Surface milling technology vs Chemical milling

The worldwide trend to become greener at all human activities and in every operation, particularly in industry, has led the Aerospace Industry to review its processes aiming to a greener operation. One of those processes under scrutiny is the Chemical Milling.

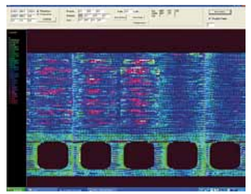
Surface Milling Equipment working on a fuselaje skin panel.

■ MTorres got involved some years ago in a project to develop a new solution to migrate from the traditional Chemical Milling process to a Mechanical Milling one. The result of that effort was the **Surface Milling Machine**. This solution includes a set of three different machines, a vertical **Torresmill** a vertical **Torrestool** and a **Torresholder** system. It machines with the **Torresmill**, a panel set up on shape at the **Torrestool** while the **Torresholder** supports the panel from the backside.

The patented Surface Milling solution is able to machine the pockets at the fuselage panels, not only accurately but also performing a thickness measurement action, on real time, as the panel is machined, to guarantee a within tolerance process eliminating fully the risk over machining. In addition it generates a QA report avoiding the otherwise needed additional step in the process to check the panels. Last but not least, it performs the final trimming and drilling of the panel without moving the part, avoiding the need of another machine for these purposes.

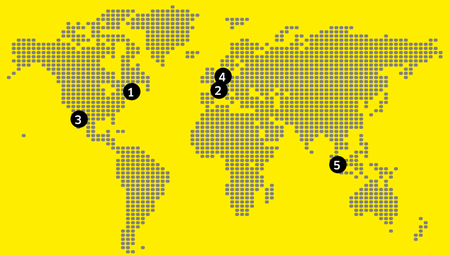
This solution has been in operation since 2006 machining panels for all the Airbus programs avoiding the usage of tons of chemicals since its entry in production. Now, the chines program C919 is about to start using this very same technology. In addition a number of other customers are showing an ever increasing interest on this new technology.

MTorres takes a leading position in a number of technologies being this greener solution one of the areas where we see a soaring and most brilliant future.



Quality Assurance report.

UPCOMING AEROSPACE TRADE SHOWS THAT MTORRES WILL BE PRESENT IN:



1. **JEC COMPOSITES AMERICAS**
   Boston, MA, USA 7-9 November2012
2. **JEC COMPOSITES EUROPE**
   Paris, 12-14 March 2013
3. **SME COMPOSITES MANUFACTURING**
   Long Beach, CA, USA 19-21 March 2013
4. **LE BOURGET**
   Paris, 17-23 June 2013
5. **JEC COMPOSITES ASIA**
   Singapore,25-27 June 2013

MTorres acquires Seattle based Aerospace Tooling and Equipment supplier Pacifica Engineering, Inc.

The acquisition is aimed at improving the MTorres value proposition to our customers in terms of technical expertise and closer communication and support

Pacifica facilities in Bothell, WA, USA.

MTORRES and Pacifica have signed an agreement for the acquisition of 100% of Pacifica Engineering shares. Final closing of the transaction is pending on regulatory approvals.

Pacifica provides Tool Design, Engineering and Design/Build services to the Aerospace and Defense industries. It is an AS 9100 certified, ITAR registered and a Key Supplier to The Boeing Company. Located in Bothell, WA, it supports composite and mechanical tool design, structural, mechanical, electrical engineering & design, FEA/stress analysis, simulation, and design for manufacture (DFM) through an experienced and highly qualified staff of 55 people, mainly Engineers and Project Managers.

MTorres, a Spanish privately-owned company, has supplied highly sophisticated automated equipment to the Aerospace Industry for over 20 years. The company is a market reference in the field of composite automatic lamination equipment, large routing and drilling with flexible tooling systems, other specialty equipment, as well as automated assembly jigs that support the manufacturing and assembly processes of the main programs around the world.

With manufacturing facilities in Spain and delegations in Germany and the US, MTorres has a workforce of 500 people and maintains business lines in the aeronautics, paper converting and wind energy sectors.

The combination of the two companies´ technologies and personnel will enhance both the reach of product offering covering most of the aerospace manufacturing and assembly processes, and the services that MTorres and Pacifica are now able to provide to their clients, mainly in the US.

FOR MORE INFORMATION
www.mtorres.es
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News of Company MTorres 2012

MTorres acquires Seattle based Aerospace Tooling and Equipment supplier Pacifica Engineering, Inc.

Acquisition enhances MTorres product portfolio, capacity and service in the US

OAK Aerocomposit chooses inovative solutions to build the MS-21 composite wing

SURFACE MILLING TECHNOLOGY vs CHEMICAL MILLING

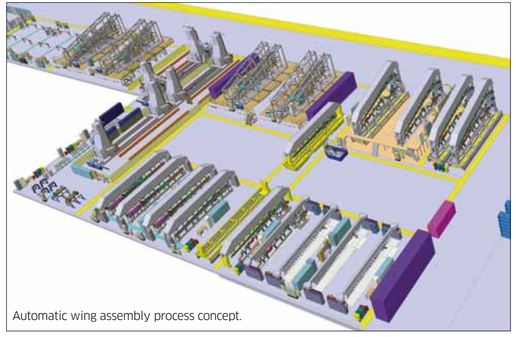
A greener solution to manufacture skins

MTorres New Composites R&D Center

OAK Aerocomposit chooses inovative solutions to build the MS-21 composite wing

M.Torres and Aerocomposit, an OAK subsidiary in charge of the carbon fiber wing of the Irkut MS-21 program, have signed a number of contracts to supply a new generation of lamination equipment, a routing system with flexible tooling and a fully automated assembly line.

AEROCOMPOSIT a Joint Stock Company Headquartered in Moscow, newly created under the OAK umbrella in Russia has been appointed as the responsible company to build the Carbon Fiber wings of the newly launched program Irkut MS21. This is a novelty within the Russian Aerospace Industry but the novelty goes well beyond that, when considering the fact that the wing will be built using a new technology of dry Carbon Fiber material layup plus a newly developed Infusion process.



Automatic wing assembly process concept.

MS-21 AIRCRAFT

All these novelties that Aerocomposit addresses on this program, requires that its supply chain has the necessary degree of expertise, knowledge and experience, to begin with, as well as the willingness to develop special new solutions. This is exactly the approach that makes the Aerospace Industry a Technology driver worldwide. This is exactly the approach that Aerocomposit has embraced when taking this challenging project and it is exactly the approach that MTorres has taken since the very beginning of the discussions with Aerocomposit.

DRY MATERIAL CHOICE

Aercomposit could have, easily, decided to use any of the available Prepreg material to manufacture the wings. This choice would somehow, look daring from the point of view of using Carbon Fiber for the first time for a civil aircraft program wings in Russia. However Aerocomposit wanted to go one step ahead from the current technology, jumping into an Out of Autoclave solution, since the very beginning of the program definition, selecting finally a newly developed dry material.

AUTOMATIC FIBER PLACEMENT SOLUTION FOR DRY MATERIAL

From the lamination point of view, coming up with an Automated Fiber placement system, newly developed, capable of laying down the thermoplastic dry material successfully is quite a challenge.

However, MTorres has a long experience on successfully implementing Automatic Layup machines in general and specifically on Fiber Placement solutions for Aerospace applications. In any case, every MTorres built machine of this type currently in operation is working with prepreg material. Automatic lay up of dry material is quite a different requirement plenty of challenges.

But MTorres is not new to this field. In addition to the Aerospace applications, MTorres has also presence at the wind mill blade manufacturing industry. In fact, MTorres has developed a unique solution to build on an automatic mode wind mill blades. This complete new concept includes, as a relevant part of the process, the automatic lay up of dry glass fiber. MTorres has been involved in this project for a few years now, and that experience is crucial for the MS21 composite wing project.

The developments made a few years back for the wind mill blade dry layup solution has turned out to be extremely relevant to ensure the success in this new aerospace project, even considering the remarkable differences between them, still the degree of commonality put MTorres in a unique position to achieve success.

Several months of trials, with different materials and using different technologies on the machine concept, have proven the ability to build a full scale machine capable of laying down the wing skins, the spars and the stringers.

MTorres past experience on Automatically Lay up of dry glass fiber for Wind Mill blades turned out to be crucial for a fast demonstration of process concept feasibility.

TORRESMILL® and TORRESTOOL® Routing and Drilling System.

AUTOMATIC ROUTING AND DRILLING MACHINE WITH FLEXIBLE TOOLING

In addition to the lamination solution, MTorres will supply to Aerocomposit a Torresmill and Torrestool system. It is an industry well known product to trim and drill aerospace components, both in aluminum and carbon fiber.

This well-known solution has been the industry standard for years and now Aerocomposit will also profit of the many years of experience that MTorres has delivering these systems. This extremely reliable and accurate solution will ensure, together with the other systems on site, the high quality of the components delivered to the Assembly area.

MS-21 AUTOMATIC WING ASSEMBLY PROCESS CONCEPT

Last but not least, MTorres will deliver to Aerocomposit a customized solution for automatic assembly of the wings different subcomponents. This expertise paves the way to conceive and then develop and implement a concept solution that works. The Aerocomposit´s Ulyanovsk plant will house the above-mentioned systems in just a few months to ensure the MS-21 wings are produced on time, with the required quality level.

Bell 525 Relentless Helicopter.

Pacifica, 15 years of reputable tooling design and supply

Pacifica Engineering, Inc. is an AS 9100 certified, ITAR registered and a Boeing supplier performance Excellence Award Company.

■ Located in Bothell, WA, USA Pacifica provides composite and mechanical tool design, structural, mechanical, electrical engineering & design, FEA/stress analysis, simulation, and design for manufacture (DFM) through an experienced and highly qualified staff of 55 people, mainly Engineers and Project Managers.

Pacifica Engineering has been a key Supplier of tooling solutions to the Boeing Company for over 15 years and has tooling and equipment on every commercial production line at Boeing today. The tools range from simple fixtures for drilling holes to large overhead handling equipment to complex electro-mechanical machines used for assembly and manufacturing of large airplane parts and assemblies. Pacifica continues to support Boeing in both Washington State as well Boeing's Charleston South Carolina 787 factory.

Pacifica is also engaged in engineering solutions and providing the tooling and equipment to help Bell Helicopter manufacture their new 525 Relentless Helicopter. Pacifica is responsible for both the Drives Systems Tooling as well as the Rotor Blade tooling package. Complex manufacturing processes and extremely precise parts go into each gearbox and transmission used on the 525 Relentless Helicopter. These parts and processes demand both innovative and repeatable tooling and processes for manufacturing and assembling gears and cases. The Pacifica and Bell Helicopter team are working closely together to assure that the stellar reputation for quality and safety Bell is known for are maintained throughout the design and manufacturing process.

In developing Rotor Blade tooling and processes Bell Helicopter has a highly experienced team of engineers working on advanced manufacturing processes with the goal of higher manufacturing yields, lower cost to manufacture and greater precision and product integrity. Pacifica is working closely with Bell Helicopter's engineering team in designing and fabricating the specialized tooling and processes used for the manufacture of high strength low weight composite blades and grips.

Pacifica continues to grow its customer base by reaching outside the US on international programs supporting and is currently supporting Embraer, Bombardier and Airbus through both tier one and sub-tier relationships.

MTORRES NEW R&D CENTER

■ It is well known that MTorres has based its growth in a continuous innovation effort. The R&D activities have been key to the development on new products and processes and year after year new projects are defined and new goals setup. In 2011, MTorres launched a 8 million euros investment to boost the production and R&D capacity. The main new assets resulting from such investments are a brand new 24.000 sqf assembly and a Clean room facility where a gantry type Automatic Fiber Placement machine has been installed.

The new facilities were inaugurated in February this year. During the ceremony Mr. Manuel Torres, president of the Company, stressed the importance of this investment in order to fulfill the growth planned for the coming years, as well as the development of the human capital of the company that it will bring.

NEW DEVELOPMENTS

The new clean room will be the center of new developments in Composite lamination equipment. The Gantry dimensions of 33 ft in the longitudinal axis, 15 ft in the traverse axis and 5 ft in the vertical axis will allow a wide variety of test and parts to be layup.

The gantry is fitted with 2 rams, one incorporates a 16 tow ¼" standard AFP head and the other one is ready to house any other type of head or end-effector to laminate different types of materials and formats, ranging from out of autoclave to dry fabric, thermoplastics, etc. Finally, a headstock-tailstock system is also available to laminate revolution parts.

During the past few months that the center has been in operation, several customers have visited our facility and some tests have been carried out. All of them have recognized that the new facility provides the perfect environment for the development of trials, testing and research of solutions for different materials and processes that allow knowing in advance the results obtained by end-users.

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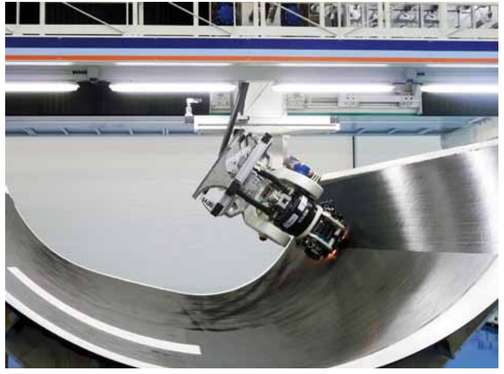
Clean room overview.



AFP conducting a trial.

AFP Head.

Investment

8

MILLION EUROS Following its corporate philosophy that stresses the efforts on R&D activities, this investment will be key to strength MTorres leading position in Composite manufacturing Systems.