Tech focus

This month's focus is on manufacturing and materials.

Info sharing progresses at Messier-Dowty

Because **Messier-Dowty**'s research, engineering, and production facilities are spread out across the globe, information-sharing amongst divisions in real time has emerged in recent years as a top strategic priority for the company. For that reason, the company made a dramatic move to adopt a fully interactive, paperless approach to design and development, which is vital for today's extended enterprise to meet ever more stringent lead times and introduce a greater amount of flexibility in the design process and control costs.

To meet the challenge of mastering the digital mockup, Messier-Dowty made significant inroads in computer-aided design and manufacturing, and in technical data management. Such progress has become more feasible with the latest advances in product life-cycle management.

Launched in 2004 as the TDI (Technical Data Integration) initiative, Messier-Dowty created a multi-functional and multi-site team fully dedicated to digital configuration management. Given the company's geographical spread, a common system was needed using the same tools, processes, and methods. In previous years, the company's design manufacturing sites used manual methods of communication, which inherently slowed down the design process and exchange between sites. Today, with the arrival of new platforms, the company is now able to accelerate these processes, offering an automatic, multi-site replication of data for collaborative programs.

Messier-Dowty's TDI initiative encompasses two major avenues of deployment. The first avenue was to integrate internal information technology (IT) platforms across the company's worldwide engineering and manufacturing facilities. For this, it defined a three-tiered architecture: **Dassault Systèmes**' CATIA V5 for design and manufacturing solutions; the same company's SMARTEAM software for management of CAD/CAM data; and **UGS**'s TeamCenter software for managing enterprise technical data.

Working through an integrated team aligned on a centralized database deployed at six worldwide locations, the company was able to progressively integrate its technical data. Through the TDI project, Messier-Dowty has been able to offer a more-customized approach to design and manufacturing, offering clients greater flexibility and responsiveness while reducing development cycles. Lag time has been significantly reduced, and engineers are now able to review product specifications at any stage in the development cycle. Also, information transfer between engineering and manufacturing divisions is now automatic, enabling product design to adapt to the latest manufacturing requirements at an earlier stage in the life cycle.

Source: Alain Ernoult

Airbus is a major landing gear customer of Messier-Dowty.

In addition to internal data integration, the TDI project focuses on client data integration. Messier-Dowty has now positioned itself to replicate this same system to efficiently exchange data with airframers on development programs, such as the **Boeing** 787, **Airbus** A400M, **Dassault** F7X, and the **Sukhoi** RRJ. In addition, as a landing systems integrator Messier-Dowty not only collaborates closely with airframers but also manages other landing gear subsystems provided by specialist partners. The next major challenge will be to progressively integrate outside partners into the collaborative digital platform.

Achieving digital configuration management across multiple time zones for an extremely diverse portfolio of development programs has been a formidable challenge, but the investment is clearly paying off. Design modifications that once took weeks to implement can now be executed in a matter of days. Users can remotely work in a complete product context, making solutions available much earlier to downstream functions in the process. Ultimately, production innovation and quality are improved through early and more frequent design validation and increased iteration. Messier-Dowty's TDI initiative has armed the company with a powerful design review environment to efficiently respond to the ever-evolving market requirements for landing gear design and development.

Source: Messier-Dowty

To meet the challenge of mastering the digital mockup, Messier-Dowty has made significant inroads in computer-aided design and manufacturing.

Despite advances in simulation for design and manufacturing of landing gears, hands-on work is still required. (Image courtesy of Alain Ernoult.)

Jacques Péchaud, Vice President, Information Technology, Messier-Dowty, wrote this article for *Aerospace Engineering*.

GE Plastics products take off

GE Plastics believes it has a good story to tell about its products, and at April's Aircraft Interiors Expo in Hamburg, Germany, it found many ears.

Among the materials displayed was Ultem polyetherimide (PEI) resin, which GE calls a "workhorse material" known for its profile of high-performance properties in the areas of inherent flame resistance, smoke emissions, strength, and chemical resistance. The company showcased Ultem resin applications in a passenger service unit, a gasper air valve panel, an air nozzle assembly, and window trim.

GE Plastics' Ultem resin is used in the fabric of the kick panel of these seats.

Lantal Textiles, a leader in the design, production, and distribution of textiles and services for the international community of operators of aircraft and other transportation vehicles, is working with GE Plastics on an aircraft interior kick panel that specifies fabric incorporating fibers made from Ultem resin. GE says the resin not only provides inherent flame retardance without the use of brominated additives to meet regulatory requirements, but it also provides better UV resistance than competitive materials.

Also displayed was extruded Ultem PEI sheet, which provides design flexibility, good mechanical properties, and good resistance in the areas of flame, smoke, and toxicity. It can be thermoformed, pressure-formed, twin-sheet formed, or used in flat or cold-formed applications. This material is paintable and is now available in a low-gloss version called Ultem 1668L sheet. It also may enable elimination of painting for cost reduction and faster cycle times.

Used in this seat for cladding, Lexan F600 sheet can be formed easily into complex shapes using standard thermoforming equipment.

In addition to showcasing its existing high-performance product portfolio, GE Plastics previewed a new material for aircraft interiors based on **Azdel**'s thermoplastic composite technology and GE's Ultem resin. Called Azdel Aero-Lite composite, it is composed of long glass fibers that enable the creation of extremely sturdy components with approximately half of the specific gravity of alternative materials such as aluminum or glass reinforced plastics/fiber reinforced plastics.

The thermoformable, lightweight composite that is a good candidate for large, semi-structural interior panels such as window masks, ceiling and side-ceiling panels, seatbacks, armrests, tray tables, luggage racks, partitions, and other interior trim components.

GE's Lexan F6000 sheet applications shown at the expo included several seat cladding parts, an airline literature rack, a window track and reveal, and an emergency door light fairing.

Patrick Ponticel

High-speed machining key to Goodrich manufacturing advance

Faced with the task of producing highly engineered, complex parts with unique features at increasingly higher production rates, **Goodrich Landing Gear** has formed a multidisciplined Integrated Product Team (IPT) consisting of representatives from quality, manufacturing, design, and manufacturing engineering, together with key suppliers within the machine tool community to develop a new manufacturing strategy based on lean principles and improved machining technologies.

The end result was the formation of value streams dedicated to improving the manufacturing technologies used in the production of very complex steel and titanium components. Within these value streams, Goodrich has taken a new approach to the profiling of large cylinders and complex components, again advancing the state of the art of manufacturing within the landing gear industry.

Goodrich Landing Gear has initially purchased several new single-spindle, high-speed machining cells from **Dorries Scharmann Technologie** (DST). In keeping with Goodrich's lean-manufacturing philosophy, the cells are level-loaded, based on customer requirements, to support one-piece continuous flow regardless of model mix. The new high-speed machining cells split profiling into separate roughing and finishing operations. They also complete all boring mill work (machining of faces and bores), thus effectively combining operations that were traditionally done on various machines using multiple setups.

Compared with traditional roughing, the new roughing machines use smaller tooling and reduced cutting depth, running at much higher feed rates. The result is fewer setups and surface contours that are closer to the final machined shape, leaving less material to be removed in the

The new high-speed machining cells used by Goodrich split profiling into separate roughing and finishing operations.

finishing operation. In addition to the roughing machines, the new finishing machines within this high-speed manufacturing cell run at spindle speeds up to 10 times current spindle speeds and at feed rates up to 40 times those of the traditional method. The results are higher-quality parts in terms of increased dimensional accuracy and improved surface finish as well as less work in process (WIP), which translates into substantial savings in inventory costs and manual polishing time.

A digital scanning system has also been incorporated into the manufacturing cells to help minimize time lost due to forging variations. Prior to the roughing operation, the scanner is used to compare the forging against an established baseline of acceptable stock sizes. After the finishing operation is complete, the scanner feature automatically highlights any variation between the actual machined dimensions of the finished workpiece and the engineering model.

As part of this comprehensive high-speed machining technology solution, Goodrich and DST have teamed up with a consortium of German-based companies to provide a complete tooling, programming, and measurement package to accompany the machining centers. Goodrich has been advancing the state of the art of landing gear design, development, and manufacturing technologies since the conception of the air-oil landing gear in 1926. The company serves the commercial and military aircraft industries.

Don Pielechaty, Manager, Production Support, Goodrich Landing Gear, wrote this article for *Aerospace Engineering*.