

POWER *Line*

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CUSTOMER PROFILES • NEW TECHNOLOGY • PRODUCTIVITY • FLEXIBILITY

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Industry 4.0: A Fascinating New World

By Ezio Basso, Prima Industrie Managing Director, Prima Power Division



The digital industrial revolution known as Industry 4.0 changes the business models of companies operating in all industrial sectors.

The future of manufacturing has already started. In order to secure their competitiveness, companies should accomplish the convergence between the digital and the real world that is at the base of a smart and modern factory.

In 4.0 factories, all systems are connected, allowing the collection and analysis of an amazing quantity of data coming from machines. This means manufacturing higher quality products in a more efficient, flexible, profitable, and sustainable way. It also means a complete new paradigm for service, where you can remotely know not only what your machines are doing, but also what they will do, preventing failures and maximizing performances.

The world before us is fascinating. By these new technologies, we are empowered to the point of being able to predict the future and act accordingly.

In order to allow our customers to unleash the potential of digital manufacturing for their business, we have developed a unique Industry 4.0 platform made of Smart Machines, Smart Software, and Smart Remote Care.

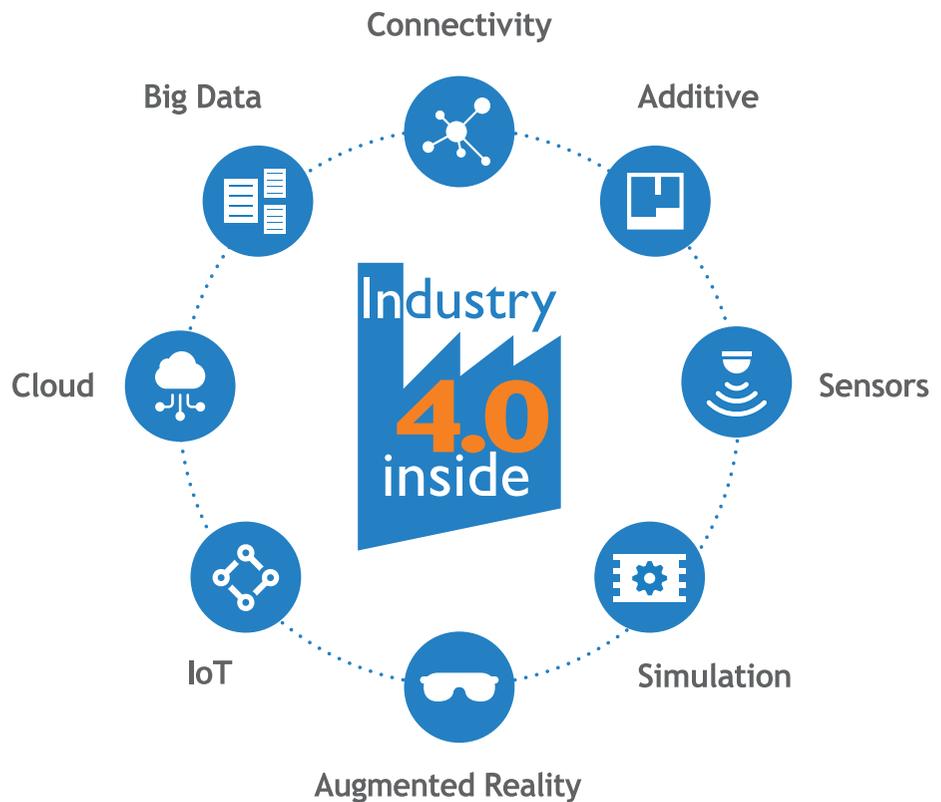
All of our machines are *Industry 4.0 Inside*, and by using sensors and cameras, they convey real-time and historical data to maximize performance and enhance efficiency and flexibility. Our Smart Software connects people, devices, and processes within one platform and provides easy access from

anywhere on the planet. Finally, our Smart Remote Care offers highly-advanced, data-driven analytics and predictive maintenance.

As you will read in this issue of the *Power Line*, we have also given concrete demonstrations and examples of the benefits of digitalization to a remarkable number of visitors during many events and exhibitions.

Among the events, I would like to mention the one dedicated to the Metal Furniture sector and Industry 4.0. For four days, our Tech Center in Collegno (Torino) was transformed into a fully-automatic factory producing office and industrial steel furniture with a line of connected machines and systems, and new digital technologies used in every step of production. (see page 6.)

Industry 4.0 offers unparalleled opportunities... let's seize them together!



Industry
4.0
inside



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Elevator Company's Productivity Reaching New Heights with Laser Genius

The company thyssenkrupp Elevator oversees all business for operations in the US, Canada, and Central and South America. The company is the largest producer of elevators in the Americas, with 13,500 employees, more than 200 branches and service locations, and sales of \$2.7 billion.

thyssenkrupp Elevator's US manufacturing facility is located in Middleton, TN. This location features a 695,000-square-foot shop for over 1,200 employees with a wide array of sheet metal fabrication and machining equipment including: punch/shear combinations, turret punch presses, panel benders, plasma cutters, shears, press brakes, CNC milling machines, lathes, etc. The products the company manufactures include the majority of components of traction and hydraulic elevators used in commercial buildings. Several years ago, thyssenkrupp decided to upgrade some older sheet metal fabrication equipment. "Because of the older equipment we were having problems maintaining tolerances," says Kevin Perkins, manufacturing engineering manager. "Members of our purchasing team evaluated three different machine tool builders, which included interviewing their customers. We ultimately purchased two Laser Genius machines from Prima Power. The first unit, the Laser Genius 1530 4kW, was installed in December 2015. The second unit, the larger bed Laser Genius 2040 4kW, came in April 2016.



Laser Genius is the high-range 2D laser cutting machine, designed for very high productivity, quality, and flexibility. Its main features include linear motors and the innovative application of synthetic granite and carbon fiber. The Laser Genius features the smallest footprint on the market today.

of automation modules, the Laser Genius is the right solution for both small batches and large-scale production.

High-dynamic linear motors ensure a 15% increase in productivity compared with conventional drive systems. The Laser Genius has a comprehensive range of automation modules and the effective CNC proprietary management guarantees accuracy in cutting and head positioning.

The Prima Power Laser Genius is a high-tech product with low operating costs, high-energy efficiency, no laser gases, and reduced maintenance. This result is obtained from Prima Power's proven leadership in laser technology in terms of flexibility, quality, user friendliness, and nearly 2,000 flat laser machines installed worldwide.

The Laser Genius has linear motors on X and Y axes, carbon fiber carriage, synthetic granite frame – unique characteristics allowing it to maximize fiber laser technology at its best. Another feature that stands out is the proprietary hardware and software for laser process control and the high-brilliance 6kW fiber laser.

The Prima Power fiber cutting head features single-lens strategy, safe impact protection system, high dynamic focal axis with 35 mm stroke, lens drawer with quick alignment system (OPC), and protection glass drawer for easy inspection. These features make it an accurate, versatile, and efficient machine capable of 24/7 lights-out production.

Laser Genius has been developed to maximize customers' competitiveness according to their application. A series of option suites is dedicated to the different production needs:

SMART Cut, for fast cutting of thin sheets (up to 5 mm) allows a reduction of the cycle times up to 30%.

MAX Cut, for the fast cutting of medium-thick gauge sheets, makes it possible to reduce processing times up to 40%.

NIGHT Cut, for intensive production, grants a higher piercing and cutting process safety.



The Laser Genius 2040 4kW was installed in April, 2016. The two Laser Genius machines helped thyssenkrupp increase its productivity by 33%.

Laser Genius

Laser Genius is the high-range 2D laser cutting machine, designed for very high productivity, quality, and flexibility. Its main features include linear motors and the innovative application of synthetic granite and carbon fiber.

Laser Genius can be used to cut a wide range of materials. Fiber lasers are more effective than other laser sources for cutting highly-reflective materials (e.g. aluminum alloys, copper, brass). Varied thicknesses can be cut with efficiency and quality. Productivity increases particularly with thin and medium-gauge sheet metal. Because of its wide range

Continued on page 4

Elevator Company's Productivity Reaching New Heights with Laser Genius

Continued from page 3

"The lasers are part of an overall strategy to replace older equipment," Perkins continues. "With the Laser Genius we were able to replace three older pieces of equipment to streamline a total of five operations and the fork lift travel between those operations – shear, debur, turret punch, re-shear, and debur. This allowed us to increase our productivity by 33%. What used to take us 2-3 weeks on the older equipment, now takes us just 2-3 hours on the Laser Genius."

- SIPS (Safe Impact Protection System) protecting the machine head in case of collisions with work pieces
- Protection cabin featuring lean transportation and installation
- Pallet changer with faster change time and automatic adjustment of speed according to sheet weight

"This allowed us to increase our productivity by 33%. What used to take us 2-3 weeks on the older equipment, now takes us just 2-3 hours on the Laser Genius."

NC Express Software

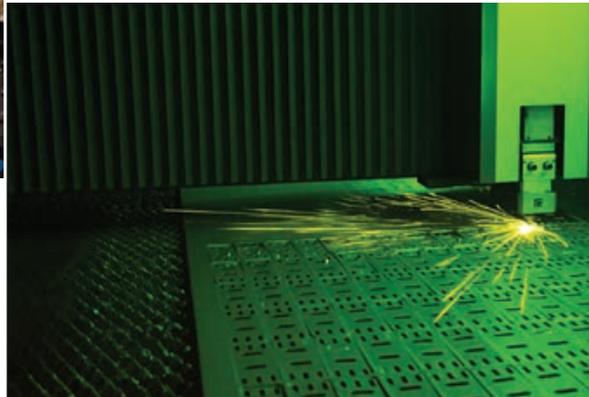
Another Laser Genius feature that thyssenkrupp likes is the Prima Power NC Express Software. NC Express e³ is a scalable CAD/CAM application that can be used for single part processing or as a fully automatic batch processing software. No matter the production style, NC Express e³ offers support for any programming need for

Prima Power lasers & turrets.

From importing and unfolding 3D models to processing daily ERP data, NC Express e³ can handle the load. "The NC Express Software is phenomenal," explains Robert Weaver, production manager. "It's the easiest programming software we use in the plant. Manual programming is now a thing of the past. With the NC Express Software, we simply download a DXF file and the software will generate the program for us to nest."



Linear motors provide enhanced speed up to 240 m/min. And the user-friendly proprietary CNC features a 17" LCD touch screen and trackball.



"The NC Express Software is phenomenal. It's the easiest programming software we use in the plant. Manual programming is now a thing of the past."

Laser Genius main features:

- Linear motors for enhanced speed up to 240 m/min
- Compact design for minimum footprint and easy transportation and installation
- Synthetic granite frame for best thermal stability and vibration damping
- Maximum accessibility to the machine
- Fiber laser up to 6kW: wide range of materials and the best efficiency for sheet metal processing of thin and medium thicknesses
- Focusing head equipped with single-lens technology for all production needs
- High dynamic F-axis for controlling the focal position independently of the Z-axis



The Laser Genius provides excellent machine quality and extraordinary performance, always focusing on the environment and ergonomics. With Prima Power machines it is possible to produce sheet metal parts at lower cost and with a lower impact on the environment.

“The Laser Genius allows us to design and process special parts at a moment’s notice. With the larger table size on the Laser Genius 2040, we now have the capability of running larger plate sizes which are industry standard and reduce the need to purchase custom blank sizes.”

Laser Genius main options:

- Automatic nozzle changer for unmanned production
- Single lens: all materials and thicknesses can be cut with a single standard lens for unmanned production
- Sheet metal position detection through capacitive sensor and automatic program skewing
- Software packages for advanced programming
- Wide range of modules for the automation of the material handling and storage



The thyssenkrupp Elevator Company oversees all business for operations in the US, Canada, and Central and South America. The company is the largest producer of elevators in the Americas, with 13,500 employees, more than 200 branches and service locations, and sales of \$2.7 billion.

“From our previous experience with other lasers on our shop floor, we were very interested in the Automatic Nozzle Changer feature,” explains Perkins. “It eliminates the guesswork and saves us setup time. The operator just loads the plate, selects the desired program, and the Laser Genius does the rest.”

- Higher laser wall-plug efficiency, less cooling capacity required, less heat generation
- Less energy, less waste of material, no laser gases
- Compact and automated – less factory space and logistics
- High efficiency – more output during machine run



The first Laser Genius, the 1530, was purchased by thyssenkrupp in December 2015.

“The Laser Genius allows us to design and process special parts at a moment’s notice,” says Perkins. “We have already programmed more than 1,000 parts affecting every part of an elevator. With the larger table size on the Laser Genius 2040, we now have the capability of running larger plate sizes which are industry standard and reduce the need to purchase custom blank sizes. Also, with the larger 2040 table size and the better nesting capabilities, we can nest multiple jobs instead of producing the same part across shear, punch, and re-shear operations.”

“In the past 10 months, we have sustained a 99% success rate on our First Article Inspection Reports.”

Quality Results

“In the past 10 months, we have sustained a 99% success rate on our First Article Inspection Reports,” concludes Perkins.

Laser Genius Sustainability

The Laser Genius provides excellent machine quality and extraordinary performance, always focusing on the environment and ergonomics. It is designed and developed following the Prima Power Green Means® concept, combining productivity and sustainability. With Prima Power machines, it is possible to produce sheet metal parts at lower cost and with a lower impact on the environment.

Prima Power Hosts Metal Furniture Industry Event

More than 300 visitors from 150 companies coming from 22 countries participated in a Metal Furniture Industry event that was hosted by Prima Power last April 4-7 at its Headquarters and Tech Center in Collegno (TO), Italy.

The Metal Furniture event was organized jointly with ArcelorMittal CLN, the leading Italian steel distribution company created from the joint venture of ArcelorMittal and CLN Group, an Italian business active in steel distribution and engineering.

The event included a visit to the new Prima Power Headquarters & Tech Center, demonstrations and presentations dedicated to metal furniture applications, a workshop on Prima Power solutions for digital manufacturing and Industry 4.0, and one dedicated to ArcelorMittal CLN, where the properties of the steel products being demonstrated were explained.

Visitors also attended the simulation of a complete manufacturing process, from production launch to the assembly of final products.

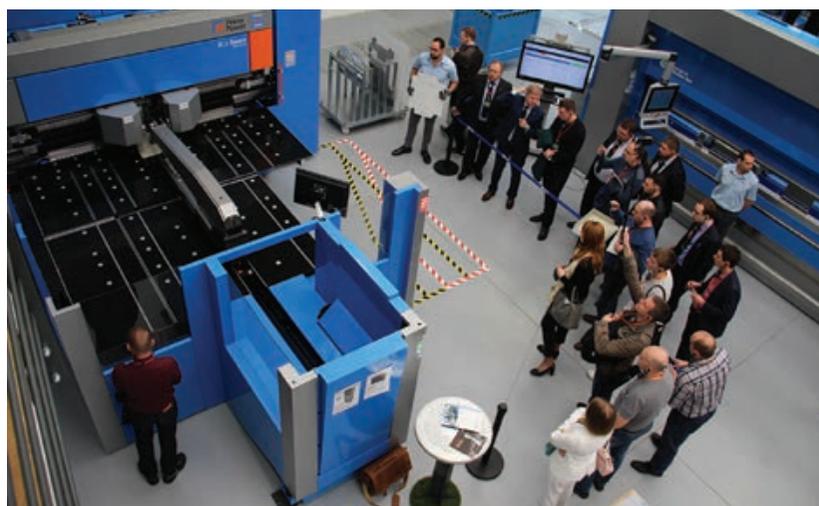
The event for the Italian market on April 7 had a strong focus on the Industry 4.0 National Plan and the important financial benefits for our Italian customers who seized the opportunities offered by the new industrial revolution.

All products of the Prima Power range are Industry 4.0 Inside, and during the event demonstrations were organized to show their high level of connectivity. The high quality of the data collected from the machines was made available for detailed performance and production reporting and for smart remote care.

At the center of the event, was the Prima Power PSBB automatic production line, including storage and automation modules, the combination punch/shear machine, and the panel bender. This FMS line demonstrated all its potential in terms of flexibility and production capacity, manufacturing all components of a variety of final products, such as metallic cabinets, tool drawers and trolleys, and other office and factory furniture.

In addition, all stand-alone machines in action at our Tech Center were connected to create a continuous production line: the combination punch/laser machine Combi Genius, the 2D laser machines Platino Fiber and Laser Genius, the 3D laser cutting machines Laser Next and Rapido, the Punch Genius machine, the panel BCe Smart, and the eP servo-electric press brake.

Feedback on all the events was very positive, and we are extremely grateful to our visitors for their interest and enthusiasm. It was really a pleasure sharing ideas on the new approaches in this sheet metal manufacturing sector.



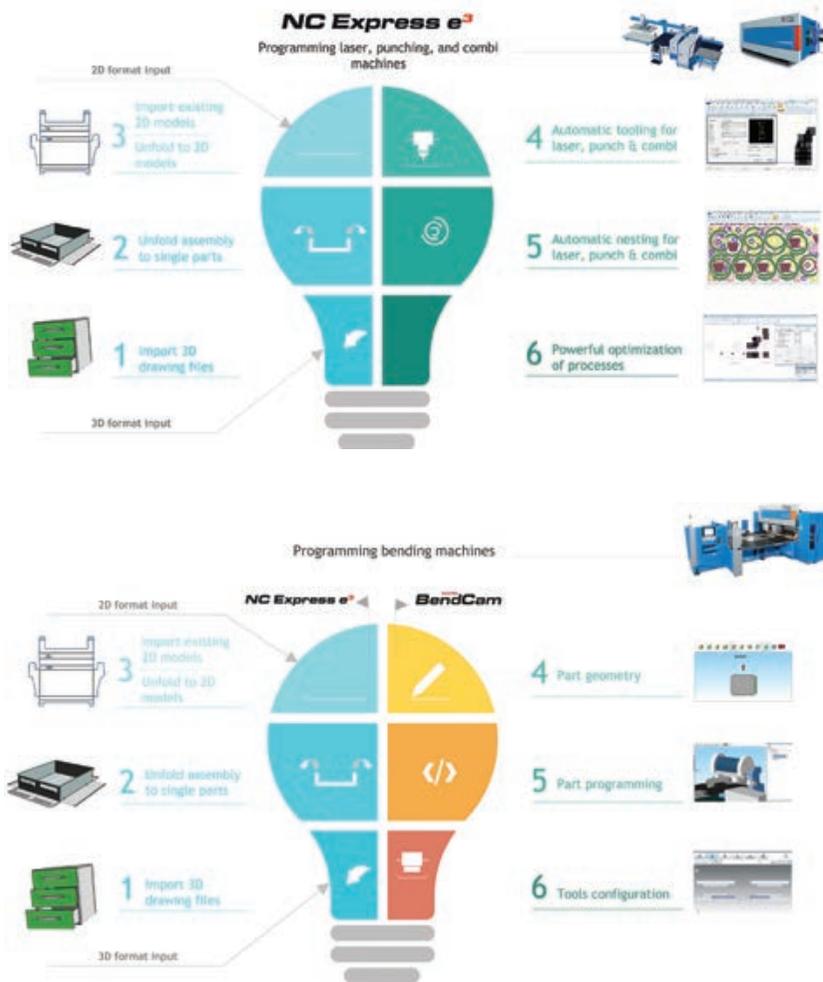
Production Management Software Process

By Ivana Montelli, SW Product Manager, Prima Power



During the Metal Furniture event in Collegno, the Prima Power Production Management Software Process was demonstrated by Marco Cesaretto and was well-received by all in attendance. The demonstrations consisted of: working the parts /assembly by **Tulus® Power Processing** then selecting Products through QRCode reading by **Tulus® e-Kanban** application, and quickly running the production.

Additional steps behind these software products were described: starting from the order importing from customer ERP system, Programming machines for both processes 2D and 3DBend, by **NCEXpress e3**, **NCEXpress e3 Unfolder** and **Master BendCam**, a unique entry point to work the part file for both processes.

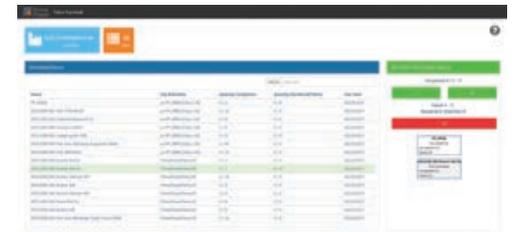


Customers can choose products to be manufactured with simple QRCode detection for a quick and direct run to production. This operation can be easily performed by **Tulus e-Kanban** Application, that runs on the mobile application. Each QRCode contains:

- Product Name or Product Assembly
- Parts Quantity



With **Tulus® Terminal** you can manage all possible external phases (ex: subcontractor, painting, etc.) or close all phases.



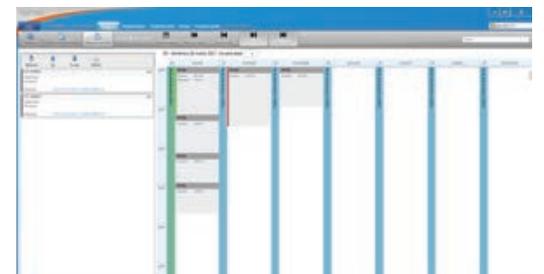
Tulus® Terminal provides the status of the part production and the current work step and information and instructions of each work step.

With **Tulus® Power Processing**, order and production management is easier than ever before. You control the entire product assembly, its parts and part counts with up-to-date inventory of parts, both stacked parts and parts in storage.

A clear indication of failure condition automatically placed the component and missing quantity on order again in the ERP system.



Launched Products are worked and ready during the day, according to Production Calendar.



While the Demo machine was running, the continuous Machine Current Status and Production and Performance data Reporting was displayed on a large monitor. Data collected back from the machines by **Tulus Office – Tulus Production** and **Tulus Performance Reporting**, demonstrated the Prima Power machines' connectivity to the same software platform and Industry 4.0 concepts application.

Laser-Punch Heats Up Production at KeepRite Refrigeration

National Refrigeration and Air Conditioning Products Canada Corp. is a leading North American manufacturer of commercial refrigeration products marketed under the KeepRite Refrigeration brand name. The company's product line includes specialized applications in food storage and processing, industrial process cooling, including evaporator coils, condensing units, condensers, heat transfer & heat recovery, and air conditioning products.

Located in Brantford, Ontario, for nearly 70 years KeepRite Refrigeration products have been manufactured and distributed to grocery stores, convenience stores, gas stations, restaurants, and commercial locations from small warehouses to large distribution terminals of over 1-million square feet of cool space. Today the company operates with 200+ employees and over 150,000 square feet for product design, engineering, manufacturing, sales, and after-market support.

Several years ago, the company began its search to update its sheet metal fabrication equipment. "Back in the early 2000's, we purchased several press brakes and a Finn-Power (now Prima Power) Shear Genius punch/shear combination machine to add capacity," explains Chris Brohman, plant manager. "The Shear Genius provided the flexibility we were looking for and has served us well over the years. By 2015, we were interested in finding another flexible workhorse like the SG to add to our equipment list. We needed the extra capacity because of the company's steady growth since 2004.

"Of all of the machines we researched, the LPef did the best job of providing the benefits we needed most. It gave us the best balance between flexibility and lights-out operation."

"We were courted by all the machine builders," continues Brohman. "I was initially nudged into considering a laser by our sister company that was investigating laser machines. Our designers had invented all these new complex profiles on products that adjusted to market demand...and the laser began to make sense. However, we did not want to invest in a CO2 laser with the large maintenance and operating costs. We set our sights on a fiber laser machine with the power to blast through copper, aluminum, and stainless steel in the thicknesses we needed. We had a strong relationship with Prima Power as a result of an earlier purchase of the company's Shear Genius and several press brakes. This relationship played a major role in our ultimate purchasing decision in 2016, along with Prima Power's ability to supply the right machine for us."



KeepRite Refrigeration purchased the Prima Power LPef8 laser punch. Another key factor in KeepRite's purchasing decision was automation that Prima Power could provide. KeepRite chose the Combo double tower 24 stations – 10 stations for finished goods and 14 for raw material storage.

Prima Power LPef8 Laser Punch

In late 2015, the decision was made to purchase the Prima Power LPef8 laser punch. The machine was installed the following August. The LPef series combines high-end, servo-electric punching and state-of-the-art fiber laser technology in a manufacturing solution that provides outstanding flexibility, speed, accuracy, and productivity to fabricate the most challenging products.

The inherent benefit of integrated punching and laser cutting is high versatility. You can use the turret punch press where it is easier or faster and the laser where it is most flexible.

Depending on the manufacturing task at hand, you can always choose the most productive manufacturing method. This amounts to flexibility for fulfilling varying requirements, cost-efficiency, and competitiveness.

The Prima Power LPef series features a modern fiber laser source with low-energy consumption and the need for laser gases is eliminated.

High-Performance Servo-Electric Punching



Chris Brohman, plant manager, explains that KeepRite management added the Prima Power LPef8 in late 2016 in order to add extra capacity due to the company's steady growth since 2004.

The high-end premium series turret punch press of the LPef has properties such as automatic tool length measurement, optimization of stroke length, and easy adjustment of the punching stroke. These combined with others, add up to faster set-ups and more ease of operation. The punching speed, tool rotation, and tool change time are improved. The punching stroke is NC-controlled, providing high-performance punching, and excellent forming capabilities.

"From the time we initiated the purchase order to the final sign-off, the installation of the LPef was the smoothest project that I was ever involved with."

"The fiber laser, the operating system, and the servo-electric punching combine to make the speed of the LPef a big plus," says Brohman. "It is also very quiet, even when we punch 10 gauge material. The LPef can accommodate all materials within reason. While stainless steel is the most difficult to process on the other machines, it is our favorite on the LPef."



The LPef series combines high-end, servo-electric punching and state-of-the-art fiber laser technology in a manufacturing solution that provides outstanding flexibility, speed, accuracy, and productivity to fabricate the most challenging products.



Fiber Laser Cutting

The laser used in the system as its most flexible tool is a 2kW, 3kW, or 4kW high brilliance fiber laser. Cutting speed increases in proportion to power. Totally closed cabin design for eye safety and noise reduction is always included with the system.

“The competition’s automation was either way too automated or not automated enough. We chose the Combo double tower 24 stations – 10 stations for finished goods and 14 for raw material storage.”

With the integrated fiber laser, a wide range of material can be cut such as copper or brass. A significant reduction in operating cost is achieved because the laser has no maintenance requirements, no laser gas is needed, and energy consumption is far smaller compared with other solutions.

Automation is Key Factor

Another key factor in KeepRite Refrigeration’s purchasing decision was the automation that Prima Power could provide. “The competition’s automation was either way too automated or not automated enough,” explains Brohman. “We chose the Combo double tower 24 stations – 10 stations for finished goods and 14 for raw material storage.”

Combo FMS Double-Sided Storage

COMBO FMS® is a flexible material system with the compact COMBO storage as the key module in automating the material flow. It makes different materials available at the working point quickly and practically, and can also serve as intermediate storage for ready components, and as a buffer.



COMBO FMS® is a flexible material system with the compact COMBO storage as the key module in automating the material flow. It makes different materials available at the working point quickly and practically and can also serve as intermediate storage for ready components and as a buffer.

“The machine was being set up and the installation crews came in one after another. That was one of the best experiences I ever had with this size project.”

The Combo storage allows processing of components from a variety of materials, which can be changed, as programmed, automatically. The sheets are automatically transferred into machines and cells of the system.

Loading and Stacking Robot (LSR)

KeepRite Refrigeration chose the high-performance portal-type loading and stacking robot LSR to be integrated with its LPef. The LSR provides a reliable, fully-automatic process from loading to picking of parts and stacking them. Skeletons are unloaded with the unloading device. The operator is free for other tasks while machine productivity and utilization increases dramatically.

“Our LPef can run lights out up to 8 -10 hours/night,” says Brohman. “The LSR does all the work between the tower and the LPef machine: the sheet unloading, parts cassette loading, and skeleton removal!”

A Machine with Benefits

“Of all the machines we researched, the LPef did the best job of providing the benefits we needed most,” says Brohman. “It gave us the best balance between flexibility and lights-out operation. Punching was paramount for us. And we have so many forms in our products, the availability of the forming tools and special tools was another strong

selling point for the LPef. If we run out of punches in the turret, we can always cut the hole. So now we can have one pre-pierced hole and do any size or any shape we need.”

Installation & Service

Service was another important factor to KeepRite management. “From the time we initiated the purchase order to the final sign-off, the installation of the LPef was the smoothest project that I was ever involved with,” says Brohman. “The machine was being set up and the installation crews came in one after another. That was one of the best experiences I ever had with this size project.”

“The LPef has given us the extra capacity that we needed, increased our flexibility with the laser, and the sheer volume of parts it can process is very impressive,” concludes Brohman. “A job that would take us three day shifts and two night shifts in the past can now be done in two 8-hour day shifts.”

Shear Genius at 30...

The evolution of innovative sheet metal fabrication technology

For 30 years, the family of punching and integrated right-angle shearing machines has been the foundation of Prima Power's products.

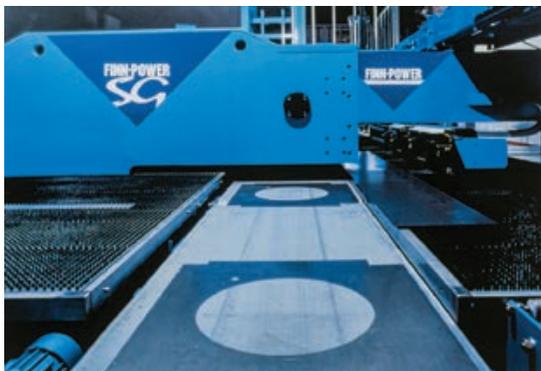
The benefits of the punch/right-angle shear continue to attract the attention of fabricators throughout the world. Today, nearly 3,000 punch/shear machines have provided such benefits as economical per-piece cost, reliable automation, and a versatile range of functions that offer efficiency and dependability in demanding applications. The integrated punching and shearing functions increase productivity, efficiency, and savings.

"That's Sheer Genius!"

Over the years, the punching and shearing machines have evolved from ball tables to brush tables, Finn-Power to Prima Power, hydraulics to servo-electric technology, and from angular shapes to round ones and back again. Speed and efficiency have improved, and the range of automation and accessories has grown. The name of the product, however, has remained the same for 25 years. The punching/shearing machine was named Shear Genius® in 1992. The ingenious name came about when an American customer praised the machine they purchased, exclaiming: "That's sheer genius!" A little play on words tweaked the name to Shear Genius, which is the perfect name for the machine. Later, the Shear family of products grew with an even more efficient punching/shearing cell, named Shear Brilliance.



In 1989 the right angle shear length grew to 800 mm and the abbreviation was changed from RAS to RS.



Today's Shear Genius provides even more advanced state-of-the-art technology incorporated with all the traditional, proven features:

- Quick tool setup time — the turret accommodates up to 382 active tools
- Automatic adjustment of shear clearance
- Fewer hits and less wearing on the tools
- No nibble marks
- Rapid loading (LD, Loading Device)
- Automated and flexible manufacturing
- Faster production and material flow
- Minimized material scrap
- Enough force to manufacture demanding products (300 kN)
- Average power consumption 6kVA / 5kW
- Mains connection 7kVA (3 x 25 A fuse / 400 V)
- Low maintenance costs
- Quicker pay-off

Sorting scrap inside the shear accelerates the process, enabling a more compact design of the machine with less floor space.



Shear Genius in 1998 with loading, unloading, and stacking automation.

Two Performance Levels: *Pure* and *Dynamic*

The new Shear Genius series offers two complementary performance levels. *Pure* provides efficiency for a variety of requirements in the sheet



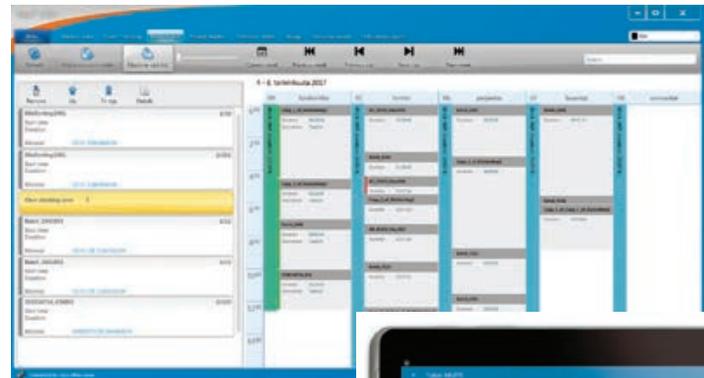
metal industry, and *Dynamic* features the best productivity and performance in the market. Both models are equipped with the latest technical features, with an option to add an extensive range of accessories.



Shear Genius and Shear Brilliance can be equipped with a variety of automation equipment. In a PSBB line the punching/shearing cell functions as the core of the fabrication line, which, thanks to its modularity, can be grown step by step.

Efficiency, Reliability, Optimized Use of Material

The majority of sheet metal pieces are rectangular in shape. The most economical way to manufacture the pieces is to first punch the sheet, and then cut off the parts using the integrated shear. To ensure both the efficiency and the reliability of these stages, Prima Power utilizes the latest technology and the newest innovations. The numerically-controlled, servo-electric axes, proprietary software, and an extensive range of tools ensure high precision of parts in both small and large run quantities.



Proprietary Software

Prima Power has developed software for both facilitating the use of the machine and managing orders. TaskLoader, Tulus MUPS and Tulus e-Kanban are light mobile applications which, depending on the application, communicate with the machine and the company's ERP system.

Proprietary Tulus software provides tools for machine operation and remote care, as well as for manufacturing execution (MES). The software can also be integrated with the ERP solution of the company.



An Intelligent Ram

The rotating ram head accelerates tool changing and allows for an increased number of tools in the turret, particularly index tools. The punching force can be up to 300 kN. Automatic overload protection and central lubrication ensure dependable machine operation.



Shear Genius® offers diverse automatization options for a variety of sectors. In the PSBB line, it is the foundation of production. The modular automation also enables building the line one module at a time.

Scratch-Free Parts

The sheet floating system prevents scratching of sensitive materials. The motion is activated programmatically, when needed.



The new Shear Genius with loading device as standard.

Prima Power Lasers Increase Speed & Quality for Chinese Automobile Parts Supplier

The Joint Venture between Magna International-Cosma and Starq created Cosma Chongqing, which opened its plant in 2012. Cosma represents one of the world's premier global automotive suppliers. The company has more than 35,000 employees and a presence in 17 countries. Cosma's product range offers a comprehensive range of body chassis and engineering solutions to OEM global customers, and has already established 10 plants throughout China, including the Chongqing and Changchun plants equipped with Prima Power 3D laser machines.

"A key ingredient to Cosma's success has been our commitment to the development, implementation, and improvement of new technology," explains Glenn Ding, Cosma's purchasing manager. "Magna International offered us several potential suppliers and left the ultimate decision to us. After analyzing what the market was offering, we decided to invest in Prima Power's 3D laser equipment. We believe Prima Power currently offers the most innovative solutions."



Cosma purchased a total of seven Rapido lasers and three Laser Next machines for the Chongqing hot-forming line, along with one Laser Next machine in Changchun.



More than 60% of the Cosma's sales volume comes from the laser cutting and welding line outputs.



From 2012 onward, Cosma purchased a total of seven Rapido lasers and three Laser Next machines for the Chongqing hot-forming line, along with one Laser Next machine in Changchun, creating the first 3D laser lines for Cosma China.

"Prima Power's support was crucial in our first phase with the machines," continues Ding. "During those first few months, our workers were not familiar with fiber lasers and didn't have enough

practical experience working with them. Over time, however, we learned how to work with the Prima Power technicians, as well as the after-sales staff who had promptly responded to our service calls, organizing the assistance onsite within two days. They effectively shared information and trained our staff, and we are now able to solve any small issues internally, ensuring the continuity of our production."

"After analyzing what the market was offering, we decided to invest in Prima Power's 3D laser equipment. We believe Prima Power currently offers the most innovative solutions."

Cosma Chongqing specializes in hot stamping, front and rear subframes, rear axle, and control arms production. Hot stamping allows the formation of complex part geometries, such as body pillars, rockers, roof rails, and bumpers, production traditionally achieved only through the cold forming of mild steels. Cosma has taken the industry lead by bringing this forming process to body structure applications in fields where vehicle crash performance has become more critical due to ever-increasing government standards.

More than 60% of Cosma's sales volume comes from the laser cutting and welding line outputs. The client portfolio is comprised almost exclusively of international enterprises that produce a diverse lineup of innovative, award-winning vehicles, using some of the most advanced technologies and manufacturing processes. As a result, it is crucial for Cosma to be proficient in producing high-quality products that meet client standards.



After analyzing what the market was offering, the Cosma management decided to invest in Prima Power's 3D laser equipment.

Currently, the principal client for the Chongqing plant is Ford. "They are concerned not only with the high quality of our equipment output, but also with our speed of production," says Ding. "When the client inspects our factory, they always measure the cycle time of our machines, and this, along with speed of production, is a key metric for us. Prima Power lasers are able to run at a fast pace, which has allowed us to keep up with client expectations."

"Prima Power lasers are able to run at a fast pace, which has allowed us to keep up with client expectations."

"We learned how to work with the Prima Power technicians, as well as the after-sales staff who had promptly responded to our service calls, organizing the assistance onsite within two days. They effectively shared information and trained our staff, and we are now able to solve any small issues internally, ensuring the continuity of our production."



One of the highlights of the Prima Power Rapido is the FPC (focal position control). "The FPC improves the quality of the cutting edge and ensures the appropriate speed of production," concludes Ding. "Prima Power's FPC allows the user to automatically adjust the position of the focus of the laser beam inside or outside the surface of the sheet metal."

Cosma's production is extremely intense and continuous, and Prima Power is proud to be working in partnership with them to ensure that their business upholds its stellar reputation for efficiency and quality.



Investment in the Future Pays Dividends For Southeast Contract Manufacturer

Farris Fab & Machine, Inc., Cherryville, NC opened its doors in 1979 with a humble 1,200-square-foot building, limited machinery, and only four employees. Although their resources were small, the Farris team had a lofty goal – to become one of the best fabricators in the Southeastern United States.

Today, Farris Fab & Machine has reached its goal and is considered a key player in the region. In fact, the FABRICATOR magazine added the company to its Top 40 list. The company has evolved into three locations with nearly 200,000 square feet of space and 200 employees. The company services an extensive and diverse customer base with plate fabrication, sheet metal fabrication, structural steel fabrication, and CNC machining. Farris services such markets as agriculture, appliance, construction, heavy equipment, HVAC, oil and gas, transportation, power generation, material handling, elevators, shelving/display, etc.

Investing in the Future

Bryan Farris, the company's president, represents the second generation ownership after his father Corwin retired in the early 1990's. "We went from a small job shop to a good-sized contract manufacturer by investing in our future," explains Farris. "We knew that price, quality, and delivery were no longer selling points...they were to be expected by our customers. For us to get to the next level, things were going to have to be different. So we set ourselves up to grow during the recession of 2008-2009." During this time, Farris Fab & Machine took advantage of the lower real estate costs and moved from its 37,000-square-foot shop to its current 110,000-square-foot main facility in Cherryville.

At the same time, Farris was accumulating an arsenal of fabrication machines and machine tools which include: seven lasers, 12 press brakes, a turret punch press, a plasma machine, two water jets, an oxy-flame cutting machine, welders, nine CNC mills, five CNC lathes, six robots, and wet paint & powder coating capabilities.

"I compared all the top-named lasers. We asked several of the laser companies to run our programs and parts on their machines. The Prima Power Platino 5kW Fiber Laser beat other higher wattage competitors by as much as 15 minutes on the nest."

Farris Fab & Machine then set its sights on the business process management aspect of its business. "To get to the next level, we began by adding a paperless ERP system," explains Bogdan Ewendt, cfo/coo. "As we got busier, customers were asking us if we had the capacity to deliver their parts on time. That's when we added a new ERP system.



After much research, Bryan Farris, president, decided to invest in the Prima Power Platino Fiber Laser and the eP-1030 servo-electric press brake in order to take his company to the next level.

Now each work cell has its own monitor to record the progress. Today, when a customer calls up and asks 'where's my part?'— the information is right there."

"After installing the ERP system that made us more efficient, we wanted to make sure that those efficiencies were put to good use," adds Farris. "We began our search for more productive fabricating equipment so we were ready for the next growth spurt. There was a substantial investment made in fabricating equipment in 2015 with the intent to grow the business."

After much research and comparison, part of that investment was the addition of the Prima Power Platino Fiber Laser and the eP-1030 servo-electric press brake.

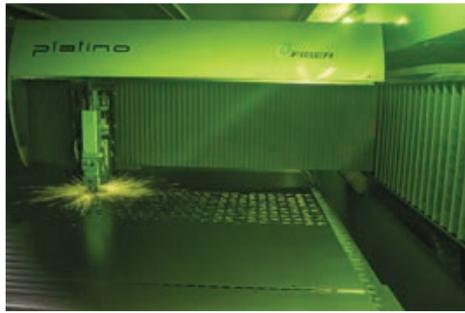


The Platino Fiber Laser cuts various thicknesses, up to 20 mm of mild steel, with efficiency and quality. Productivity increases particularly with thin and medium-gauge sheet metal.

Platino Fiber Laser

The Platino Fiber Laser cutting machine is the perfect balance of innovation and experience. This product combines state-of-the-art efficient and ecological fiber laser technology, with the proven reliability and flexibility of the Platino platform. The Platino Fiber Laser can be used to cut a wide range of materials. It is the right choice for sheet metal manufacturers looking for a production tool which is:

- efficient, granting energy and maintenance savings
- productive, particularly on thin and medium-gauge sheets
- flexible, suitable for a wide range of materials, including highly-reflective metals
- reliable and capable of meeting any production need, with a variety of automation modules
- user-friendly, easy to install, use, and maintain



The Platino Fiber Laser can be used to cut a wide range of materials. Fiber lasers are more effective than other laser sources for cutting highly-reflective materials (e.g. aluminum alloys, copper, brass).

Comparison Shopping

"I compared all the top-named lasers," reflects Farris. "We asked several of the laser companies to run our programs and parts on their machines. The Prima Power Platino 5kW Fiber Laser beat other higher wattage competitors by as much as 15 minutes on the nest. I'm very happy with the way the Platino Fiber Laser is running. I knew that I wanted a fiber laser to cut faster. We had a job coming up that was a production challenge, and our speed on the Platino Fiber was exponentially higher than the CO2 lasers. This job called for 4,000 sheets of stainless steel to be cut, and our savings from that job alone was 50% faster than the CO2 lasers."

"Depending upon the materials, we run between 50%-100% quicker on the Platino Fiber Laser."

"Because our jobs are so diverse, the Platino Fiber Laser was an important piece of the pie," adds Ewendt. "We were able to offload some of the jobs to the faster fiber laser that allowed us to do more of the smaller run jobs on the CO2 lasers and still remain competitive. Depending upon the materials, we run between 50%-100% quicker on the Platino Fiber Laser."

Servo-Electric Press Brake

Farris Fab & Machine, Inc. also purchased the Prima Power eP-1030 servo-electric press brake. Prima Power has applied a servo-electric drive system on the new eP-Series press brake. It is a fast, accurate, non-hydraulic bending solution. The innovative machine concept combines productivity, accuracy, flexibility, and reliability with high respect to ecological aspects. The concept offers both



The Prima Power eP-Brake is based on a rigid O-frame. This ensures tool alignment even under stress deformation since there is no horizontal displacement.

sustainability and manufacturing efficiency and productivity. It also means greater versatility, lower power consumption, less maintenance, and no oil to purchase or to dispose of. In addition, easy programming and outstanding accuracy eliminate waste production. The net result is the ability to form higher-quality sheet metal parts at a lower cost.

Stable eP Brake Frame

The Prima Power eP-Brake is based on a rigid O-frame. This ensures tool alignment even under stress deformation since there is no horizontal displacement. The position of the upper beam, in relation to the lower beam, is measured by dual Y1 and Y2 linear encoders that are attached independently of the machine frame and are bed referenced. This design isolates ram positioning accuracy from any deflection in the side frames under load and maintains accurate positioning even during off-center bending operations. Ram repeatability on the eP-Series is ± 0.005 mm.

Ease of Programming

An operator-friendly 17" Touch Screen user interface leads to a significant improvement of data input rates and a considerable reduction in programming time. 2D graphical programming with automatic bending sequencing will assist in making even first-time operators productive.

"We had a job coming up that was a production challenge, and our speed on the Platino Fiber was exponentially higher than the CO2 lasers. This job called for 4,000 sheets of stainless steel to be cut, and our savings from that job alone was 50% faster than the CO2 lasers."

Maximum Productivity

The eP-Brake features the advantages of high acceleration, deceleration, and fast response times of the servo-electric drive system. Compared to conventional brakes, considerable productivity increase can be reached; reduction of cycle times by up to 30% and more is the reality.

"We've been very happy with our partnership with Prima Power," concludes Farris. "Prima Power has stepped up whenever we've had any issue with either machine. The machines have increased our productivity. We are getting the same amount of work out now working five days a week than when we were working six. Now everyone goes home by noon on Friday. We are making more money and working fewer hours while dramatically increasing our quality."

Prima Power China Showcases the Latest Product Developments at Open House

The Chinese market is eager for innovative products that can further increase production standards. Throughout the Open House event, five machines were displayed: the Platino Fiber + 6kW Fiber Laser, the SGe5 Shear Genius, the BCe Smart Bending Center, the E5x Evolution Punching Machine, the ep-1030 Press Brake, and the Industry 4.0 Software Management.

“During the first day of the Open House, we have already signed two contracts: one E5x Evolution punching turret (manufactured in Suzhou factory) and one BCe Smart Bending Center,” says Bob Wang, Prima Power Suzhou General Manager.

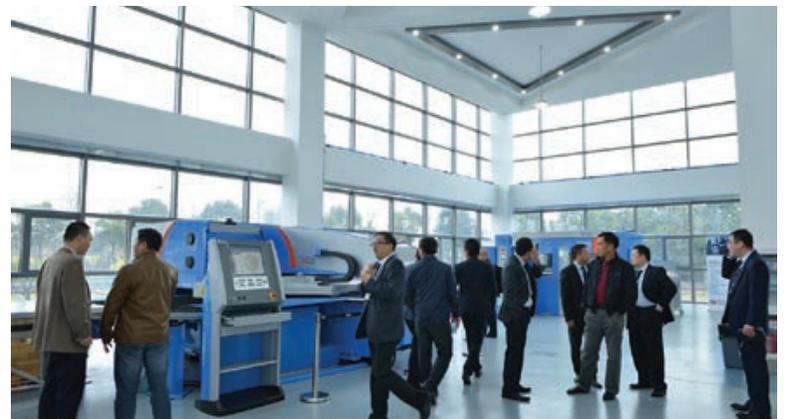
Industry 4.0 Software Corner

Prima Power China has recently renovated the showroom of the Suzhou plant, adding a dedicated Industry 4.0 Corner to demonstrate the Software products line. “The concept of Industry 4.0 in China is a bit different than in Europe,” explains Wang. “Among the main factors that are pushing towards increased automation is the increasing labor cost, the increasing awareness of safety regulations, the need to improve the output quality, and the significant incentives from the government. We base our research and development on the idea that our clients need a flexible and comprehensive solution plan, able to serve the entire production process and its management. Our software can not only manage Prima Power machines, but can also integrate equipment from different brands.”

Prima Power has established itself in China, and today covers more than 60% of the 3D laser market, and is also increasing its share in the 2D laser segment. “We are now able to provide our clients with a 6kW fiber laser source,” continues Wang. “Our 6kW laser is not only an advancement in technology, but it is able to automatically expand the speed and level of light to improve the cut.”

After Sales Service

“We are especially proud to announce that our Spare Parts Online Store is now available on the Prima Power Chinese website,” says Wang. “As on-line purchasing steadily increases, we offer our customers a quicker and more convenient way to carry out ongoing machine maintenance. Our customers are provided with a username and password to access their account on our online store and order the spare parts needed.”



Lamiera 2017: Prima Power's Complete Range for the New 4.0 Era

The world of sheet metal processing is transforming: Big Data, Cloud, IoT, sensorization, connectivity, simulation, augmented reality, and additive manufacturing are the pillars of the new 4.0 factory that are strongly entering into this sector.

Lamiera 2017, the Italian exhibition dedicated to the metal forming machine tool industry, was held from May 17-20 in Milan.

Prima Power technologies help customers capture the opportunities offered by the Fourth Industrial Revolution. In addition to the surprising direct benefits of intelligent, ultra-flexible, productive and efficient production, Italian companies investing in Prima Power products can also enjoy the great tax benefits introduced by the National Industry Plan 4.0.

With the *Industry 4.0 Inside* brand, Prima Power introduced its portfolio of products that enable manufacturing companies to transform their production processes and evolve towards an intelligent and sustainable factory, in line with the concepts of Industry 4.0.

The main technologies exhibited were:

- 2D Laser Genius fiber laser machine has a new adaptive head to maximize performance and cutting quality for every thickness and material. Available with up to 6kW fiber laser source, numerical control, and automation by Prima Power for maximum integration... a very important factor related to maximum connectivity and ease of use.
- BCe Smart panel bender, characterized by ease of use, ergonomics, flexibility, safety, and reliability, meets the new challenges imposed by today's market. Innovative safety devices, active through laser scanners, programmable light references for simple piece



positioning, barcode reader, and ATC system for automatic setup are some of the intelligent systems that are featured on the machine.

- The new Combi Genius, combined punching/laser machine equipped with a servo-electric punching system, is available in two different performance categories: *Pure* – to meet all the objectives of an efficient production with a lower level of investment, and

Dynamic – for maximum productivity and efficiency. The Combi Genius is equipped with: a CF series 4kW fiber laser, developed and manufactured by Prima Power; the new intelligent Ram, which increases the number of index tools in the turret, and the latest generation of automatic loading/unloading systems, the Compact Express.



- The eP-2040 press brake, the largest and most flexible of the Prima Power servo-electric press brakes, provides the perfect combination of tonnage and machining capacity. Some of the winning features of the machine: O-frame, open concept tools, Prima Power touch screen numerical control, and the new Lazer Safe IRIS system for operator and tool safety.
- Prima Power displayed the entire suite of software products for digitizing the production process and remote & predictive care solutions. A large area of the Prima Power booth was available to visitors to attend demonstrations and presentations on Factory 4.0.

Another opportunity to see Prima Power machines in action was in Pavilion 15, where the Platino Fiber was integrated with the sorting system of the Swiss company ASTES4.

For demonstrations at the exhibition, Prima Power used special steel of ArcelorMittal CLN, a leading flat steel products distribution company



created by ArcelorMittal's and CLN Group's joint venture: the most advanced machining technologies and the best steels for the highest quality.

Platino Laser Helps Italian Agriculture Machine Manufacturer Increase Quality & Productivity

Italy boasts an industrial sector composed of mostly small and medium-sized businesses. Entrepreneurial realities, that represent the real engine of the economy, are recognized not only for the quality of the products they produce, but also for how they coordinate and manage the entire development cycle. As in the case of Badalini, located in Rivarolo Mantovano (MN), Italy, a micro-company specializing in the design and construction of agriculture machinery, such as multi-row rototiller, biological inter-row cultivators, subsoilers, rolling cultivators, fertilizer distributors, and disc harrows. These products are exported to more than 60 countries around the world, for a 70% export turnover (which is on average 2 million Euro).



View of Prima Power Platino CO2 laser cutting machine installed at the production unit of Badalini in Rivarolo Mantovano (MN).

According to owner Giorgio Badalini, "We produce reliable machines, some of which are patented, but all designed and developed for durability and performance to meet the ever-increasing demands of modern agriculture." Metalworking machines that the company utilizes to manufacture its products increasingly focus on technological upgrading and process optimization. A prime example is the Prima Power Platino laser, a flexible, compact and easy-to-use flat CO2 laser machine and a 10-pallet automated tower. "This Platino laser is an important piece of equipment that is necessary for us to maintain our high level of competitiveness," explains Badalini.

From the design to the cut

Since the early 1990s, when Badalini took over the company's leadership, he has been able to apply his well-defined ideas to redesign and reorganize the business at all levels, from the IT infrastructure to the production cycle. "More technology, more process innovation and, above all, targeted human resources are all important factors in our growth," says Badalini. The company manufactures an average of 300-350 machines per year, customized to the individual customer's specification, while maintaining full production capacity and quality. "Every model is equal to itself," adds Emanuele Bottoli, technical manager. "This means that a specific study is carried out for each customer, according to his needs, and consequently a project is developed which, if approved, rapidly turns into the fulfilment of the contract."



(from left) Emanuele Bottoli, technical manager and the owner Giorgio Badalini.

"A major investment was made in terms of software and design adaptation that today allows us to optimize our production in full 4.0 view," explains Badalini. "All this is performed through a global digital management of the process. The design, managed directly in 3D, is sent to the sheet development software which, ignoring the solid and commercial parts, explodes every single piece automatically while creating the nesting to be sent to the Prima Power Platino laser cutting machine."



Detail of 10-pallet automation tower at the service of the Prima Power Platino laser cutting machine.

"This Platino laser is an important piece of equipment that is necessary for us to maintain our high level of competitiveness."



For its machines, Badalini laser cuts high-strength steels with thickness between 2 and 15 mm.

Badalini chose the Platino LP 2040 which processes sheets up to 4,000 x 2,000 mm, with an axis up to 150 mm, and an axes speed up to 80 m/min (combined up to 110 m/min). With a reduced set-up time, the machine can move from processing a flat sheet to round, square, or rectangular tubes. With its wide range of automation modules, it represents a valid solution for the production of both small batches and long runs.

“In addition, the compact design and the ability to completely open the machine are key features. These features, along with automatic nozzle changeover, are fundamental to our needs.”



Badalini specializes in the design and construction of earth working machines.



Patented by Badalini, the new biological inter-row cultivator with rotating disks can be used to simply and effectively remove weeds in the row.

Maximum Process Flexibility

The Badalini brand is well-known throughout the world for the quality and reliability of the machines it manufactures. These results are achieved from a great focus on the product development cycle, the use of state-of-the-art technology, and the choice of qualified partners. What were the main reasons that led the company to partner with Prima Power? “We found the Platino layout favorable,” says Badalini. “In addition, the compact design and the ability to completely open the machine. These features, along with automatic nozzle changeover, are key features fundamental to our needs. An option that we have strongly wanted gives us the ability to schedule, using the automatic magazine that provides long machining cycles. Our structure reflects the flexibility and efficiency of the Platino laser cutting. These were decisive elements that allowed us to compete in an increasingly demanding market, along with customization and attention to every detail.”

View of the P30L proprietary numeric control installed with the Platino laser machine, easy to use and ergonomic (with 17” touch screen and trackball).



Prima Power Platino Laser was chosen by Badalini in the LP2040 version, with a working range of 4,000 x 2,000 mm.

UK Company Discovers New Dimensions in Forming with Prima Power eP-1030 Press Brake



and metalwork processes, including 3D CAD, punching, CNC bending, multiple welding techniques, and assembly. We also offer a wide range of coating and finishing processes.

“We recently identified the need for a larger press brake that would increase our size capacity, give us a faster bending throughput, and allow us to further develop our capabilities in this critical area. In addition, as we pride ourselves in our ability to deliver the highest standard of fabrications at a cost-effective price, we wanted a rapid action machine that could deliver the required standards of quality.”

Prima Power Equipment

Acorn Laser Ltd. has several Prima Power laser cutting machines, including a Platino CP4000, a Platino CP3000, a Platino PRC, Platino Rofin-Sinar, and a Platino Fiber 4kW. “We have found

Since the company commenced trading in 1999, Acorn Laser Ltd. has earned an excellent reputation for the quality of its output, the company’s cost effective pricing policy, and for providing a reliable service to its customers. From its humble beginnings, operating from a small unit with a single laser-profiling machine, Acorn Laser now has the North East of England’s largest laser cutting capacity.

Over the last 17 years, prompted by ever-increasing customer demand, the ISO9001:2008 accredited company has continually increased its staffing levels and expanded its range of metalworking capabilities. Acorn Laser now boasts an extensive range of state-of-the-art sheet metal processing equipment housed in its 36,000-square-foot facility located in Washington, Tyne and Wear. Markets currently served include: automotive, off-shore and marine, rail, earth-moving equipment, and electronics industries.

“The eP-1030 is providing excellent levels of production of high-quality parts. It has enabled us to accommodate larger fabrications, and has also helped us to further expand our bending capabilities.”

A growing order book, and the need to increase the company’s press brake capacity, recently prompted a search for a machine that would help relieve the pressure on the company’s existing press brakes. Acorn Laser Director, Graeme Deanus explained, “We provide a wide range of metalwork services and supply high-quality finished products to our customers throughout the UK and beyond. Whether our customers require design, development, prototyping, or low to high volume production, we can help at every stage, from the initial inquiry through manufacturing. In addition to laser cutting, our experienced team provides a complete range of design, development, prototyping,

all the lasers to be very reliable, highly productive, and able to turn out high-quality work,” continues Deanus. “In searching for new bending technologies, we considered Prima Power, as well as the offerings



from several other leading manufacturers. Although a couple of the competitors’ machines we viewed had some of the features we were looking for, the eP-1030 from Prima Power, with a length capacity of 3060 mm and a press specification of 105 tons, proved to be the most comprehensive package and represented the ideal bending solution for our specific needs.

“Now fully operational, our new press brake is delivering on all of the promises made by the staff of Prima Power UK. The eP-1030 is providing excellent levels of production of high-quality parts. It has enabled us to accommodate larger fabrications, and has also helped us to further expand our bending capabilities.”

LASERDYNE 606D Users Report Triple Productivity Gains

Prima Power Laserdyne reports that users of the LASERDYNE 606D are reporting up to three times the throughput of previous systems.

Users of the LASERDYNE 606D, which was first publicly demonstrated at IMTS 2016, are reporting better-than-expected productivity gains which they attribute to the system's high dynamic performance and advanced fiber laser control.

"We were pleased to hear that early LASERDYNE 606D laser system users are reporting consistent productivity gains of up to three times (3X) when processing similar parts on their 606D machine versus their older machines," reports Terry VanderWert, president of Prima Power Laserdyne. "While the processes are often proprietary and will not be disclosed, the results are real and setting a new productivity level for laser processing."

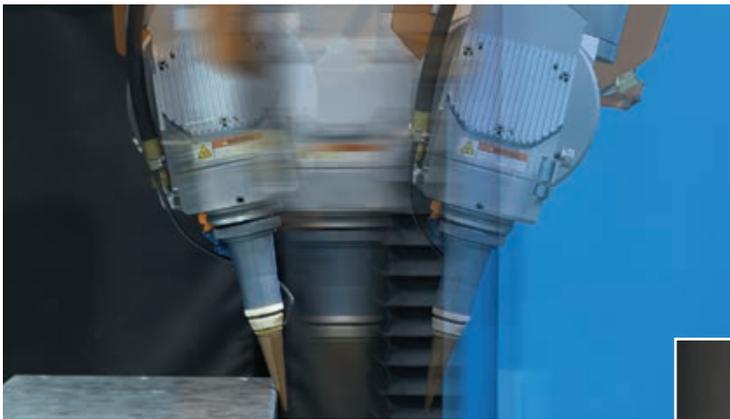


New LASERDYNE 606D dual workstation system is the only standard laser system with simultaneous dual laser processing capability.

In addition, the two LASERDYNE S94P controllers provide integrated control of the laser, motion, process gases, and process sensors in both workstations, providing smart solutions for cutting, welding and drilling.

Finally, productivity is also enhanced by the two integrated machines located next to each other where they are most often operated by a single person.

"The LASERDYNE 606D provides faster and more flexible ways to use laser processing," says VanderWert. "In combination with LASERDYNE SmartTechniques™, it helps manufacturers get the most from the latest high power QCW fiber lasers. The system helps them achieve ever more demanding manufacturing goals by encouraging users to go beyond their earliest expectations for the system."



LASERDYNE BeamDirector® technology is included in both 606D workstations. It allows drilling at angles as shallow as 10 degrees from the surface throughout the entire work envelope.

A main design goal of the system was to maximize throughput per unit of manufacturing floor space. To accomplish this, the 606D system is comprised of two completely independent laser machines within a single unitized structure.

The throughput goal also is accomplished through a machine design that gives high dynamic performance and takes full advantage of the capabilities of high power QCW fiber lasers.



The 606D is shown percussion drilling (foreground) cooling holes in an aerospace engine combustor dome assembly while simultaneously cutting larger holes in a similar aerospace component on the second workstation (background).



Refurbishing Turbine Engine Components Using LASERDYNE Multi-Axis Laser Machining Systems

Turbine engine repair and refurbishing is a rapidly growing business requiring specialized equipment and experience. Leading engine manufacturers are more frequently outsourcing this activity, demanding the highest quality work from their suppliers. TL Precision Welding, Inc., Houston, TX, is a 12-person laser contract shop started in 1997 that serves this important and growing area of the turbine engine industry.

Success at TL Precision's early engine refurbishing work has led to new opportunities in laser processing, company growth, and a broadening of TL Precision's laser capabilities. In an era of general economic decline, this is an industry niche with promising growth simply because of the sheer number of turbine engines and the constant need for engine maintenance. One leading turbine engine manufacturer for aircraft alone reports 25,000 engines in active service, all of which are continuously monitored for periodic maintenance.

TL Precision has met this challenge by becoming an expert at refurbishing these components, but also positioning itself with new equipment and skills to handle new laser machining work as well. In 2008, TL Precision purchased their second system from LASERDYNE SYSTEMS, maintaining a tradition commonplace for LASERDYNE SYSTEM users. TL Precision uses these systems for drilling difficult-to-machine materials such as Inconel 617, Titanium and Hastelloy X. These are the base materials used to make land based gas turbine engines. The result – the company is attracting substantial new laser processing work.



Quang Tran, president (right) and Son Dao, operations manager of TL Precision Welding, Inc., stand adjacent to a refurbished gas turbine component laser processed with the company's LASERDYNE 790 BeamDirector system.



Recreating Turbine Engine Holes

A significant amount of engine overhaul calls for the repair and refurbishing of engine components' airflow holes. Large combustor components have thousands of these small airflow holes of various sizes and shapes. The holes are designed to maximize engine thrust by selectively cooling critical components, and are precision drilled using laser processes in carefully plotted, complex patterns over the part's contoured surfaces. The holes also are contoured and angled to the part surface to maximize air flow, reduce engine noise and minimize fuel requirements. Hole angles vary from 90° to just 20° to the surface and require a high degree of complex and agile positioning and dimensional precision.



Using LASERDYNE'S through-the-lens viewing system (45 times actual size), the system operator positions the laser nozzle and enters the command for recreating each hole.

The challenge with refurbishing air flow holes in these complex parts is that they must be "re-created" in the same position and with the identical precision size characteristics as the original part when new, according to Quang Tran, president of TL Precision. "Recreating precision holes in a used part is often more difficult than generating precision holes in a new part," reports Tran. "In recreating the hole, there's no margin for error because most of these holes are positioned closely together and have diameters as small as .020 inches and require tolerance accuracies as tight as ± 0.002 inches. To position and laser process each of these holes accurately - without damaging the part - requires the very best multi-axis laser machining technology and a high level of operator skill. We have both with the LASERDYNE 790 system, the LASERDYNE BeamDirector and the continuing support of LASERDYNE SYSTEMS."



TL Precision reports that it recreates thousands of holes in a single combustor without damaging the part, most of which are valued at many thousands of dollars.

Recreating Combustor Holes Accurately Without Part Damage

“Our LASERDYNE 790 BeamDirector systems are the keys to doing this work successfully,” reports Tran. “These systems are often the same models used by OEM’s to make the original parts, so there is both hardware and software compatibility which helps facilitate the refurbishing process. Using the same programming coordinates as when the part was processed new, our operators employ LASERDYNE features to re-establish the hole location and align the laser beam to it. Our operators verify hole location and beam alignment so there is no chance of error using LASERDYNE’s *through-the-lens* viewing feature, which magnifies clearly all hole features (magnification is 45 times). Every hole is thereby processed and verified individually.”

TL Precision utilizes percussion drilling and trepanning processes to recreate cooling holes. Percussion drilling, most frequently used, is a method that generates a hole with only the laser’s focused beam diameter. A single pulse or a series of pulses remove the material in the beam path, with an assist of co-axial flowing gas until the hole is recreated. For existing holes, foreign material that has built up in the holes during engine operation is removed cleanly and accurately. Trepan drilling is a similar but less frequently used method in this engine refurbishing process.

Tran reports that while this hole refurbishing process often requires a manual *point and shoot* technique, it is consistently accurate and faster than any other known method.

Tran and his laser system operators are fast becoming champions of the LASERDYNE multi-axis laser technology. Take, for example, LASERDYNE’S Automatic Focus Control (AFC™) feature. “What we often must do manually to recreate a hole, we can do automatically to make new holes in new parts with AFC,” reports Tran.

AFC guides the motion system, maintaining critical focus position and following the contour of the part, regardless of slight surface irregularities. With AFC, all machine axes react to sensing of the part surface, creating unlimited R-axis correction with high speed and unmatched sensitivity.

Another important capability with Tran’s laser systems is a variation of percussion drilling called *drill-on-the-fly*. This is a feature whereby laser beam pulses are delivered to the part by the stationary laser while the part is rotated. The hole placement is a function of rotational speed and laser pulse frequency. If multiple pulses are required, *drill-on-the-fly* software developed by LASERDYNE engineers is utilized to synchronize the movement of the part to the laser pulses, ensuring that multiple pulses are delivered to the exact location required. By changing the laser pulse energy, pulse count, or lens focal length, the characteristics of the drilled hole size and taper can be controlled to meet the requirements of the part. Drill-on-the-fly software also allows changes of the pulse shape during the process to improve hole geometry.



Operator is shown programming the Optical Focus Control (OFC) feature of the LASERDYNE Beam Director system.

TECHNOLOGY AND SOLUTIONS FOR INDUSTRY 4.0

All Prima Power products are "Industry 4.0 Inside", ready for the digital manufacturing era.

The future of manufacturing has already started: secure your competitiveness with Prima Power smart, cutting edge technologies and solutions.

