L3 L5
Laser Cutting

S4 SL4
Punch-Shear Punch-Laser

P1 P2 P4
Panel Bending

B3 E3 ROBOpower
Press Brake Bending

AJS FMS S4 + P4 FlexCell
Manufacturing Systems

MTW MD MVL MBT MV
Raw Material Storage & Retrieval Towers

Integrated punching and shearing and punching and laser cutting centers.

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www.salvagnini.com
Salvagnini S4 punching & shearing machines – prime components of a lean manufacturing system

S4 punch-shears provide a more efficient solution than traditional turret presses. An innovative, patented stationary punching head and an integrated shear significantly shorten blanking cycle times while increasing tool life. Salvagnini nesting software ensures highly efficient material management, processing nests without holding scrap and reducing waste to a minimum.

The S4 is a cornerstone of lean practices, especially when working in-line with Salvagnini panel benders. S4 punch shears use easy to understand, yet sophisticated control techniques and digital communications protocols to achieve extremely precise and rapid part processing movements. This easy to operate system can be relied upon to produce the most accurate parts of astonishing product quality.
Salvagnini SL4: punch+ fiber laser versatility.

The industry's first punching machine equipped with fiber laser technology, Salvagnini's SL4, eliminates all constraints associated with punched part geometry while reducing operating and maintenance costs.

The combination of stationary head punching and fiber laser cutting makes it possible to produce formed features with heights of up to 5/8", minimize the cost of special tools, and allow the laser to perform complicated profiles at high speeds. Production costs benefit from the optimization of material usage; no scrap "dead zone" and the virtual absence of sheet trimming mean that scrap is practically eliminated.
Productivity goes up when cycle times go down.

The patented Salvagnini multi press head. Productivity incarnate.

The stationary, multi press punching head is such a simple concept that it’s amazing it wasn’t invented before now. One tool store in one spot containing a full arsenal of punching tools ready to fire at any time when called upon means that valuable seconds required by traditional "fetch and carry" turrets is eliminated. Patented by Salvagnini, the multi press head consists of a die-structure in which the punching stations are fitted with all the tools needed for production. Each tool is independently controlled to allow for individual and multiple processing. No stopping is required for tool change nor are automatic set-up devices needed since the tools are always ready to go to work.

Thanks to this feature, all the movements required to move the sheet to the active tool are eliminated. This function makes the S4 and S4.4 unbeatable in terms of both cycle time and tool life.

Occasionally, production needs may require a special tool which takes just a minute or two to change out. Simply release the tool-holder cartridge, replace the die and then slot the cartridge back into place. Salvagnini offers 5 different multi press head configurations, with different numbers of stations, to meet the diverse production needs of each and every customer.

Salvagnini software further shortens the cycle time by optimizing the positions of the tools in the head for the production required.

<table>
<thead>
<tr>
<th>Tool stations</th>
<th>Press specifications</th>
<th>H2</th>
<th>H3</th>
<th>H4</th>
<th>H5</th>
<th>H6</th>
</tr>
</thead>
<tbody>
<tr>
<td>700N / 1.77 kips with max. 0.35 mm / 0.01&quot; tools</td>
<td>40</td>
<td>50</td>
<td>38</td>
<td>34</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>2000N / 450 kips with max. 0.50 mm / 0.02&quot; tools</td>
<td>8</td>
<td>10</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Basic configuration</td>
<td>44</td>
<td>50</td>
<td>36</td>
<td>32</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>Internal Station</td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Bending Punch Stations</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Dressing Tools</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Poly Punch Stations</td>
<td>30</td>
<td>30</td>
<td>16</td>
<td>15</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Maximum number of punches in head</td>
<td>70</td>
<td>86</td>
<td>72</td>
<td>64</td>
<td>74</td>
<td></td>
</tr>
</tbody>
</table>
Salvagnini S4's integrated shear: reduced blanking cycle times – reduced scrap.

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, ensuring an extremely high degree of efficiency and performance. It consists of two 19° inclined independent blades, orthogonally positioned, mobile and equipped with blank holder to permit cuts of any length along both the X and Y axes.

Only the incorporation of the integrated multi-press head shear can achieve significant advantages in terms of efficiency and productivity, since the following work modes can be exploited:

Scrap-free nesting

The shear enables the incoming blank to be divided into parts of any size without punch-cutting or punch-holding scrap.

Punch&Cut

In traditional systems, individual parts making up a multiple sheet or nesting pattern are processed sequentially once the whole starting sheet has been punched. Salvagnini's Punch&Cut function, on the other hand, recognizes the punchings belonging to each individual part, groups them together accordingly, and processes them separately – thus balancing kit or multiple productions as generally required on FMS lines.

Mode of operation:
no energy, time or scrap wasted
Salvagnini SL4 with fiber laser cutting: ideal for blanking of complex shapes and reduced cycle times.

For those companies that routinely deal with complex blanking profiles, Salvagnini offers the SL4 punch laser that harnesses the strength of a stationary punching head coupled with speed and agility of a fiber laser to make those intricate cuts. The Salvagnini fiber laser drastically reduces cycle times for difficult cuts, and does it with all the economies of low energy consumption, low maintenance costs, and reduced assist gasses.

The Salvagnini manipulator automatically controls ramps and reduces cycle times.

Innovative architecture for maximum precision
The manipulator, patented by Salvagnini, slides along guides integral with the lower part of the stationary punching head to achieve high precision positioning. It features a mobile device with 9 axes that open independently and are controlled by a path optimization algorithm to deliver an efficient centering cycle, high productivity and superior process reliability. The long, 118" stroke allows blanks up to 118" to be processed without regrapping, for excellent productivity and incomparable process accuracy.

A double motor for superior performance
The manipulator is equipped with two pairs of brushless motors: one pair uses proprietary hand-over kinematics while the second uses gantry control logic. This solution yields the following advantages:
- It greatly increases manipulator dynamics and maximum speeds;
- It reduces cycle times, allowing greater machine productivity;
- Thanks to the perfectly balanced thrust, processing accuracy is assured;
- It enhances sheet dynamics, even when processing thick or long (up to 15") material;
- It maintains accuracy, even with very long manipulator strokes.

Sophisticated and unique control techniques
The SL4 is equipped with a proprietary controller to provide highly efficient operating modes. The handover command structure and superior control techniques automatically modulate acceleration and brake ramps within a single machining process as the mass of the blank changes. This makes the machine more adaptable, reducing cycle times and consequently increasing productivity by an average of 15%.
Technical specifications.

<table>
<thead>
<tr>
<th>Machine</th>
<th>1.4.40</th>
<th>34.40</th>
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<tbody>
<tr>
<td>Maximum sheet dimensions (mm)</td>
<td>1220 x 697</td>
<td>1868 x 697</td>
</tr>
<tr>
<td>Minimum sheet dimensions (mm)</td>
<td>135 x 135</td>
<td>175 x 175</td>
</tr>
<tr>
<td>Punching</td>
<td>Technology</td>
<td>Multi-press head</td>
</tr>
<tr>
<td>Punching tool change time (s)</td>
<td>0 (tool is always ready for use)</td>
<td></td>
</tr>
<tr>
<td>Possibility of activating two or more tools simultaneously</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Maximum material thickness</td>
<td>0.202mm</td>
<td></td>
</tr>
<tr>
<td>Aluminum, UTS 260,000 psi</td>
<td>0.160&quot;</td>
<td></td>
</tr>
<tr>
<td>Steel, UTS 65,000 psi</td>
<td>0.127&quot;</td>
<td></td>
</tr>
<tr>
<td>Stainless steel, UTS 65,000 psi</td>
<td>0.078&quot;</td>
<td></td>
</tr>
<tr>
<td>Minimum material thickness</td>
<td>0.010mm</td>
<td></td>
</tr>
<tr>
<td>Sheet thickness</td>
<td>1mm</td>
<td></td>
</tr>
</tbody>
</table>

**SL4 Punch-Laser Machines**

<table>
<thead>
<tr>
<th>Machine</th>
<th>2000 W</th>
<th>3000 W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutting capacity (mm/sq)</td>
<td>Stainless steel (304L, 316L)</td>
<td>02 - 220</td>
</tr>
<tr>
<td>Aluminum (5083A, 5083)</td>
<td>02 - 230</td>
<td>02 - 470</td>
</tr>
<tr>
<td>Copper (C10100, C10200)</td>
<td>02 - 230</td>
<td>02 - 370</td>
</tr>
<tr>
<td>Brass (C26800, C36000)</td>
<td>02 - 230</td>
<td>02 - 370</td>
</tr>
<tr>
<td>Minimum material thickness</td>
<td>0.055mm</td>
<td></td>
</tr>
<tr>
<td>Sheet thickness</td>
<td>1.5mm</td>
<td></td>
</tr>
</tbody>
</table>

**SL4 & SL4 Dynamic**

<table>
<thead>
<tr>
<th>Machine</th>
<th>Maximum speed (mm/min)</th>
<th>X axis</th>
<th>Y axis</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000 W</td>
<td>0.195</td>
<td>3.775</td>
<td>3.775</td>
</tr>
<tr>
<td>3000 W</td>
<td>0.195</td>
<td>3.775</td>
<td>3.775</td>
</tr>
</tbody>
</table>

Conclusions:

- **Frequently Asked Questions**
  
  **Question:** I have a great scrap rate, but I’m always looking to improve. Can Salvagnini help reduce my scrap rate and how?
  
  **Answer:** The obvious answer is that we don’t know, but Salvagnini usually finds that we can reduce your scrap by at least 10%. To know for sure, we are willing to do a feasibility study. Scrap savings is usually obtained by better nesting and shearing parts instead of punching, shears, and break border parts. It sounds simple, but look at your savings, it might not be.

- **Question:** I had a salesman in the building pushing for an automated system. I am a smaller shop and it doesn’t fit the picture. I don’t think he was too smart. What gives?
  
  **Answer:** Yes, I often feel the same way! But I have to say at Salvagnini we love automation as well, in the right amount and in the right situation. If you have a complex and that is extremely competitive. Saying this, Salvagnini can also grow with you in your times. If you feel that in the future automation would be right for you, Salvagnini can be right beside you providing world-class automation solutions.

- **Question:** I see that you have a punching machine, but where is the turret?
  
  **Answer:** There isn’t one. Salvagnini punching machines use a one of a kind punching head, with all tools able to be actuated at any given time. This eliminates a lot of time in sheet movements and in tooling exchange times to boot.

- **Question:** Do you rotate your sheet during punching?
  
  **Answer:** Yes, by doing this we can eliminate holding scrap and also square up the sheet if necessary. If the sheet is the size of a blank we can still override four corner notches and punchings for the blank.

- **Question:** If I buy a Salvagnini SL, do I have to reprogram all of my existing turret programs?
  
  **Answer:** This is the case. If you think about it, it makes sense that even if you could ‘reuse’ your programs, you shouldn’t, instead, you really should re-opt your parts. It is the inherent abilities of the machine that allows for scrap reduction. If you use a program built for a turret you won’t get all the available savings by using this unique machine. If you have a third party CAM and nesting software it will be easy to get a new post processor to make the nests. Salvagnini also makes CAM and nest software built for Salvagnini machines which permit current or future use in a fully automated ERP system, making simple pieces manufacturing a reality.

Salvagnini reserves the right to change the data listed without prior notice.
Salvagnini flexibility includes both maximum system configurability and efficient part movement.

**Feeding solutions**
S4 and S4.4 punching and cutting centers can mount different types of feeding connections: from in-line conveyors and automatic destackers to automatic single-lower sheet stores and multi-layer tray storage systems. The MD store is an automatic store for packs of sheet metal that feeds the machine with single blanks in masked time. This application covers a wide range of storage needs, eliminating unnecessary material transfer and facilitating just-in-time lot production of parts using different gauges and materials.

**Unloading solutions**
The punched and/or cut parts can be automatically directed to different collection bins, to buffer stores, to one or more stackers, to intermediate stores or straight to other machining centers.

Salvagnini's intermediate gravity buffer-store perfectly balances production during in-line operation. The part leaving an S4 or S4.4 drops onto one of the shelves in the buffer-store where it is correctly positioned by a mechanical stop. Unlike most competitive products, the Salvagnini buffer-store does not work LIFO but rather positions itself so that the shelf with the part required for the next, downstream process is in front of the feeding conveyor.

Salvagnini stackers allow S4 and S4.4 systems to run unmanned until all the unloading areas are completely full, thanks to the use of an optical beam and controlled axes that ensure extremely accurate positioning and stacking.

The MC cartesian unloading robot picks up the punched, sheared or cut parts as they leave the machine and stacks them on one or more tables using two suction-cup gripping devices that run along a carriage and can rotate around a vertical axis. Manipulator rotation allows the parts to be stacked and positioned correctly for subsequent downstream processes. The two manipulators can work either independently or simultaneously as required by part dimensions.

Automation" is included in everything Salvagnini does. Even with the lights-out.

**Logistic efficiency**
Salvagnini offers highly flexible systems, suitable for all sheet metal processing needs. All Salvagnini systems are designed to reduce production and overhead costs while satisfying the latest manufacturing criteria and production trends. Thanks to a wide range of sheet handling devices, S4 and S4.4 systems can work unmanned and can easily be incorporated into AGV or FMS systems. Customers can choose from a range of different feeding and unloading connections to optimise throughput by eliminating non-productive operations and their associated processing costs, while at the same time, guaranteeing excellent quality and product profitability.

**Part identifier**
The S4 system can be equipped with a labeler, laser, or inkjet printer for marking and identifying the workpieces (with a barcode, for example).
At Salvagnini, quality is our primary product.

S4 software

**JOB.CONSOLE**

JOB.CONSOLE is the set of software packages that is integrated into the SIX controller to graphically manage and supervise the system. JOB.CONSOLE provides the operator with all the information needed to run production, thanks to the following modules:

**Salvagnini Console**

Main system command module that allows user-friendly management by:
- Line and setting production programs directly via the graphic interface;
- Making parts of the system perform semi-automatic movements, guided by a user-friendly graphic interface.

**Maintenance Manager**

A database that analyzes the movements and cycles of the components of the system, allowing simple and structured management of maintenance activities.

**SDEX**

The Salvagnini compiler that interprets programming instructions based on part geometry and defines the production cycle to optimize sheet movements and cycle times.

**Process software**

Opera-OPA is the package capable of satisfying requests from company resource management systems. The software receives production orders from ERP systems and analyzes typical parameters such as quantity, codes, delivery and job priorities. Single part programs are generated by interfacing with your CAD/CAM software to create work programs for the machines in the system. If installed, WMS software which also interfaces in real-time with the management systems, fully monitors raw and semi-finished material over the entire production process, optimizing tray localization, permitting multi-pack storage and dynamically searching for free positions.

**JOBS4 and JOBSL4**

Software that dynamically programs the day’s production: the operator can create a series of programs called "job" or "list" on the screen. JOBS4 allows a series of jobs to be prepared, edited or suspended, without stopping the current production.

**DBMT**

Graphical database that checks the punching tools present in the operating head. The system warns the operator if the punch set-up is not compatible with the part to be produced.

**EasyData**

Integrated diagnostic software for interactively browsing the documentation. EasyData provides information about each of the components managed by the Salvagnini controller, using photos, part codes and automatic filters. The system's electrical and hydraulic diagrams are available in the main command console. The operator can:
- Expand the image archive or search for specific text or codes in the diagrams;
- Add personalized notes or photos to the image archive;
- Print one or more diagrams from the documentation or export them in PDF or JPG format.

**ETHERCAT protocol**

Digital communications protocol that guarantees fast response times along with excellent signal quality and resolution.

**Scrap suction**

To guarantee extremely high process quality and minimize waste, all stations are equipped with an adequate vacuum system. In this way, valuable material processing, multiple punching and complex contours can be achieved with maximum precision and yield.

The word “ethics” has a new meaning: KinEtic.

"KinEtic" expresses the design dynamics that Salvagnini puts into its entire range of products. This word summarizes the ethical values that allow Salvagnini to go beyond machine innovation and achieve significant goals for both man and work. "KinEtic" means being able to guarantee high productivity and intelligent energy consumption. It means achieving excellent work safety levels, thanks to selective safety systems and machine ergonomics, as well as offering workers ease of use and maintenance. "KinEtic" means innovating with complete respect for both man and the environment. Salvagnini has coined this word with the specific aim of communicating and sharing the philosophy that drives its entire production with those who choose its machines and systems: technological innovation is a matter of ethics and ideas first and foremost.

**High-efficiency components**

S4 and SL4 punching and cutting centers are the result of a continuous technological evolution that has successfully and successfully improved performance and environmental impact standards, thanks to the sole use of high-efficiency components. The intelligent electronic power pack modulates its intensity according to process load, going on stand-by when the system is not running, thereby reducing energy consumption by over 50%.

**Ecological structures**

With maximum respect for the environment in mind, Salvagnini has chosen to use only metal panels around both its machines and the main command console. Furthermore, Salvagnini uses only water-based paints so as to eliminate organic solvents and solvents containing heavy metals from the workplace. The introduction of water-soluble paint greatly reduces the chemical risk to those who use it, as well as considerably lowering the fire risk.

**Safety devices**

Salvagnini machines are produced with a commitment not only to minimizing energy consumption, but also to proper handling and disposal of waste. Salvagnini environments provide a totally safe workplace for which it has earned OHSAS 18001 accreditation. The S4 and SL4 machines are all CE or UL/C/CSA certified and equipped with adequate safety devices. The machines are so innovative that they can selectively inhibit some areas for tests or work without shutting down the entire production line, while at the same time ensuring complete operator safety.

**Extremely low noise levels**

The use of brush worktables and tools with their own blankholder, together with high-efficiency components, have resulted in below-average in-cycle noise levels (65 dB), far below OSHA requirements.
Beyond our systems. You’ll even find Salvagnini excellence in our training and service.

Punch department.
Salvagnini’s punch department has one driving goal: to produce world-class standard and special tooling that complements the excellence of both S4 punch-shearers and SL4 punch-laser systems. Each tool is produced in-house by experienced designers and machinists, to provide owners with the very best in terms of system performance. This department’s main goal is to guarantee quality throughout the entire tool production cycle: in steel choice, mechanical processing, assembly and testing. From the moment an order is received until the new punch is delivered to a customer, attention to detail is the guiding principle that exemplifies Salvagnini customer service.

Training.
Salvagnini strongly believes in the value of training those who use its systems, considering this to be an increasingly important aspect of the automation concept. For this reason, the Salvagnini training program is the synthesis of our consolidated know-how of, and direct experience with, sheet processing systems. In addition to standard courses, Salvagnini also offers individual training courses for specific machines and functions, as well as on-site training if requested.

Customer service.
Salvagnini systems are always installed on customer premises by highly specialized personnel, trained in-house. Thanks to Salvagnini software and systems technology, customers always receive a quick response, preventing unnecessary machine downtime. Salvagnini’s preventive maintenance programs aim to keep machines in excellent working order.

Spare parts.
Any industrial machine will, at some time, require that parts be replaced. Preventive maintenance programs will certainly help to identify part wear before faults occur, but having the necessary spare parts on hand, nearby and ready for rapid installation, is also essential. To accomplish responsive, proactive customer service, Salvagnini has built a worldwide network of spare part warehouses, with constantly updated part selections, ready for immediate delivery wherever needed.