6-7 Torresmill® and Torrestool®
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The World’s Most Comprehensive Range of Solutions for High Productivity Metallic Components Manufacturing Systems
MTORRES has developed over the years the widest range of systems to automate, with the highest flexibility and productivity, the Aluminium components manufacturing process.

Ranging from Laser Scriber with Flexible Tooling Systems for Chemical Milling, Surface Pocket Milling and Routing and Drilling Machines with Flexible Tooling for net trimming, to special solutions such as Laser Welding, Clip Installation, Trailing Edge Riveting to Automated Assembly Jigs, MTORRES provides the most comprehensive, productive and well proven range of solutions.

MTORRES strong Engineering and Project Management capabilities ensures the capacity to define, manage and successfully implement complex integrated projects providing Turn Key global solutions to our customers. That powerful engineering capacity allows the development of a number of customized special projects, such as Laser Welding Machines, Automatic Clip installation solutions, special Trailing Edge Riveting systems, etc to fulfil particular customer needs. Every machine includes customized Human Machine Interface (HMI) software for easy operation.
TORRESMILL®
AND TORRESTOOL®
5 Axis Gantry/Column Routing and Drilling Machine with Flexible Tooling System

OPTIONS
- Volumetric compensation system
- Temperature controlled enclosure
- Tool management
- Automatic calibration

The well proven sturdy and, torsion free gantry concept enables the machine to provide the maximum acceleration-deceleration at the highest feed rates.

A high frequency spindle provides appropriate spindle revolutions for optimal cutting and maximum feed rates.

TORRESMILL® Gantry Milling Machines are built in various sizes to meet customer requirements and specifications.

By integrating the TORRESTOOL® with the TORRESMILL® 5 axes High Speed Milling Machine, the system provides the highest degree of flexibility and reduces changes over time from one work piece configuration to another to less than 2 minutes.
TORRESMILL® 5-axes gantry DNC-CNC high speed milling machine series has been specially designed for high speed milling and drilling of aircraft Aluminium structural components. The integration with the TORRESTOOL® provides the maximum flexibility.

OPTIONS
- Laser based vision system
- Photogrametry measuring system
- Dry/wet machining
- Temperature compensation

All supports rods with vacuum cups move simultaneously in the X/Y/Z axes and are automatically locked in their final positions.

The TORRESMILL® can also be delivered with a conventional T slotted table for hard tooling set up.

A Vertical TORRESMILL® can also be delivered eventually working integrated with a Head Stock/Tail Stock system for mandrel rotation on a fully interpolated manner with the TORRESMILL®.
TORRESLASER® AND TORRESTOOL®

5 Axis Gantry Laser Scribing Machine with Flexible Tooling System

The well-proven sturdy and torsion-free gantry concept enables the machine to provide the maximum acceleration-deceleration at the highest feed rates.

A low power CO₂ laser resonator set up on the machine provides appropriate power, mode and beam quality for optimal maskant cutting and maximum feed rates.

TORRESLASER® Gantry Laser Machines are built in various sizes to meet customer needs.
TORRESLASER® 5-axes gantry DNC-CNC high speed Laser machine series has been specially designed for high speed laser Maskant cutting for chemical milling process of aircraft Aluminium structural components. The TORRESTOOL® provides the maximum flexibility.

By integrating the TORRESTOOL® with the TORRESLASER® 5 axes High Speed Laser Machine, the system provides the highest degree of flexibility and reduces changes over time from one work piece configuration to another to less than 2 minutes. All supports rods with vacuum cups move simultaneously in the X/Y/Z axes and are automatically locked in their final positions.

The TORRESLASER® can also be delivered with a conventional T slotted table for hard tooling set up.

OPTIONS
· Special attachments for leading edges scribing
OPTIONS
- Automatic repositioning software integrated with TORRESMILL® or TORRESLASER®
- Multipart set up software
- Absolute positioning system

TORRESTOOL®
Multiflexible Universal Holding Fixture

The TORRESTOOL® is a modular concept consisting on a number of carriages that move on the X-axis direction, with a number of supports per carriage, that move on the Y and on the Z axes under a computer program instructions.

Each support rod has a self-adjusting 45º tilting capability vacuum holding cup on the top. In certain applications a part clamping device is set up on top of the rod instead.

The TORRESTOOL® is controlled from a PC where all part programs are downloaded from, into the MTORRES developed multi-axes control system to trigger the TORRESTOOL® repositioning process.

All supports rods move simultaneously in X, Y, Z axes and are automatically locked in their final position. All motions are servo driven and NC controlled. Ground guide ways, rack and pinion and ball crews systems are used to drive the axes.
The TORRESTOOL® is a Multiflexible Universal Holding Fixture specially designed to support in space aircraft structural components, while they are machined or laser cut.

OPTIONS
- Part automatic searching
- Vacuum level control
- Special attachments and cups to fixture complex surface components

By integrating the TORRESTOOL® with the TORRESMILL® or TORRESDRIL or TORRESLASER®, the system provides the highest degree of flexibility on their milling, drilling or laser cutting operations, reducing change over time from one part configuration to next to a maximum of two minutes. All supports rods with vacuum cups or clamping devices move simultaneously in the X/Y/Z axes and are automatically locked in their final positions.

TORRESTOOL® Universal Holding Fixtures are available in different design configurations, horizontal, vertical, round, 3 Axis, single axis, etc, and in any required size to be integrated with other MTORRES machines.

The TORRESTOOL® has a sophisticated built-in executive software package (HMI) to allow an extremely easy machine operation, as well as its maintenance, providing self-diagnosis routines etc.

Applications are machining, assembly, laser scribing, etc.
The well proven lightweight, sturdy and, torsion free gantry or column concept enables the machine to provide the maximum acceleration-deceleration at the highest feed rates, delivering the most demanding accuracy.

A high frequency spindle provides appropriate spindle revolutions for optimal drilling and countersinking at maximum feed rates.

TORRES DRILL and TORRESTOOL®

5 Axis Gantry/Column Drilling and Countersinking Machine with Flexible Tooling System

OPTIONS
- Volumetric compensation software
- Customized CNC cycles
- Temperature compensation system

TORRES DRILL Gantry or column Drilling Machines are built in various sizes to meet customer requirements and can be built for milling purposes too.
A unique pressure foot design provides an efficient and highly accurate solution for countersinking Aluminium components as well as to drill and countersink a stack of different materials (Al, Carbon Fiber, Ti, etc.).

By integrating the TORRETOOL® with the TORRESDRILL, the system provides the highest degree of flexibility. All supports rods with vacuum cups or clamping devices move simultaneously in the X/Y/Z axes and are automatically locked in their final positions.

The TORRESDRILL Automatic Drilling and Countersinking Machine has been specially designed for high speed drilling and countersinking Aluminium parts as well as stacks of different materials.

OPTIONS
- Vision based measuring system
- Pressure foot
- Countersink depth control
- Wet/dry drilling
- Environmental controlled enclosure
Flexible Drilling Head [FDH]

5 Axis Crawling Drilling and Riveting Machine

The FDH is a 5 interpolated axis drilling machine with modular design for easy system customization.

Its principle is to ‘walk’ over the aircraft fuselage, holding on place by means of a set of vacuum cups. Once the FDH walks to position, gets locked with the vacuum cups and is ready to perform the drilling/riveting operation.

After drilling/riveting at the current area, the FDH walks one more step, by releasing the vacuum at half of the cups and moving them one step ahead, where it will lock them on place again getting ready for the next drilling/riveting operation.
The FDH does not need any additional guiding system mechanically engaged to the Aircraft to walk on its fuselage, irrespective of its position, even upside down.

FDH is a 5 axes autonomous platform that carries the necessary end-effectors for drilling and countersinking.

The robot optimal design ensures the best drilling and countersinking positioning accuracy and a high speed performance at the lowest weight. A vision and laser system ensures that the FDH follows the desired path and correct CNC program from theoretical to real path.

A portable electric cabinet is provided, connected to the FDH by means of a minimum hosing/wiring harness.

A MTORRES developed control system allows the FDH to work without needing a conventional CNC system.

Applications are drilling and riveting circumferential, longitudinal and conical joints.

A 5 minutes set up on place by 2 operators is enough to be ready to start.
Special Solutions

MTorres Capability to Supply Specially Tailored Solutions to our Customers

The MTORRES extremely strong engineering capabilities, as well as our willingness to address highly complex new developments upon our customers’ requirements, has led to the actual implementation of very successful unique developments over the past few years.

MTORRES philosophy of continuously assign efforts to highly sophisticated R&D activities has develop an atmosphere in which is not unusual to address special complex problems. The result of the implementation of this philosophy has led to the existence at some of our customers sites a number of extremely unique and complex but also successful solutions, which are in operation for years.

The following systems are perfect examples of the above defined open approach to develop those particular and special solutions.

The MTORRES extremely strong engineering capabilities, as well as our willingness to address highly complex new developments upon our customers’ requirements, has led to the actual implementation of very successful unique developments over the past few years.
The TORRES RCS (Reconfigurable Check System) is a unique, ‘three in one’, proven solution for wing skins measuring system.

It consists on the integration of three machines working together on the same cell. It includes the following systems:

- a TORRESTOOL® Universal Holding Fixture for supporting the part on place while the shape check-up process takes place.
- a Laser Radar system for contour checking located underneath the a TORRESTOOL® running below its structure throughout the overall installation cell.
- a 6+1 axes robot with an End-Effector for thickness checking using an ultrasonic measuring system.

It is a time saving process, fully automated, using the most advanced metrology technology.

The overall system accuracy is guaranteed by the TORRESTOOL® subsystem (+/- 0.05 mm in Z axis.) and by the non contact technology utilized on the implementation of the solution.
The TORRESCLIP has been specially designed for High Speed and fully automatic process to assemble the clips to the fuselage or wing skins.

The TORRESCLIP is a unique machine designed to locate, set up and bond the clips to the fuselage skin on an accurate, flexible and fast manner.

It is a modular concept, based on our well proven vertical TORRESTOOL® Universal Holding Fixture system.

The cell includes, as an addition to actual clip installation system, a vertically set up gantry to drill holes on the clips after they are bonded to the skins.
The TORRES RIVETING SYSTEM provides the highest production rates and the most accurate results when it comes to riveting on either a semiautomatic or fully automatic CNC mode.

A specific application of the TORRES RIVETING SYSTEM is the highly successful and well proven Riveting Machine for trailing edges of elevators, rudders, flaps and other similar components for different types of aircraft models.

The system is able to rivet different type of materials stack, which is typical on the above families of components.

The machine includes a material thickness measuring system, rivet selection depending on that material thickness. Also a part distortion measuring system as well as a part distortion compensation system is a feature of the machine.

Optionally it can be provided with a totally integrated TORRESTOOL® Universal Holding Fixture, to boost the solution degree of flexibility and the avoidance of dedicated tooling requirements.
The TORRESWELDING is a world’s unique piece of equipment. It has been developed aiming to the substitution, at certain aircraft fuselage sections, of the traditional riveting process to join the stringers to the skins. This joint is made by means of a unique laser welding process.

The TORRESWELDING includes to high power laser resonators, which laser beams are brought to the machine welding head separately, so that the stringer is actually welded to the skin using both laser beams, one at each side of the stringer, simultaneously.

The machine is capable of working on both single and double curvature panels.

The system provides significant productivity advantages in terms of manufacturing speed as well as overall panel weight reduction of about 15% vs the traditional riveting process.
1. Postprocessor

MTORRES postprocessor is a powerful, easy to use and the most economic software to Program the MTORRES machines. They are well proven software packages, frequently upgraded by MTORRES Software department with no yearly maintenance fees. They are designed to maximize our machines performance minimizing the program generation time.

2. Simulation

MTORRES has developed over the years unique and specific solutions for Machine simulation, integrated in DELMIA V5, particularly for our Composite Manufacturing equipment. Our simulation software reads CAD models and NC programs executing them on a virtual machine detecting collisions etc. for program correction.

3. HMI

HMI applications are developed to create user friendly packages to allow the operator to run complex NC manufacturing processes on an easy and errors free mode. MTORRES HMI’s are customized for each application to minimize the operator training requirements and time and still allowing an efficient and safe way to run the machine.

4. Process development

In order to provide total solutions to our customers MTORRES has developed specific processes to maximize customers productivity. Examples of these development range from cutting tools, work flow, process definition, lay outs, programing strategies, quality integration, production support development, using SCADA and other environments.
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