



FAGOR AUTOMATION

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NEWS

# Automotive

New Formulas for  
Higher Productivity and  
Efficiency



FAGOR AUTOMATION

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## Editorial

New information technologies have reached all aspects of our lives and the manufacturing industry is no exception in the technological revolution. In Industry 4.0, all productive processes are connected to and interact with each other. Hence, innovation and research prove to be essential to permanent development of new products and integral solutions tailored to each customer.

*At Fagor Automation, we feel comfortable in this scenario.*

*We are used to innovating, we have been thinking, developing and manufacturing products for machine automation and control for more than 35 years. This is why our CNC systems and feedback devices are well prepared for an industrial revolution.*

*However, not only are our products ready for this change but our services too. We offer worldwide-personalized attention, tailored to each customer in order to increase efficiency and provide a higher value to the machines throughout their entire life cycle.*

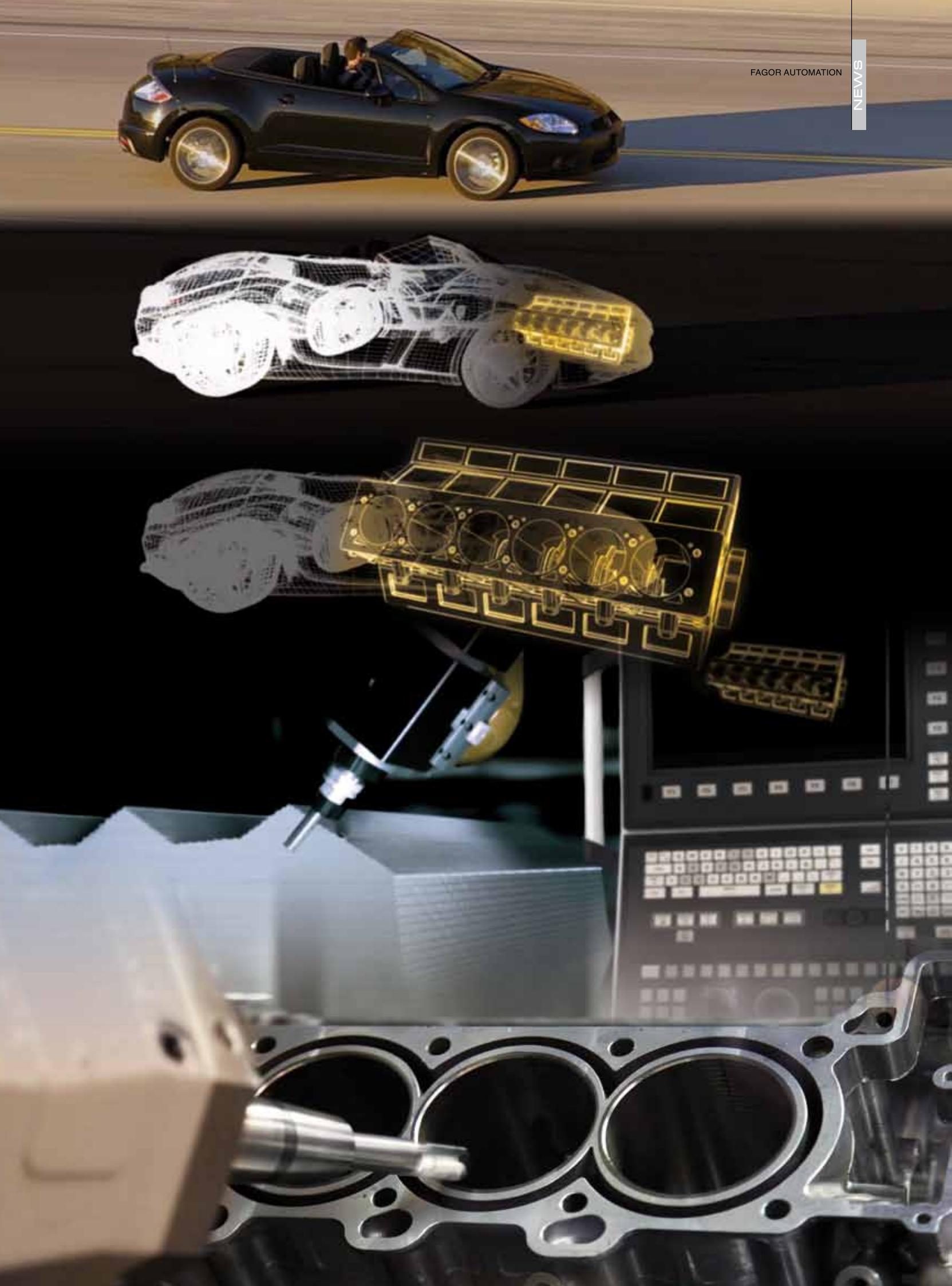
*Proof of that value is Fagor Automation's worldwide presence with a sales and service network in more than 50 countries. Not to mention our participation at the most significant exhibitions in the industry. Fagor has a solution for all of your needs and we look forward to seeing you at the next show!*

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IÑAKI BAÑUELOS

FEEDBACK SYSTEMS BUSINESS MANAGER





FAGOR AUTOMATION, EXPERTS ON  
HIGH PRODUCTION AND PRECISION MACHINES

# Integral Solutions for the **AUTOMOTIVE** Industry

The automotive industry is one of the most competitive and dynamic industries which must continually adapt to market demands. Demand within the automotive market forces this sector to search for new formulas to improve productivity, efficiency and competitiveness.

Fagor Automation develops solutions tailored to each customer by optimizing and galvanizing their processes to obtain higher machining quality and reduce costs in order to provide a high added value to the automotive industry.

Like other sectors, the automotive sector benefits from being able to count on Fagor Automation as their single provider of machine automation. Fagor offers a broad range of highly capable CNCs for this technology driven sector. Among them, is the CNC 8065, which is capable of satisfying the needs of high speed machining and highly complex processes. The features of the CNC 8065 make it possible to fully manage the most complicated machining operations on 5 continuous axes, the RTCP functions and automatic kinematics calibration.

Likewise, the Fagor 8060 CNC has been designed to provide a solution for high production and precision machines.

The CNC 8060 is designed with specific productivity features for mold making and for slant bed lathes.

For example, high-end linear and angular encoders are part of the ideal solution for 5-axis machines, EDM and high speed machining centers.

Particularly, geometrically complex parts may be obtained with EDM that cannot be obtained with any other kind of machining process. This technology is widely used in the automotive sector as well as by providers of auxiliary elements such as those found in the mold and die industry. Fagor Automation supplies EDM manufacturers with precision encoders and supplies several world-leading manufacturers of the wire EDM sector offering them micro-encoders with nanometric resolution utilizing both digital and incremental signals, that comply with the electromagnetic compatibility standards in effect today ■



# The Synergy Between FAGOR and **FAGIMA** Yields Outstanding Results

In early 2015, Fagor Italia SRL began a historic collaboration with the well-known Italian manufacturer of machine tools, Fagima, located in Tavarnelle Val di Pesa (province of Florence). The first result of this synergy is Fagima's new universal machining center Jazz-L 5 equipped with a Fagor CNC 8065.

Founded in 1973, Fagima produces machine tools, especially milling machines and vertical machining centers. Due to their high technical competence, research and innovation, Fagima has manufactured machines that have continuously met the high

demands of the market. Now, with the ever-growing demand for Fagor CNCs for the milling sector, Fagima has become one of the most important partners of the Mill project, which was created by Fagor in its Technological Center in Ivrea at the end of 2011.

With a dynamic and diverse team as part of a modern industrial organization, the collaboration between Fagor and Fagima has developed a high performance, meticulous product with remarkable features and with an excellent quality/price ratio. The Fagima



*The universal machining center Jazz-L 5 equipped with a Fagor CNC, meets all the needs of high speed machining and highly complex processes*

Jazz-L, with 5 axes and dual table is equipped with a full Fagor package consisting of the CNC 8065, Digital AC motors and drives as well as precision absolute linear and rotary encoder systems that do not require referencing the axes.

**High speed machining coupled with advanced technology**

The universal machining center Jazz-L 5 is capable of satisfying the needs of high speed machining along with highly complex processes. The machine consists of a structural base holding the two main machining supports, a fixed table and a swinging rotary table (C+B axes). The features of the Fagor CNC 8065 make it possible to fully manage the most complicated 5 axes machining operations including the RTCP functions

and automatic kinematics calibration. This is an important technical aspect and has been created thanks to the collaboration between the Technological Center in Ivrea, Fagor Automation's R&D department and Fagima's decades of experience.

Fagima's demands have been met with important new software features developed by Fagor for the milling sector, such as profile programming in ProGTL3 language, 3D graphics setup for most complex kinematics, program translator (converter) into Selca language and perfected high speed algorithms for 5 axes machining.

**Efficiency and reliability for mold making**

Fagima can now offer a fully efficient and reliable product with a modern, high performance Fagor CNC System to all their customers who have previously used an Italian CNC. The new Fagor CNC Technology is advantageous to the mold and tool making sector and also in precision machining. The ongoing growth of Fagor CNCs in the milling sector, is for Fagima, a great sales opportunity in Italy and other countries due to both their

ease of use and programming, thanks in part due to the developed machine logic and parameter settings.

The two Jazz-L models have two tool magazines (60+60) and a touch probe for automatic part centering and kinematics measuring for calibration and verification of tool integrity.

The machine tool is also capable of swing machining to increase its already high flexibility, thanks to a dual door opening and a central partition that ensures it is possible to work safely in two separate areas with both tables.

**Further improved programming language**

The ProGTL3 programming language keeps evolving with our CNC 8065.

The latest software version installed on these machines, besides the basic plane functions (different methods of defining

*Fagima has become one of the most important partners of the Mill project created by Fagor in its Technological Center in Ivrea at the end of 2011*



straight lines and circles), now includes new important features for end users, like spiral milling on any geometric profiles, 3D solid milling carried out with a topview profile and up to 10 section profiles. In addition, creating 3D solids with rototranslation in space, linear or circular character writing that now easily allows writing parametric numerical values (such as a parts counter) and last but not least, trochoidal milling for high speed roughing and fast material removal due to Fagima's highly dynamic Jazz-L. Fagor and Fagima are completely convinced that this collaboration will continue to prosper in a market that is always looking for new advanced technologies and features along with higher reliability. This partnership guarantees all of this and even greater technical support ■



# Fagor Linear Encoders

## HIGHER SURFACE QUALITY

ONA, a worldwide leader in the manufacturing of large and special EDM machines integrates Fagor feedback systems as standard in their products.

*The technology of EDM machines ensures the high quality required by the components for the automotive industry*

The company, with HQ in the Basque Country (Spain), has been offering their customers solutions tailored to their requirements for over 60 years. ONA is specialized in manufacturing diesinking (plunge) and wire EDM machines and are market leaders in large machines.

Die sinking (plunge) EDM is a material removing manufacturing process created by the thermal action of controlled electrical discharges jumping between an electrode (work tool) and a part submerged in a dielectric liquid which produces the shape of the electrode on the part (usually made out of graphite

or copper). The electrode and the part are electrical conductors; electric pulse generators create the discharges. There is no contact between the electrode and the part during the process.

Whereas in wire EDM, the electrode is replaced by a conducting wire (usually brass). This type of machining is used for parts with very tight tolerances and complex configurations (inside corners with a very small radius, parts that are very thick, very hard or difficult to machine, etc.). An example of die-sink (plunge) EDM would be gasoline injector nozzles for the automotive



industry or plastic injection molds used to manufacture many automotive components (bumpers, dashboards, electrical connectors, etc.). An example of wire EDM are the dies for metal cutting and forming processes.

Mr. Sergio Ruiz de Larrea (General Manager of ONA) states, «It is essential that the machines we manufacture have a long useful life, normally of at least 25 years for service and spare parts. Because of this, the reliability of all the parts used in the machining process is very important». Fagor linear encoders are some of the components that guarantee the performance of the machine. In fact, ONA includes, as standard a second feedback system. Fagor Automation encoders are on all linear axes of their machines. Fagor Automation was challenged to provide the technology necessary to achieve improved surface quality coupled with a reduction of roughness of Ona's manufactured parts. Fagor suggested using linear encoders of nanometric resolution capability.

ONA's results could not have been better, the wire EDM machine ONA AV-25 was awarded as, «The Most Innovative Spanish Machine» last year. The machine is equipped with an 8-axis CNC with integrated CAD/CAM and a 21.5" touch screen and can work with very thin wires (only 0.07 mm thick); the new micro-fine finish generator can obtain a minimum roughness of 0.1 microns Ra and the new eco-cutting technologies help reduce wire consumption. It has Fagor nanometric resolution linear encoders on all axes and the new advanced energy management system that can reduce electrical consumption up to 30%.

ONA's expertise has opened doors to new sectors such as Aerospace and Energy. These sectors are very demanding but offer great opportunities for EDM manufacturers because they provide the necessary technology for manufacturing complex parts with complex geometries such as turbine components and special gears, among others. Even though Ona has expanded their markets served, 60% of their customer base still reside in the automotive sector ■



## MAIER, European Leader in Chroming and Special Finishes for the Automotive Sector

MAIER, one of ONA's customers, is the European leader in developing and manufacturing automotive texture components for both interior and exterior parts, such as front grills, knobs, door handles, hubcaps, etc. MAIER is a leading supplier for the 9 leading auto manufacturers in the world. The company develops and manufactures 100 % of the molds as part of the process to obtain the geometry and texture of the finished parts. The mold finish has a direct

effect and look of the finished part. 80% of the mold shape is produced by high-speed milling and the other 20% with EDM. According to Mr. Javier Calvo, MAIER's General Manager of the Die Management Unit, «EDM will always be essential for making grooves, nerves and deep footprints. And the improvements of ONA's latest models mean faster machining of parts with difficult cleaning conditions, better accuracy and surface quality».

GENERAL MANAGER OF  
TECNIJUSTA

PEDRO MATEUS



# «Fagor CNCs are the Guarantee of Our QUALITY»



Founded in 2006, Tecnijusta is a Portuguese company specializing in producing technical molds for plastic injection. Located in the city of Marinha Grande (mid region of Portugal), Tecnijusta exports its products to some of the most demanding markets in Europe and South America. There are five CNC machining centers in their production plant, each equipped with a Fagor CNC.

Mr. Pedro Mateus, general manager of Tecnijusta, explains that the company's highest priorities are to obtain the best technology-functionality-cost ratio and to provide full, diverse service to their customers. «At Tecnijusta, we believe that the suppliers are our partners and that has allowed us to grow and improve permanently. That's the case with Fagor, with whom we enjoy a very gratifying relationship», asserts Mateus.

## *What are Tecnijusta's main production lines?*

Our company manufactures technical molds for plastic injection; such as «sandwich» type molds, transfer or rotary plus gas or water assisted, bi-material molds and overmolding, of multiple cavities and unscrewed.

## *With which sectors does your company work?*

We manufacture molds for some of the most demanding and complex sectors: automotive, medical, household appliances and packaging. We manufacture molds and accessories for the interior and exterior of many car makers. In the sanitary sector, which

is one of the most demanding, we have specialized in the artificial respiration area. In the household appliance sector, we work with the most renowned companies in the world. In packaging, we manufacture a large series of packaging molds for lids, basins, etc. Besides Portugal, our main geographic markets are Spain, France, Germany and Brazil.

## *What added value do you offer your customers?*

We have a dynamic and highly qualified team that faces each project as a

challenge. At Tecnijusta we have a motto, «We are not interested in getting customers temporarily but also gaining their loyalty». On each project, we adopt a pro-active attitude that allows us to provide full and diverse service. For example, our customers can follow-up on the mold making process at all times via an FTP link. We also offer full after-sales service that runs maintenance of the molds throughout their entire life cycle.







*Are all the machines in your company equipped with Fagor CNC?*

Right, all Tecnijusta CNC machines are equipped with Fagor CNCs and the operators are highly satisfied with their operating ease. We believe that Fagor CNCs are reliable, intuitive, versatile and accurate. One of the main characteristics of our molds is their accuracy and Fagor CNCs are the guarantee of the quality of our product.

Our customers recognize the high level of our products. That is why the constant evolution of the new Fagor CNCs, in terms of features like speed and precision, are essential to our manufacturing process.

Also, we use several generations of Fagor CNCs in our company and every time we upgrade to a modern CNC we do not run into any problems, due to their high compatibility with earlier models.

I would also like to point out that Fagor encourages upgrading the oldest CNCs to the most modern ones. This way, we turn maintenance costs into time and quality investments for our molds.

*What would you like to point out about the new Fagor CNCs?*

The latest model that Fagor has launched on the market, their CNC 8060 has been in our company for over a year and has shown significant improvements, especially in terms of operating ease, display (ergonomic keyboard, touch-screen and high definition graphics), speed and accuracy. Not excluding the new features like «on-line» acceleration adjustment that allows the operators to move the axes more smoothly or sharper while machining ■

# HURCO

## On the Trail to Machine Tool Perfection

Fagor Automation began working with Hurco Machine Tool (Indianapolis, USA) a leading manufacturer of machine tools and inventor of CNC technologies some time ago on improving overall machine accuracy and repeatability utilizing Fagor linear and rotary encoder product solutions. At the time, we did not realize how robust Hurco CNC machines were. However, over time we have learned to appreciate what the Hurco Machine Tool is all about and have come to realize, in our opinion, they have created exceptionally innovative CNC machines.

Fagor Automation's role is centered around providing precision linear encoders incorporating the patented TDMS® (Thermal Determined Mounting System) on all GY series encoders provided that allows for minimum error deflection, regardless of the environment, by controlling the expansion and contraction of the scale. The positioning errors originating from machine mechanics are minimized as the encoder is directly mounted to the machine surface and the guide ways. The encoder sends the real machine movement positional data to the CNC; therefore, mechanical errors due to thermal behavior, pitch error compensation and machine backlash are minimized.

As stated by Maggie Smith, Hurco Marketing & Media/PR Manager, «Hurco selected Fagor encoders because they

offer a broad range of linear and rotary encoders to meet our requirements in terms of physical size, accuracy and resolution». She continued «The Fagor encoder products helped Hurco achieve the high speed machining accuracy required within the stringent Hurco Quality Program».







Having a machine that provides the speed, accuracy and repeatability the industry requires was simply one part of the equation, in addition, Hurco has developed the WinMax CNC control utilizing a 19" high resolution touch screen control available in either a single or dual screen package. The updated graphics screen offers a modern look and feel allowing the operator to manipulate the part, view simulations and jump directly to the program code associated with a feature without having to go through nested menus or multiple screens.

*«Hurco selected Fagor encoders because they offer a broad range of linear and rotary encoders to meet our requirements...»*



The new full screen DRO or Min-DRO screen can be selected instead of the graphics screen to best suit the task at hand, be it programming, machining or concurrent operations, i.e. running the current milling job while simultaneously programming another.

Customers can select any one of the 3 remote jog options, standard, LCD and LCD-wireless. The LCD units allow the machinist to set up tools and parts right from the remote jog unit. All jog units feature a large 70 mm hand wheel with finger cup spinner, graspable over

molded body, integrated work light, magnetic base, T-Slot tongue and much more.

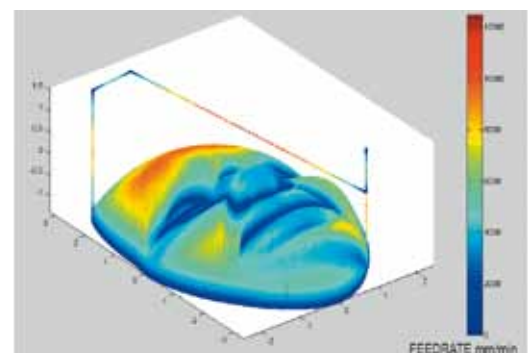
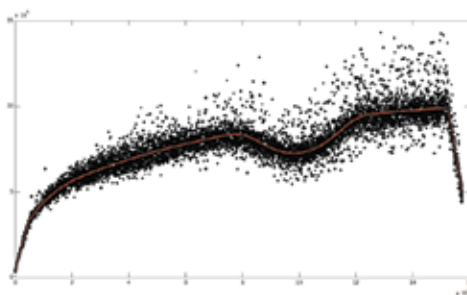
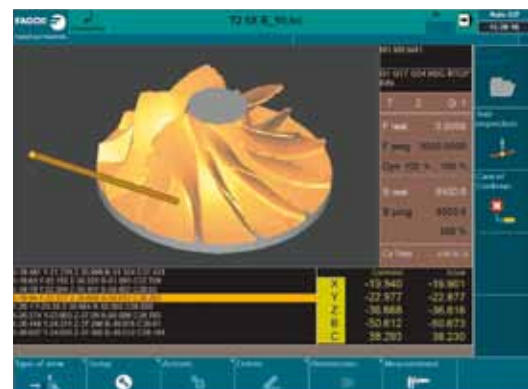
As concluded by Edward Galzin, Fagor Feedback Sales Mgr, «As with most world class manufacturers, they are always striving to improve their products, Hurco typifies this. This ongoing improvement strategy employed by Hurco, keeps suppliers striving to supply their best product solutions». Edward concluded, «Hurco understands the value of precision encoders and hence, knew to offer it to their customers. They have, in

effect, made a great machine even better, more accurate and repeatable».

Hurco states their goal is to provide the highest quality, most innovative machine tools, software and CNC controls coupled with best-in-class support to insure their customers achieve maximum productivity and profitability. We think they are well on their way to that goal and we are happy to have played a small role in their trail to perfection and hope to remain side by side with them for years to come ■

# The Fastest and Most Accurate HSC

High speed machining (HSM) consists of optimizing machining by obtaining cutting speeds between 5 and 10 times higher than those used in conventional machining. This represents a challenge for the CNCs because they must be capable of controlling the high speeds and accelerations of the axes with the required level of accuracy.



The CNCs designed for high speed machining centers develop a set of features and algorithms that convert the points generated by the CAM program into the path that the machine must follow as fast and as accurately as possible. The information within the CAM program provides the position and orientation of the tool in a cloud of positions and it is up to the HSC algorithms to reconstruct the original geometry based on the set of points and indications of the operator when setting the parameters of the algorithms.

Since the HSC algorithms consume a lot of CNC's CPU time, it is necessary to develop heuristic algorithms to deal with uncertainties resulting from the fact that not all the points of the curves are known and that the positions have a finite precision. Calculating a continuous path from a set of discrete data and with finite precision is not an easy task; on the other hand, the CNC must also calculate in each interpolation cycle the position commands for all the drives while trying to optimize speed, smoothness and/or

## *Fagor Automation CNCs improve time, quality and HSC accuracy*

accuracy while taking into account the dynamic behavior of the machine.

The latest features developed for Fagor Automation's CNCs improve the time, quality and high-speed accuracy of machining.

■ **Dynamic Override.** This feature allows increasing or decreasing the jerks and accelerations used by the HSC algorithms. For example, the operator can prioritize machining time over quality in roughing operations.

■ **Smoother tool speed.** This feature considers the dynamics of the machine to prevent the excitation of resonance frequencies. This algorithm reads the program many blocks in advance (large look-ahead buffer) to analyze the curvature changes and choose the best curvature changes for the dynamics of the machine. The main parameter of this feature MPG.HSC.SOFTFREC may be changed from the program at the discretion of the Operator, thus allowing for the best roughing and finishing strategies.

■ **Extended curvature monitoring.** The algorithm reads the future path points (look-ahead), analyzes the position, speed and acceleration changes and whether these changes exceed the jerk limits. The algorithm considers

the tool position and orientation that may have very different results depending on the machine kinematics. This algorithm always selects the smoothest path for each machine.

Since many of HSC machines use 5 axes, a number of features have been designed for RTCP work, such as:

■ **Advanced look-ahead for transformed positions.** Look-ahead buffers use the positions transformed into machine coordinates instead of the programmed points. This feature complements the dynamic requirements of the machine and the movements depend less on tool

length and on large orientation changes.

■ **Extended curvature monitoring.** The improvement with advanced look-ahead feature working with machine coordinates is two-fold.

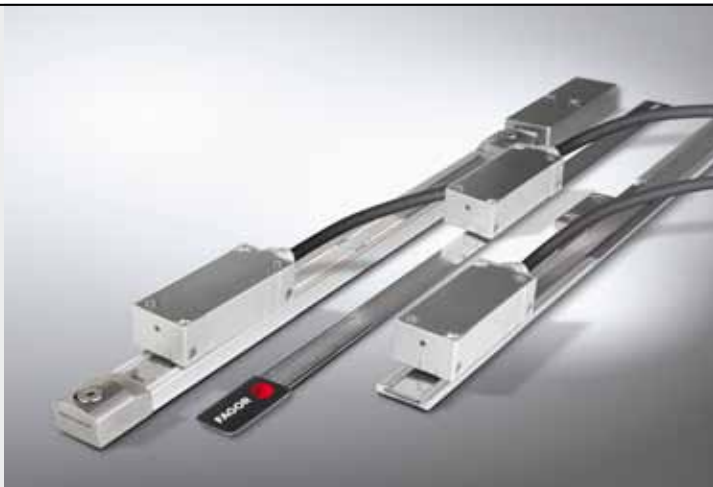
■ **Path smoothing with splines.** 5-axis machines also use splines in tool orientation to obtain smoother transitions and higher speed in roughing operations.

■ **PATHND.** This algorithm processes the information differently. Until now, the position and orientation information were processed separately, but with this algorithm all the information is processed together generating smoother and continuous paths for

faster machining and shorter cycle times.

■ **VIRTAX.** This feature allows programming a virtual axis in the direction of the tool. This virtual axis may be programmed in jog or automatic mode and more importantly, in tool inspection mode. Thus, the tool may be extracted or the machining depth can be easily modified.

■ **CSROT.** With this feature, it is possible to work with the same program generated for a particular orientation of all the axes, even when the part has to be secured (fixtured) in another orientation, keeping the orientation programmed for the rotary axes ■



## New Linear Encoders

### Absolute Non-Contact and Absolute Enclosed

#### Non-contact absolute linear encoder

Absolute technology has been implemented into the non-contact (exposed) linear encoder range. The technology is available with several digital connection interfaces such as, Panasonic and Mitsubishi, nanometric resolution and other various formats to customize the requirements of the application to the customer's specific needs.

The reader head has a single mechanical body that may be mounted on the side and contains all the opto-electronic components that generate the output signals. The reader head also has an LED to assist in installation and diagnosis without the need for additional electronic devices.

The Fagor absolute technology with digital interface provides the position instantly after power-up without the

need to move the machine; it is more immune to electronic noise, allows additional data transmission between the encoder and the CNC system and reaches maximum resolution at a higher speed. Although not exclusively, this product is concentrated in markets such as metrology, optics, semiconductors and electronics among many others. It is important to note that, in applications with linear motors,

when using absolute technology switching is made easier without the need for additional devices of any kind.

### Enclosed absolute linear encoders

Fagor has expanded the capabilities of their enclosed absolute linear encoders for CNC machines and high-precision applications with new product families, S2, SV2 and G2 and as a result, have improved the mechanical elements in the current families.

The S2 series has new side endcaps for the profile with a more attractive and modern design, yet still maintaining their excellent quality and performance of the linear encoder versus its predecessor. The new side endcaps are installed more easily to achieve the same level of protection against pollutants. In addition, the reader head now offers the mounting option of threaded attachment directly on the reader head, a feature already included in the G and L series and widely accepted by the market because it eliminates the need for nuts.

The SV2 series, inline with the S2 series, also has new side endcaps thus maintaining consistency with the new families. Likewise, the threaded reader-head option (without the need for nuts) is also available in this new model. The new backer bar, for high vibration encoders, has been completely redesigned, it is now smaller and may be mounted from the top or the bottom at the same time while also maintaining the performance and mechanical compatibility with its predecessor.

The G2 series has a smaller head while maintaining compatibility with the previous series. Also note, the reader head has two connectors and air intakes at both ends. Hence, the connection cable and the air intake may be oriented in any direction without having to manipulate the reader head. The endcaps have been modified in order to adapt to the design of the new reader head ■



## Intelligent Industry

# INDUSTRY 4.0

Industry 4.0 is a term invented in Germany that describes the new factories and production systems where products, processes and users are connected and interact with each other. All of this is possible thanks to the great advance of information technologies. In the USA, they commonly use terms like IoT (Internet of Things) or Industrial Internet which refer to the same concept. The fourth industrial revolution is already here and Fagor CNCs are ready for it.

In the productive systems of Industry 4.0, the data flow of low level systems (sensors on a machine or process) are centralized at the highest possible level (the cloud), are processed and then converted into production orders

(commands), maintenance or even a failure diagnosis, and the new processed data is returned to the drives for execution.

The main players in these new factories are the Cyber Physical Systems (CPS)



where the data from the various sensors is collected and products are manufactured. In typical machine tools, the CPS is the CNC. According to this, the CNC is in charge of:

- Gathering the data from the various sensors, either inside the CNC and drives or outside like accelerometers, Watt meters, etc.
- Transforming all the data received to be processed later.
- Sending the data to the plant servers or to the cloud.
- Receiving instructions, programs and algorithms from the servers.

### *On a typical machine tool the Cyber Physical System (CPS) is the CNC*

Although these tasks may be carried out now by the CNC 8065, thanks to the new technologies, it will be possible to develop new «Industry 4.0» functionalities and features in the near future.

Some of the most promising possibilities in terms of added value are:

- **Maintenance.** The new technologies can offer added value to the machine manufacturer and to the end user. Instead of programming periodic revisions of the machine, condition-based maintenance uses all the information of the sensors to suggest that a component needs to be checked or replaced. This concept is easily extended with new communication possibilities that provide access to the expertise of a large number of machines and may be downloaded from the cloud like algorithms. Additionally, the data of each particular machine may be added to the information on the cloud for optimizing future maintenance algorithms. The outcome is a collaborative solution where intelligence that results from the data of many machines helps improve each one of them.
- **Troubleshooting.** If an operator has a problem, the accumulated experience of machines or similar components is available on site and may guide the operator in solving the incidence. This help may be, for instance, the type of

diagnosis to run (available on portable devices), the solution to the problem or even a direct call to technical support. In this case, a report on the current status of the machine and the tests performed would be sent at the same time.

- **Monitoring and control of energy consumption.** Many of these functionalities may be developed with sensors already existing in a system equipped with a CNC and digital drives.

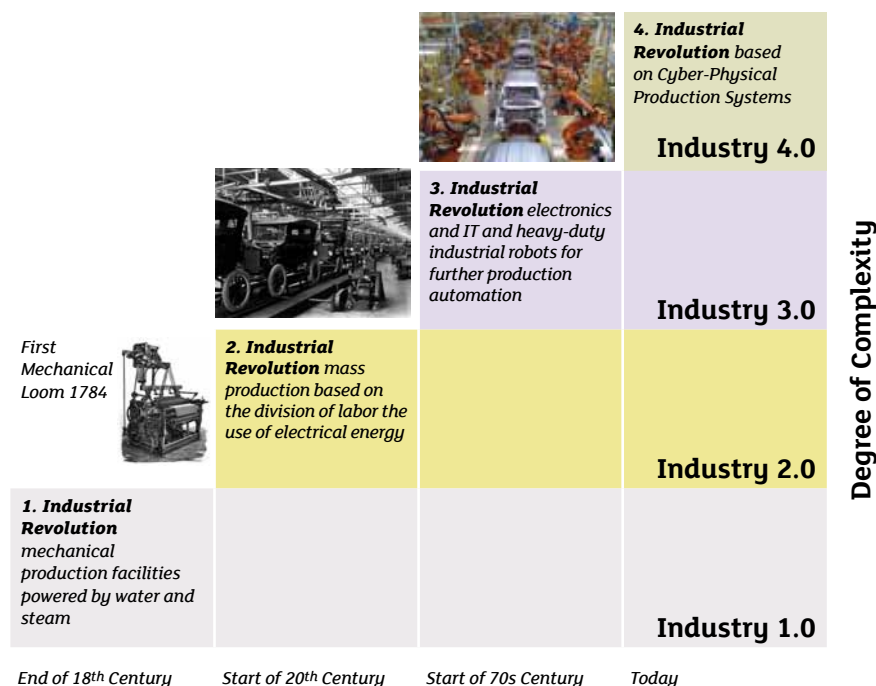
*Thanks to the new technologies, the CNC 8065 will be able to develop new «Industry 4.0» functionalities and features*

In this case, there is information on speed and power of the drives and it will even be possible to connect external Watt meters to the CNC bus to measure the consumptions and be able to provide the operator or the plant manager with real time consumption of the whole system. The energy control may be done by communicating with the PLC and stopping the unnecessary components based on the experience of other machines, or it will be possible to download new energy policies integrated as PLC routines.

- **HMI.** Thanks to smartphones and tablets, we have all the information we need at hand at all times. This will have a great influence in a system like the CNC 8065 that is very open and configurable. The future will unveil that a CNC behaves like HMI of various devices that connect to remote servers to download data and algorithms or that act as a data server for portable devices like tablets and smartphones. Accessing any table, editing any program and having access to any information of the CNC or associated peripheral, will be possible anywhere, anytime ■

## Evolution

### From Industry 1.0 to Industry 4.0



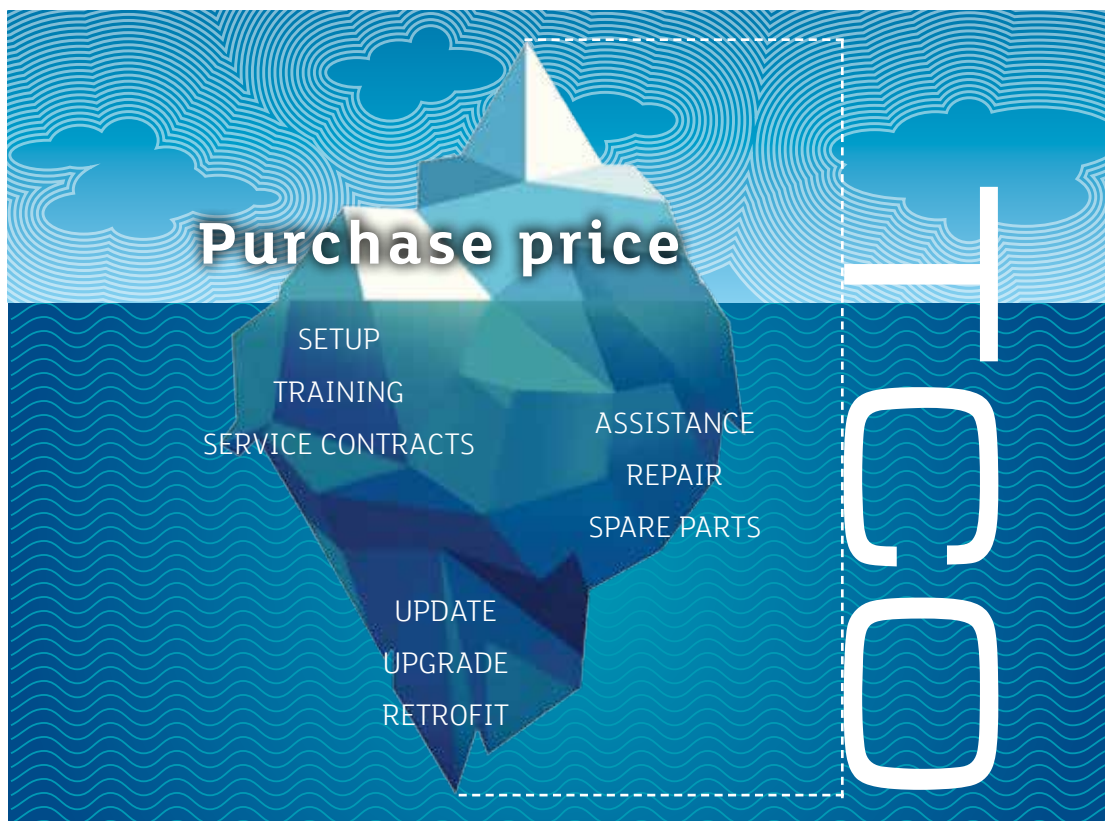
# Lifetime CUSTOMER SERVICE

Fagor Automation offers worldwide flexible and integral solutions that increase equipment availability with maximum quality and productivity. And guarantees global service for markets of local machine consumption and for those oriented to imported or exported machines.

In a global environment like the current one, with maximum industrial competitiveness, the customer-service combination is becoming more and more important with clear goals of increasing efficiency and provide higher value to the machines throughout their entire life cycle. Hence, the TCO (Total Cost of Ownership) concept is especially important; according to the concept, the total price of the machine is given not only by its own purchase value, but also by the services associated with it throughout its entire useful life. To achieve that, it is essential to have services tailored to customers' needs, oriented either to optimizing production or to extending the life of the assets.

Fagor Automation, besides offering the classic services that guarantee proper performance of the equipment with services such as on-line support, setup assistance, repair, exchange and spare part availability also offers flexible and integral solutions that increase equipment availability with the maximum quality and productivity possible. All of this, utilizing the most modern remote monitoring technology, diagnostic systems and data gathering.

Fagor Automation's large catalog of tailored services ranges from warranty extensions, service contracts, upgrade services, retrofits, machine optimization and adjustment, activation of new software features, specialized training for OEM and end users; to telediagnosics or back-up of machine configurations to avoid future problems. While also providing services tailored to the needs



of each customer with delivery times and prices specified regardless of the final destination of the machine.

In order to comply with this catalog of services, it is essential to have processes and a structure oriented to the customer ensuring these services globally attainable. Fagor Automation, with its worldwide presence in the market, has exhibited a special sensitivity towards the customer and as a result, has developed an organizational structure

that ensures customer service is our highest priority.

In addition to this, Fagor Automation guarantees worldwide service to markets with local machine consumption and to markets clearly oriented to importing or exporting machine tools.

Fagor Automation has a commercial and service network presence in more than 50 countries with its own subsidiaries and service centers ■

# Leadwell Receives the AWARD of EMINENCE

for their Lathe Equipped  
with the CNC 8065

The CNC TM 1500 lathe from Leadwell CNC Machines MFG. Corp, equipped with both the Fagor CNC 8065, servo drives and absolute feedback systems has been given the «Award of Eminence» at the 12<sup>th</sup> edition of the award for excellence in research and innovation by the machine tool industry in Taiwan.



Leadwell's multi-task machine has the ability to mill, turn or perform both functions at the same time, drill and copy surfaces. The machine is ideal for production shops and for complex high-speed profile surfaces commonly found within the Aerospace industry.

Fagor Automation and Leadwell collaborated nearly 4 years ago and continue to strive for excellence and flexibility toward supplying the end user with the latest technology in today's ever-changing industry.

The Fagor 8065 CNC is capable of handling the complexity that is required to control this high-end machine at

its highest performance level while maintaining its ease in operation.

The Leadwell TM-1500 demonstrated the actual machining of a turbine blade used in the Aerospace Industry. It conducted both milling and turning simultaneously using 5 total axes to achieve the same result normally requiring two different machines. Time savings and productivity significantly increase with the use of mill/turn technology and has rapidly become a cornerstone of manufacturing excellence.

The Fagor CNC 8065 is the solution for complex 5-axis machining needs and other applications ■

## R&D+i commitment



Fagor Automation, from the very beginning is committed to innovation, research, technological development and advancement of the machine tool sector, both locally and globally.

Because of our commitment, Fagor Automation participates actively in some of the most influential machine tool builder associations in the world: AFM (Spain), ABIMEI (Brazil), UCIMU (Italy), AMT (USA) and VDMA (Germany).



UCIMU-SISTEMI PER PRODURRE



Our company also participates in other technological and innovation entities: MANU-KET (Spanish technological platform for advanced manufacturing); CIC marGUNE (Cooperative research center on high performance manufacturing); Innobasque (Basque innovation agency); GAIA (Basque association of industries of electronic technologies and information); SERCOS (entity that promotes and develops

the Serial Real-time Communication System); EtherCAT Technology Group (group that keeps the EtherCAT technology open to all potential users) and Mechatrolink Members Association (organization that promotes and develops the open protocol Mechatrolink in the machine tool sector) ■





# RELIABILITY AND PRECISION OF THE MOST INNOVATIVE TECHNOLOGY



Fagor Automation shall not be held responsible for any printing or transcribing errors in the catalog and reserves the right to make any changes to the characteristics of its products without prior notice.

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FAGOR AUTOMATION



Fagor Automation holds the  
ISO 9001 Quality System Certificate and the  
CE Certificate for all products manufactured.

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