

# AUTOMATIC HANDLING OF SHEET METAL

**The PrimaServer line by Prima Industrie of Turin features some automatic loading/unloading and storage systems for the firm's laser machines. The proposed solutions provide for optimum handling and greater efficiency**

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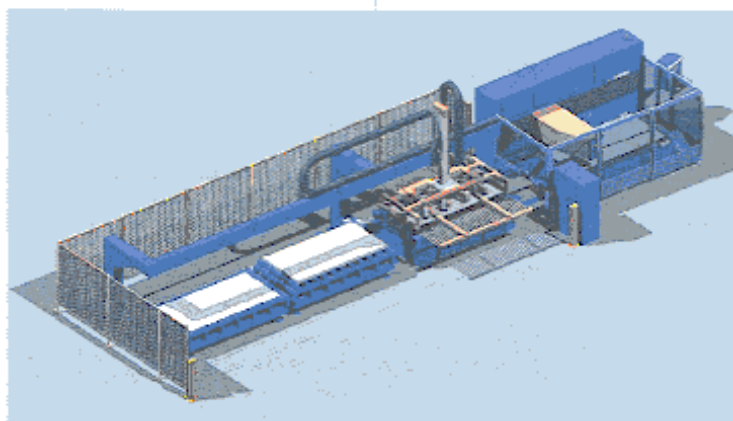
Those in the sheet-metal business know very well that cutting precision and speed are critical for competitiveness and to meet customers' request for timing and quality. The machines of Prima Industrie, Collegno, Turin, are designed to comply with such requirements. For its laser machines, the elements that Prima Industrie considers as most important are flexibility, to cover a wide range of applications, mobile optics, Cartesian, compact structure, large working volume, full accessibility, high precision and easy programming. Also, all the machines are equipped with numerical controls of the last generation, tailor-developed by Prima

Electronics. In this way the machine and laser technology are fully integrated and their whole potential can be used. Platino, in its new High-Speed version, is a 2D laser cutting machine attaining 140 m/min by 12 m/s<sup>2</sup> combined acceleration. It features overhanging Cartesian architecture, small footprint, is fully accessible and easy to transport and install. The automatic, programmable focal-length control and rapid lens change make it possible to go over from one to another material immediately and from thin to thick workpieces without adjustments. Domino is the firm's most advanced 5-axis laser machine for joint 2D and 3D jobs. It will handle different materials and thicknesses without requiring operator's intervention. This is made possible by the numerically controlled F axis, which adjusts lens position independently from the nozzle-workpiece distance. Domino, with its large working volume (3000x1500x370 mm), can cut tridimensional pieces of 160 mm max. height at any orientation of the headstock.

## THE PRIMASERVER LINE

The PrimaServer line was designed to work jointly with the Platino and Domino machines, and developed to meet the current requirements in terms of yield.

The Laser-Server Configuration.





layout and configuration. The line includes LaserServer, TowerServer and MiniServer, which allow sheets of different sizes to be handled autonomously. The several possible layouts ensure minimum overall dimensions and accessibility for manual loading and unloading. This line's high technology provides for unattended storage of rough or machined sheet metal and remote production monitoring.

#### THE LASERSERVER SYSTEM

Two versions are available to permit LaserServer to be installed in the most efficient way: a lengthwise and a crosswise arrangement, differing by the position of the handling robot and of the loading/unloading station with respect to the Laser machine. LaserServer's crosswise version is composed of a thickness gauge, a sheet picker with lateral blowers and standard protections. Two shuttles or 2 stationary tables can be installed, depending on application. The main frame is a gantry with a strong welded steel beam. The beam is arranged crosswise to the moving pallet of the cutting machine so that it can reach two tables on the left side or a shuttle on the right side for loading and unloading the sheet metal.

The beam carries the longitudinal guideways on which the slide with the pick-and-place arm runs. The slide is driven by a numerically controlled geared-motor-pinion-and-rack device. At the loading station, a suction cup is used to pick up the sheet. The suction cup drops from above in an adaptive way to account for the progressive reduction in thickness of the stack, to pick up one sheet at a time. Magnetic pick-up devices are optional. An angular suction cup with lateral compressed-air blowing helps for sheets of

max. 4-mm thickness. Should more than one sheet be picked up, as reported by a local sensor, a repeat cycle can be run. As an option, the fixed tables can be replaced by power-driven shuttles.

A double-comb gripper picks up from the pallet changer and removes the cut pieces. The robot traverses on the pallet changer, opens the double rake and is lowered on the cut sheet. The gripper closes by sliding the rake prongs between two blades of the "fakir's bed" carrying the pieces. The robot lifts the gripper and moves to the unloading station to drop the pieces. After unloading, the system moves back to the load station and picks up a new sheet with the suction cup, to deliver it to the pallet changer. The maximum sheet gauge allowable is 20 mm, as rectangular-section prongs are used. Standard sheet size is 1500x3000 mm, but smaller sheets can also be handled.

The control system is based on a 3-axis NC (Siemens 810D) and a PLC, mounted in the control cabinet. The drives and electricals are Siemens, too. The control unit of the loading/unloading system interfaces with the machine's control when load/unload cycles are carried out.

The machine is delivered complete with fixed or photocell-controlled safety guards, in compliance with the EC regulations.

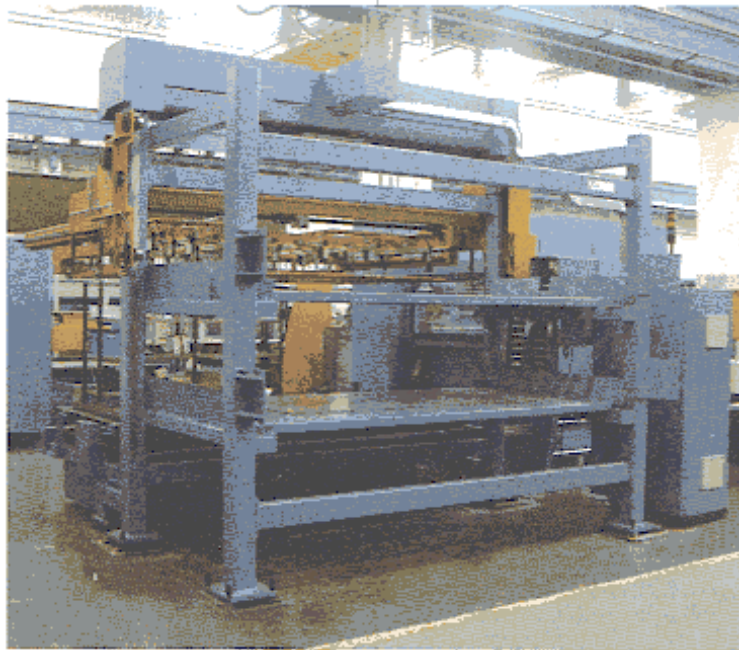
#### THE TOWERSERVER SYSTEM

The TowerServer System includes 10 pallets, a thickness gauge, a pick-up with lateral air blowers and standard protections. It will automatically feed a Platino or Domino machine with uncut sheet metal and unload the cut sheets. The sheet metal is stored in a tower storage; a pick-and-place arm is part of the system and places the sheets in the machine's pallet changer. The cut sheets

#### The Tower-Server System.

EFIM  
FIERA

The MiniServer  
System.



are automatically unloaded from the pallet changer and fed back to storage.

TowerServer can handle sheets of different sizes, max. gauge 20 mm; more precisely, the following standard sizes 1000x1000 mm, 1000x2000 mm, 1250x2500 mm, 1500x3000 mm. Optionals are available to handle other sizes and both magnetic and amagnetic materials.

TowerServer consists of: a tower storage, a travelling lift, sheet metal handler and control post.

The tower storage is made of strong rolled-steel profiles, linked by transoms and braces, which make the assembly extremely stiff and resistant, even under full load. Additional transoms form a track for the casters carrying the trays for the sheet metal.

The tower's face is suitably reinforced to act as a guideway for the travelling lift. The sheet load/unload area can be easily reached with the usual lifting equipment.

The vertical lift essentially is a slide running on the tower's front guideways and on which a translator device picks up and deposits the metal trays in the storage magazine. There are 10 trays, carrying both uncut and cut sheet. As an option, another tower with up to 22 trays can be installed.

The lift is driven by a geared motor, can accurately reach any level and perform automatic or operator-controlled semi-automatic load and unload cycles.

At the lift's base, a mechanical structure provides for easy, accurate loading of a new stack of sheets on the pallet. The

sheet-handling device removes the cut sheets from the pallet changer and loads uncut ones. The cut-sheet removal unit is fitted with a steel-tube rake, which can simultaneously unload the cut sheet and the swarf. The uncut-sheet pick-up device is an assembly of 20 suction cups, which can be manually adjusted so as to optimize handling of all the sizes required. An assembly consisting of one mobile suction cup, an air jet and an (optional) magnet facilitates picking up one sheet at a time. A thickness gauge checks that no more than one sheet at a time is picked up. The storage control system allows the operator to store easily and rapidly a large amount of sheet metal by entering a few commands on the storage keyboard. Stock accounting makes it possible to know the types and quantities stored.

#### THE MINISERVER SYSTEM

This is the most economic solution. It has all the load/unload and automatic storage functions of the other systems, storage magazine excepted. The system includes thickness gauge, two-tiers stand, sheet separator with lateral air blow jet, standard protections.

MiniServer was designed to meet the requirements of those needing an extremely compact, low-cost, easy to install and operate system to handle sheet metal.

MiniServer is not expansible and cannot be equipped with other components to allow long periods of unattended operation.