure in which all the punching stations are fitted with the tools needed for production. No stopping is required for tool change nor are automatic set-up devices needed since each tool is controlled individually and always available. The head is designed for precision machining and delivers high punching quality and unrivalled productivity on thin blanks.



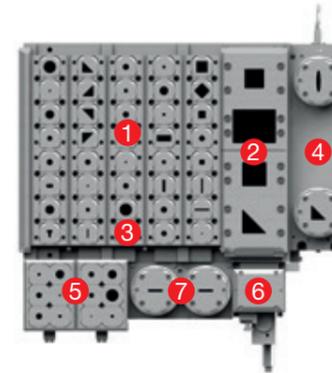
**Unique**, thanks to its patented die-structure.



**Fast**, because there is no stopping for tool change.



**Versatile**, as tools are always available and ensure efficient nesting.



1 2 punches



5 polypunch



3 embossing tools



6 taps

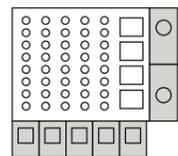


4 7 indexing tools

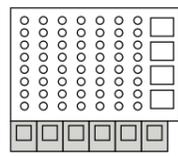


When production needs require them, tool changes take just a few minutes. They involve releasing the tool-holder cartridges, replacing the dies and then slotting the cartridges back into place.

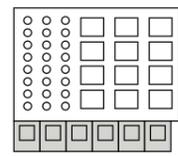
There are 5 different **configurations**, with different numbers of stations catering to different manufacturing requirements.



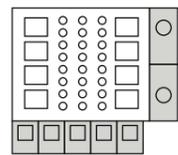
**H2**, the most versatile option.



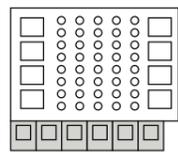
**H3**, ideal for nesting.



**H4**, specially designed for thick material.



**H5**, designed for symmetrical processing.



**H6**, suitable for nesting on thick material.

## Technical focus

Thanks to its special die-structure, the multi-press head allows for:

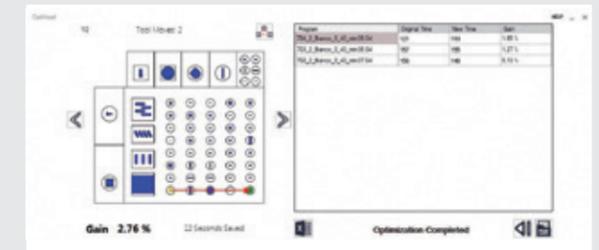
- **realization** of individual and multiple productions;
- **elimination** of all movements required to move the sheet to the tool;
- **reduction** of cycle time and tool wear;
- **increase** of productivity in nesting that requires punchings differing in shape and size.

## Technical focus

The **OPTIHEAD** software optimizes the position of tools inside the head based on the production process to be carried out, to the advantage of the cycle time. This increases the system's ease of use considerably as the programmer no longer has the task of working out the best set-up, which is instead suggested automatically by the software.



**OPTIHEAD**



## CONFIGURATION DATA

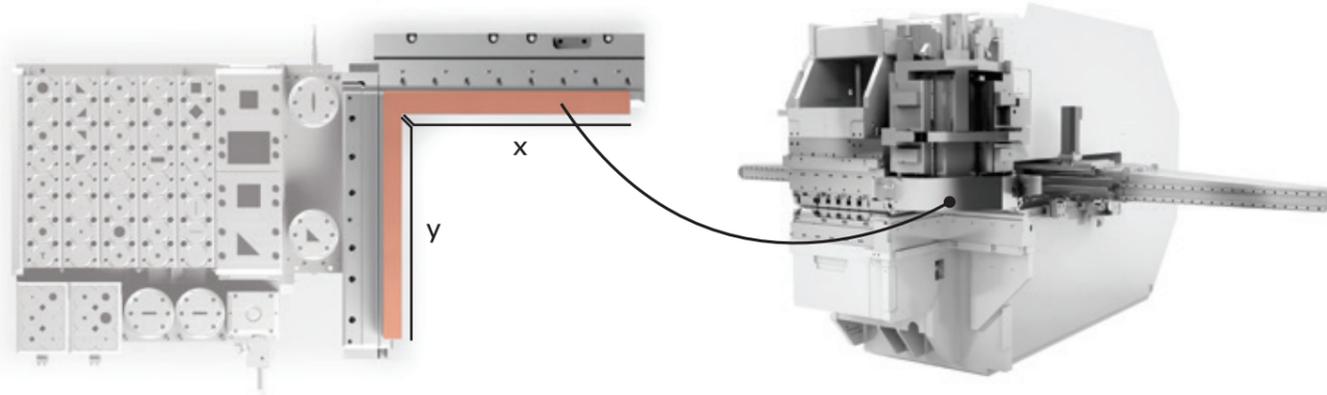
Press specifications	TOOL STATIONS				
	H2	H3	H4	H5	H6
70 kN / 7.7 ton presses with max. Ø 33 mm / 1.30" tools	40	56	24	24	40
260 kN / 28.6 ton presses with max. 90 x 90 mm / 3.50" x 3.50" tools	4	4	12	8	8
<b>Basic configuration</b>	<b>44</b>	<b>60</b>	<b>36</b>	<b>32</b>	<b>48</b>
Optional 120 kN / 13.2 ton presses with max. Ø 60 mm / 2.36" tools	5	6	6	5	6
Optional 80 kN / 8.8 ton embossing presses with max. Ø 60 mm / 2.36" tools	5	6	6	5	6
Optional 120 kN / 13.2 ton double indexing presses with max. Ø 60 mm / 2.36" tools	6	6	6	6	6
Optional 30 kN / 3.3 ton multiple presses with 6 max. Ø 33 mm / 1.30" tools each	30	36	36	30	36
Optional 55 kN / 6.1 ton lower-effect embossing presses	5	5	2	3	3
<b>Maximum number of punches in head</b>	<b>76</b>	<b>96</b>	<b>72</b>	<b>64</b>	<b>84</b>

# Unique solutions for fast and accurate uninterrupted processing.

## Integrated shear: independent blades for cuts of any length

The shear, one-of-a-kind on the market, adjacent to and integrated with the multi-press head to create a single structure, makes for an extremely compact, multi-function system.

It consists of two 500 mm (19") independent blades, orthogonally positioned, mobile and equipped with blankholder to permit cuts of any length along both the X and Y axes.



**Unique**, because of its single structure integrated with the head.



**Versatile**, as the blades are independent and can make cuts of any length.



**Accurate**, thanks to automatic blade clearance adjustment.

## Freedom of choice

The shear enables the incoming blank to be divided into parts of any size, **with or without holding scrap**, with the optimal option chosen according to manufacturing requirements.

## Trimming on all four sides

To meet specific requirements or in case of incorrectly sized blanks, the shear's independent blades allow it to trim all four sides of the sheet.

## Balanced production and optimized flow

In traditional systems, individual parts making up a multiple sheet or nesting pattern are sequentially processed once the whole starting sheet has been punched. Salvagnini's **Punch&Cut** function recognizes the punchings **1** belonging to each individual part, groups them together accordingly and processes them separately **2**, minimizing stress in the sheet metal, for improved accuracy and repeatability, optimizing the production flow downstream **3** and balancing kit or multiple productions.



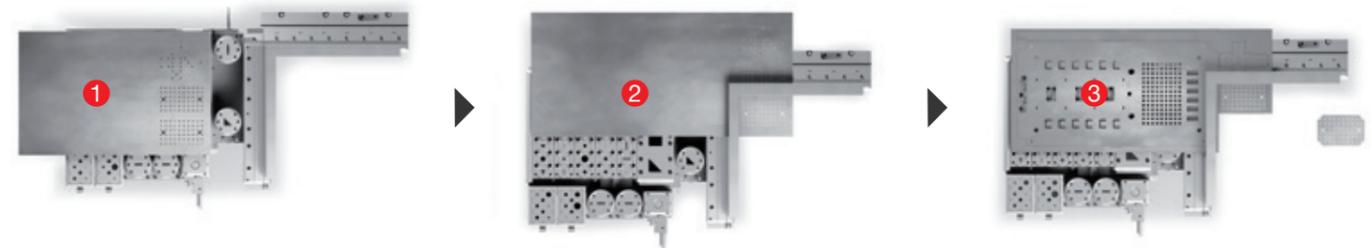
**Balanced production**



**Scrap reduction**



**Quality and repeatability**



## Technical focus

The system owes its stability to the sturdy C-shaped structure holding the multi-press head, the shear and the manipulator unit, ensuring accuracy and repeatability.



# Manipulator: accurate referencing and fast scrap-free processing.

## TECHNICAL DATA

The manipulator references the blank when processing begins and keeps it clamped during punching and cutting. It consists of a lightweight movable symmetrical device, with a maximum travel of 3030 mm (119.29"), featuring 9 **independently opening** pincers. An intelligent path and punching optimization algorithm manages its movements, achieving high levels of process reliability. It is driven by two pairs of brushless motors according to cycles balancing the thrust perfectly.



**Positioning accuracy**, as it slides along guides integral with the lower part of the "C" structure.



**High dynamics**, thanks to cycles that modulate the acceleration and brake ramps automatically as the mass of the blank being processed changes.



**Process accuracy**, with the long stroke for processing blanks up to 3048 mm (120") without re-gripping.



**Zero waste**, as the independently opening pincers open up the possibility of nesting without any holding scrap.



**Centering accuracy**, given that the stops placed between the pincers act as reference stops during centering at the beginning of the cycle; in case any variations are detected, the system reports errors, if any, so that appropriate corrective action can be taken, such as trimming the sides.



**Process quality**, as the pincers have two pressure levels (125 & 40 bar).



Machine		S4Xe.30		S4Xe.40	
<b>Technical specifications</b>					
Maximum sheet dimensions (mm)	(in)	3048 x 1650	120" x 65"	4064 x 1650	160" x 65"
Maximum sheet diagonal (mm)	(in)	3466	137"	4386	173"
Minimum sheet dimensions (mm)	(in)	370 x 300	15" x 12"	370 x 300	15" x 12"

<b>Punching</b>					
Technology		multi-press head			
Punching tool change time (s)		0 (each tool is always ready for use)			
Possibility of activating two or more tools simultaneously		yes			
Maximum material thickness (mm):	(in) / (gage)				
aluminium, UTS 200 N/mm <sup>2</sup>	38500 psi	5.0	0.20" / 6		
steel, UTS 410 N/mm <sup>2</sup>	59500 psi	3.5	0.14" / 10		
stainless steel, UTS 610 N/mm <sup>2</sup>	87000 psi	2.0	0.08" / 14		
Minimum material thickness (mm)	(in) / (gage)	0.5	0.02" / 25		

<b>Multi-press head type</b>	H2	H3	H4	H5	H6
Maximum number of punches in head	76	96	72	64	84

<b>Shearing</b>					
Technology		simultaneous or independent X- and Y-axis cutting			
Blade clearance adjustment		automatic			
Length of shear blades X x Y (mm)	(in)	500 x 500	19.5" x 19.5"		
Maximum material thickness (mm):	(in) / (gage)				
aluminium, UTS 200 N/mm <sup>2</sup>	38500 psi	5.0	0.20" / 6		
steel, UTS 410 N/mm <sup>2</sup>	59500 psi	3.5	0.14" / 10		
stainless steel, UTS 610 N/mm <sup>2</sup>	87000 psi	2.0	0.08" / 14		
Minimum material thickness (mm)	(in) / (gage)	0.5	0.02" / 25		

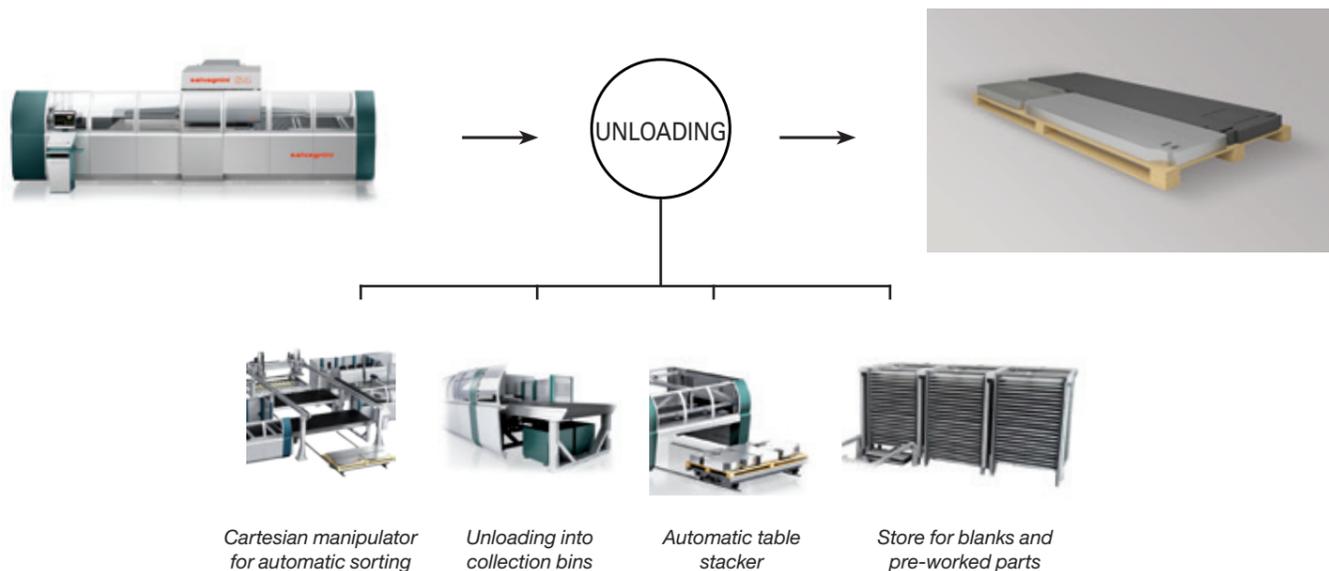
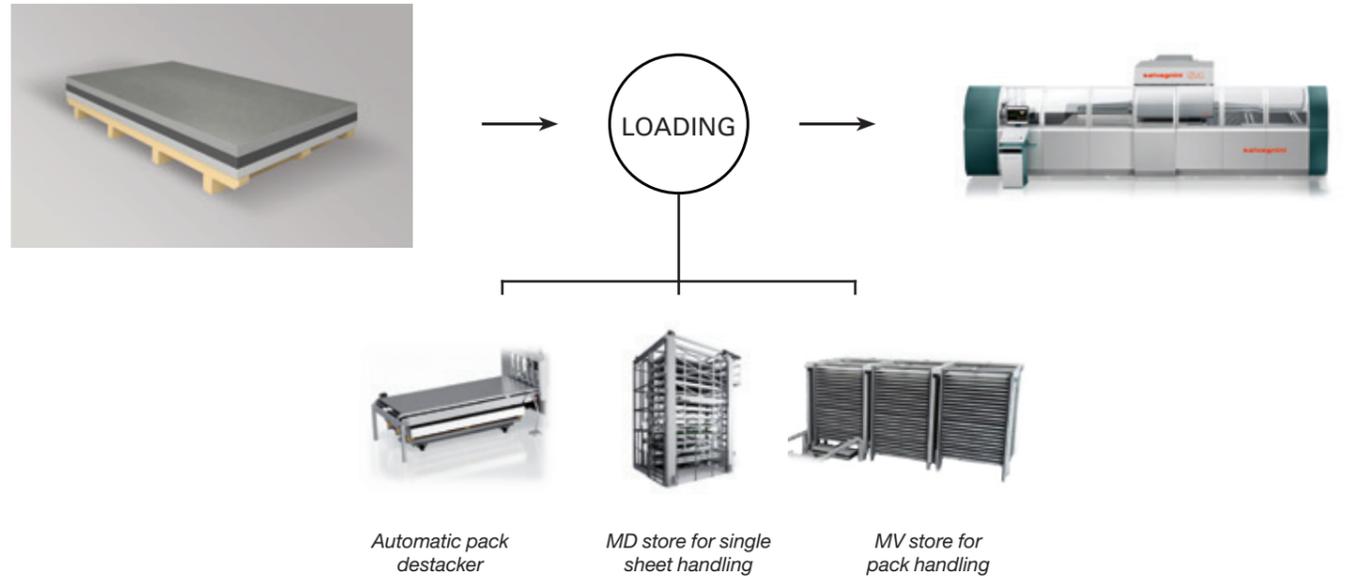
<b>Dynamics</b>					
Maximum speed (m/min):	(in/min)				
X axis		132	5.19"		
Y axis		96	3.78"		
Speed with both axes moving simultaneously (m/min)	(in/min)	163	6.41"		
Maximum acceleration (m/s <sup>2</sup> ):	(in/s <sup>2</sup> )				
X axis		30	1.18"		
Y axis		15	0.6"		

<b>Consumption</b>					
In-cycle power consumption (kW)		21.6			
Power consumption in stand-by (kW)		0.7			

Salvagnini reserves the right to modify this data without prior notice.

# Modular automation for all manufacturing requirements.

The S4 punching-shearing center can be set up in different ways and the possible configurations are designed to suit individual requirements in terms of process and internal logistics.



The punched and/or sheared parts can be directed automatically to collection bins, to buffer stores, to one or more stackers, to intermediate stores or straight to other machining centres.

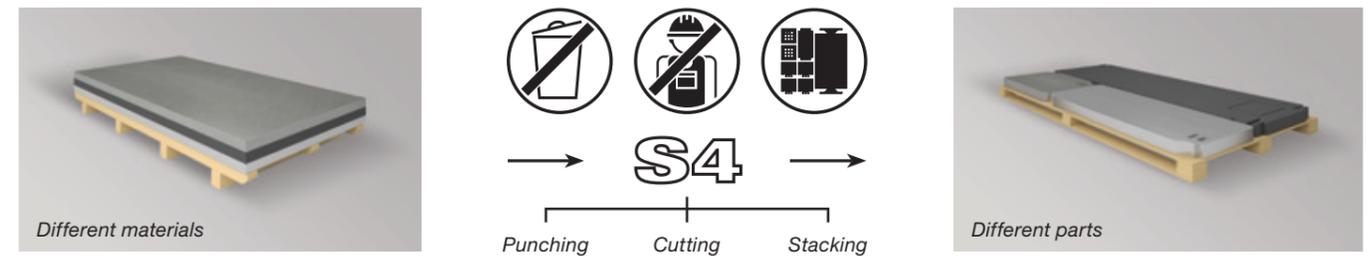
# Lean production for Industry 4.0.

The S4 punching-shearing center is designed to evolve and meet the demands of ever-changing manufacturing trends. It has been designed for easy integration with automatic handling devices and to be ready for Industry 4.0.

## Integrated communication and flexible automation



With its proprietary software, the punching-shearing center can exchange information with the company's ERP or communicate with other systems: for instance, in S4+P4 FMS lines, dedicated software allows the two systems to communicate with each other and balance production to increase productivity and reduce waste and waiting times.



The S4 punching-shearing center is a tangible example of what it means to implement flexible automation, expressing the principles and concepts of process efficiency. **All the operations that require manual intervention - such as cutting, loading, unloading, stacking, separating and sorting - are combined and automated in this single system.**

## FMS and unmanned in-line manufacturing

The S4 punching-shearing center lends itself to working in line with the P4 panel bender thanks to the handling and transfer devices that connect it mechanically and the communication software that allows for a 2-way dialogue between the two systems, even with unmanned operation. The in-line combination of the S4 and P4, presented for the first time in 1979 by Salvagnini, has been designed to run kit or batch-one production - or process other series of parts that differ from each other - in an efficient flow, without work-in-process, avoiding intermediate sheet handling and, thanks to automatic blankholder set-ups and the multi-press head, without set-up times. It is the ideal solution for companies seeking responsiveness, i.e. wanting to run operations without restrictions, on a just-in-time basis, reducing stock to zero, or kit, batch-one or parametric basis, while still having the utmost flexibility.

### Technical focus

The **PACK-MODE** and **STACK-MODE** software optimizes flow along the line between the S4 and P4. It balances production, switching to table- or buffer-fed processing during run-time, or ordering parts - again during run-time - to be stacked on pallets, in accordance with the actual progress of parts along the line.



# CHECKLIST



PD + S4 + IA



PD + S4 + BIG

**Accuracy and responsiveness for modern manufacturing.**



PD + S4 + MC



MD + S4 + IA



MD + S4 + MC



MV + SMD + S4 + IA



MV + SMD + S4 + MC

**Automation:** *efficient process.*

All the operations that require manual intervention - such as cutting, loading, unloading, stacking, separating and sorting - are automated in the S4.

**Flexibility:** *no set-up and always available tools.*

All tools are always available for processing single parts or multiples and do not require set-up.

**Productivity:** *controlled thrust ramps and optimized paths.*

The manipulator achieves high dynamics thanks to the cycles that balance the thrust. The path optimization algorithm and software for optimal tool positioning help reduce cycle time.

**Efficiency:** *less scrap.*

Punch & Cut recognizes the punchings belonging to each individual part, groups them together accordingly and processes them separately.

**Responsiveness:** *on-demand manufacturing.*

S4 is the ideal solution for productions without restrictions, on demand and on a just-in-time basis, reducing stock to zero, or kit, batch-one or parametric basis.

**Versatility:** *Industry 4.0-ready.*

Loading/unloading solutions can boost productivity in the different configurations: stand alone, FMS or AJS; OPS creates an automatic flow of orders, programs and parts between the system, ERP and office for the Industry 4.0 factory.



Laser cutting

**L3 L5**

Punching

**S4Xe SL4**

Panel forming

**P1 P2lean P4**

Bending

**B3 ROBO*former*ER**

Systems

**AJS<sup>®</sup> FMS S4 + P4 FlexCell**

Automatic storage systems

**MTW MD MBT MV LTW**