

Military Programs is looking for new opportunities to fuel growth in 2010

"The Aerostructures Strategic Plan calls for us to double our revenue contribution in the next four to five years"

One goal outlined in the Aerostructures Strategic Plan is to significantly grow military business. To gain insight into the status of our business unit's current military programs -- as well as where growth may come from -- *Skylines* recently sat down for a conversation with Tim Dumbauld, vice president, Military Programs. Dumbauld discussed both active programs and potential opportunities for Aerostructures in the military business arena. (*Continued*)



Aerostructures will be increasing production rates on the nacelles and pylons it supplies for the Lockheed Martin C-5M strategic airlifter modernization effort this year. The C-5M Super Galaxy (pictured above) climbs higher and faster than its legacy counterparts, while carrying more cargo over longer distances. In fact, the C-5M can carry twice the cargo of other strategic airlift systems.

To level set, can you please summarize Aerostructures' active military programs?

Major programs include the big ramp-up currently underway on the C-5M Super Galaxy strategic airlifter upgrade effort (see related story in this issue of *Skylines*) -- providing pylons and nacelles to customers Lockheed Martin and General Electric, respectively. We will increase our production rate from one pylon and nacelle a month to two on this program by the middle of this year.

Also in the cargo plane arena, the C-X is waiting in the wings. That's a brand new two-engine military transport for the Japan Air Self-Defense Force that will be going into flight test soon. Our role on that would be supplying the nacelles for the plane's General Electric CF6 engines.

JSTARS (*Joint Surveillance Target Attack Radar System*) is another program we're hopeful about. (*Note: The JSTARS re-engining program is targeted at upgrading the U.S. Air Force's fleet of E-8C aircraft - which are used to detect, locate, classify, track and target hostile ground movements, communicating real-time information through secure data links. Funding for the program is part of the Defense Appropriations bill - which has not yet been approved.*) We worked on an extension of a temporary contract related to this program through the end of 2009. With the 2010 budget, when it passes, it looks like we will at least go through the development phase and produce somewhere between two and six airplanes for the initial engine retrofits . . . with the hope the program will expand to include the entire fleet of 17 airplanes. We have worked closely with our Washington office and our customers to keep the program funded. It was doubtful for a while, but looks good now.

Of course, GRID-LOCK® is our largest ongoing program. We're producing flight control surfaces and doors for the F-15 tactical fighter, F-16 jet fighter and A-10 ground attack aircraft right now. That work is for U.S. Air Force aircraft only, but Japan is just starting their F-15 retrofits and Saudi Arabia is getting ready to sign a contract to start retrofitting their fleet. Meanwhile, Boeing still has sales campaigns for new F-15s with Saudi Arabia and South Korea. We have also not given up looking at new applications for metallic GRID-LOCK with the U.S. Navy on the F/A-18 Hornet fighter jet and the V-22 Osprey helicopter.

Additionally, we utilize our LID (liquid interface diffusion) bonding technology on the titanium engine bay doors and keel panels for the F-22 Raptor advanced tactical fighter. But that program is in a wind-down phase; we only have about another year and a half to go. It's been a great program for us from a number of perspectives -- customer, volume, use of the Lean tools, profitability, etc. We hate to see it go away, but the end is on the horizon.

Finally, it's been a good year for our Engineered Polymer Products (*EPP*) value stream in Jacksonville, Florida. They recently announced a contract to provide a variety of components for the U.S. Navy's Virginia Class nuclear fast attack submarines, such as the bow dome and sonar and weapons equipment. They also announced a follow-on contract to provide composite components for the Spanish Navy's new fleet of S-80 submarines.

For the last few years, military programs have accounted for about five percent of Aerostructures revenue. What's the goal?

The Aerostructures Strategic Plan calls for us to double our revenue contribution in the next four to five years, bringing our share of Aerostructures revenue to close to seven percent.

Along those same lines, one of Goodrich's objectives is to position for new programs in order to grow the military market. What steps are you taking to do that and which programs are you eyeing?

One major program we're keeping a close watch on is the U.S. Air Force tanker program - which is focused on replacing the KC-135 tankers currently used for air-to-air refueling. These "flying gas stations" for the U.S. military have been in use for nearly 50 years. There are two competing teams. One is from Boeing and features the 767 as the platform. The other is a team made up of Northrop Grumman and the European Aeronautic Defence and Space (EADS) Company -- the defense part of the Airbus parent company. This team would use the A330 as the platform. The selection has been a political football for several years now. We would have content only if the Northrop Grumman/EADS team wins the competition because we would do the nacelles for the GE CF6-80E engines . . . as well as quick engine change (QEC) kits. Selection is scheduled for this year. But it's anybody's guess on when the dust will finally settle on that program.



"We're looking at doing helicopter rotor blades in a different way than they've historically been done, taking advantage of GRID-LOCK technology and cellular construction," according to Military Programs Vice President Tim Dumbauld. "There are a lot of helicopters out there today and a lot more to be built in the future, plus aftermarket, so this market holds great potential for us."
(Photo by Randy Stambook)

Our metallic GRID-LOCK work is tailing off, but developing composite GRID-LOCK fixed wing structures for fighter aircraft and military helicopters represents a promising market opportunity. What's our rough plan of attack for maturing this technology and marketing it to the military?

From a Research & Development standpoint, we are indeed looking at composite GRID-LOCK and how we can take it to the next level.

The Air Force has committed to flying a composite Horizontal Inboard Box on an F-15 for a fixed-wing structure proof of concept program. We just had the internal PDR (preliminary design review) for that effort. We're also looking at other opportunities where we could help reduce the weight of airplane flight control surfaces through use of composite GRID-LOCK technology. Some of those may be the same surfaces that we're currently using metallic GRID-LOCK on.

Then there are helicopter rotor blades. While helicopter blades can be either metallic or composite, the big carrot is in composite GRID-LOCK main rotor blades. We recognize that we need to partner with an original equipment manufacturer to help us get through the initial application of the technology on helicopter rotor blades. Some OEMs do their own rotor blades, while others will outsource it. There's a lot of "dark art" involved in designing a rotor blade and we think we have a better mousetrap. We enlisted the help of an expert on rotor blades from a leading university to validate our concept. We're looking at doing rotor blades in a different way than they've historically been done, taking advantage of GRID-LOCK technology and cellular construction. It won't be just another rotor blade. It's a unique design.



Aerostructures is working with Bell Helicopter on a metallic GRID-LOCK tail rotor blade for its UH-1 "Huey" platform (pictured above). The plan is for Bell to conduct a flight test of the tail rotor blade compatible with the Huey platform to provide the structural and performance data necessary to develop the first generation of composite GRID-LOCK rotor blades.

Initially, we're focusing our efforts on tail rotor blades because they're a little less flight critical and there are some metallic ones out there we could replace. (*Note: Tail rotor blades are much smaller than a helicopter's main rotor blades and serve several purposes. They provide the pilot with directional control to help steer the helicopter. In addition, they counter the torque - or rotational force - generated by the main rotor blades. Without this compensating force or "antitorque," a helicopter would spin around uncontrollably upon leaving the ground.*) In contrast, the main rotor blade, which provides both thrust and lift, is a highly complex structure.

There are a lot of helicopters out there today and a lot more to be built in the future, plus aftermarket, so this market holds great potential for us. At an enterprise level, it's also a market that Goodrich wants to pay more attention to.

The unmanned aerial vehicle (UAV) market also seems to be booming -- with increased use of drones in Afghanistan and along the Afghanistan/Pakistan borders. What are our plans, if any, to develop content for this product line?

We are definitely keeping a very close eye on the market. The issue there is that content for UAVs is smaller, less complex, and less sophisticated than our traditional nacelle products. We have done some work in high-temperature composites for some of the higher-speed and supersonic UAVs, however. There's no really new technology there, we're just trying to see if there's a home for either our high-temperature composites or for GRID-LOCK structures.

It's still an immature market; nobody is sure how many there are going to be and how many of any specific type they're going to build. New ones come out of the woodwork and go away just about as fast. Over the years, we've dabbled, but it seems to be a rather confused market and a lot lower tech than what we're used to.

You've now worked on both the commercial and military sides of the house. What's the difference when it comes to how business development is handled?

If you stand far enough back, it's really not that different. Our job is to anticipate the needs of our customers, to understand their requirements, and guide them to a solution. There are different rules for engaging a military customer -- especially in the areas of business practices, intellectual property, and patents. But, ultimately, you're trying to help your customer figure out what they're looking for - and then get there first with the product ahead of the competition. It works the same on both sides of our business.

As far as funding, your customers are dependent on their governments providing money for their programs. In the case of the U.S., there was some concern going into last year that the new administration might curtail military spending. Has that come to pass, and what's the expectation going forward?

I've been surprised that the Department of Defense has fared as well as it has this year. In fact, there have been reports that the Obama administration could increase the defense budget by \$100 billion as part of its five-year plan. I think the fact that President Obama kept Secretary of Defense Robert Gates in place from the prior administration has been positive . . . it has provided some continuity and removed a lot of the politics, which is especially important since we're engaged in two wars. From the big-picture defense budget perspective, I don't think there's a whole lot that's going to change in the near- to mid-term, though.

Finally, last fall you brought a dedicated Lean resource into your value stream. What is the significance of creating that position and what does it tell us about Military Programs' Lean journey . . . past and future?

Marsha Baker joined our team to help us along the next steps in our Lean journey -- particularly with Lean Product Development. And we're doing well in that regard. As an example, Boeing just conducted a Lean audit in Foley and stated that our C-5M pylon assembly line is world class in its application of Point of Use tools. This was after a very concentrated effort to ensure we minimized Foreign Object Damage during our program restart efforts. By the way, JSTARS will be one of the first programs to make full use of the Goodrich Lean Product Development System that was recently rolled out.

We're also going to put a renewed effort into our Lean journey at the EPP facility. They've done a great job since joining Aerostructures, but we want to redouble and refocus our efforts there to take it to the next level.

We've even had an impact on some of our customers. The Fleet Replacement Center at the North Island Naval Air Station here in San Diego embarked on a Lean journey several years ago and they credit Aerostructures with helping put them on that path. We're open to opportunities to working with them, maybe doing a public/private partnership down the road when it comes to helping them advance along their Lean journey.

C-5M team delivers its first nacelle since program restart, looks ahead to a steady stream of deliveries this year

When Foley's C-5M RERP (Reliability Enhancement and Re-engining Program) team delivered a nacelle to customer General Electric during last year's fourth quarter, several milestones were realized. For one thing, the nacelle delivery was the first to GE (for *its* customer, Lockheed Martin) since the military transport upgrade program shifted from "dormant" to "full restart" status in 2007. But the delivery also represented something more -- the achievement of an ambitious goal set by Foley C-5M Operations Manager Don Chesscher.

Chesscher -- in a February 2009 interview concerning the late 2008 delivery of the first C-5M pylon since the program's restart -- noted: "Our team goal is to establish a new Least Waste Way. We want to improve our processes and reduce cost associated with excess inventory. I'm confident that the team we have is going to be able to do all that and more."

Chesscher's confidence was well placed. Diligent application of the Lean tools has helped the Foley team significantly reduce cycle time, address program restart issues in real time, and mistake proof the nacelle assembly process.

The nacelle team had a good model to follow.

Like starting a new program

"The C-5M contract with Lockheed Martin includes nearly 200 pylons," according to C-5M Pylon & Nacelle Value Stream Leader Peter Martin. "The nacelle lagged the pylon restart by 10 months . . . and both had been out of production for more than three years. All restarts - especially after two years - are basically the same as starting a new program. Any changes to engineering have to be released and validated, tooling (both supplier and internal) needs to be validated, Standard Work needs to be written and validated, cell layout events need to be conducted to ensure Least Waste Way flow and linkage, suppliers need to be selected, and first article inspections have to be completed on all parts. We used exactly the same Lean tools on the nacelle program as we did on the pylons. We managed the program startup with the Least Waste Way Program Plan, Impact Matrix, Deliverables Map and the Risk Register. The team met almost daily and -- as issues arose -- they were addressed real time in the C-5M Obeya Room using the Lean tools, such as real-time problem resolution."

Another one of the Lean tools the Foley team relied on was *kanbans* - visuals which trigger production of components and subassemblies based upon notification of demand from a subsequent operation. In fact, the nacelle team held a kanban event prior to the restart of C-5M nacelle production.

"We built two sets of kanbans for both parts and fasteners. One set was for the dispatcher to fill, while the other set was for the engine in work. Each engine has 19 individual kanbans for parts and 19 kanbans for fasteners. Parts for the kanban only fit in their space on the foam boards we built and only the exact quantity of parts required per engineering are on the boards," Chesscher explained. "Each numbered fastener kanban corresponds to the same number part kanban, and -- like the parts kanbans -- they are also filled with the exact number of fasteners required per engineering. The mechanics pull the kanbans in sequential order, which is also reflected in their Standard Work. When the Number 1 part kanban is complete, the number 1 fastener kanban should be empty. This process mistake-proofs the assembly and ensures no FOD (Foreign Object Debris) is left in the engine."



A proud Foley C-5M team poses in front of the first nacelle delivered to General Electric since 2007. Pictured in the front row (left to right) are: Marti Dixon, cell leader; Jane Martin, program quality engineer; Gail Green-Aguon, PC production control coordinator; Pam Campbell, quality control inspector; Latonya Lanier, dispatcher; and Karen Keenan, manufacturing engineer. Pictured in the back row (from left to right) are: Alan Meeker, systems mechanic; Randy Syper, team leader; Peter Martin, C-5M Value Stream leader; Curtis Webb, systems mechanic; and Don Chesscher, Operations manager.

Chesscher added that the nacelle team took another step that resulted in a notable reduction in cycle time.

"We had a rate readiness event, as well as cell layout and shipping events, prior to the restart of C-5M nacelle production," he said. "These events helped to ensure the nacelle area and team would be ready for the engine buildup and A-frame activities on the first unit. We were then able to prove A-frame repeatability on the first engine and, given the results from the SDD (System Development and Demonstration) phase of the program, GE waived the requirement to continue the A-frame checks. Lockheed Martin may still want to check a second unit in the future, but -- for now -- we are no longer required to perform those extensive inspection requirements. This will take as much as four days out of our cycle time."

Nacelle production will parallel that of the pylons -- with an initial production rate set at one per month this year. But the Foley C-5M nacelle team is also emulating the success of the C-5M pylon team in another respect.

"Both our customer -- GE -- and their customer -- Lockheed Martin -- were on hand for the delivery in October. They were very pleased with the first nacelle system and we look for that satisfaction to continue as our rate ramps in 2010," said Martin.

Added Chesscher: "We experienced typical restart disruptions that you would normally experience after a multi-year shutdown. None of these was major, however, and -- with the customer's help -- we were able to work through each one in a timely manner."

Job shadow day helps college engineering students get a taste of life at Aerostructures

Participating in a day of job shadowing for college students involves a small investment of time by Aerostructures. But the potential benefits down the road could be significant to the company's competitive future as it seeks new graduates to fill the shoes of a maturing - and retiring - engineering work force. This is one reason the Chula Vista facility hosted several engineering majors in December under the auspices of the MESA (Mathematics, Engineering, and Science Achievement) program.

The MESA program helps students from groups that have had historically low scholastic attainment to graduate from a four-year institution with that all-important college degree. For the past several years, Aerostructures has



Second-year engineering student Kiedra Taylor recently spent the day with Design/Project Associate Engineer Michael Scamardo as part of a job shadow day for students participating in the MESA (Mathematics, Engineering, and Science Achievement) Alliance. Taylor is majoring in aerospace engineering and said her day at Aerostructures was "thrilling." (Photo by R. Stambook)

supported the MESA Alliance -- which is a collaboration of MESA programs at San Diego City College, San Diego State University, and Southwestern College. In addition to scholarship support, the company also provides opportunities for a day of job shadowing for a handful of students.

"We could not provide Shadow Day, and other professional development components, without the direct involvement of the companies like Goodrich, as well as county and state engineering firms," according to Natasha Celise of the MESA Engineering Program at San Diego State University's College of Engineering. "Job shadowing gives students an overall experience in which they get a first-hand look at engineering and science and how their studies apply to the real world."

And that's exactly what the MESA students hosted by Goodrich received during the job shadow day last month.



Greg Petrossian (left) was one of several Chula Vista employees who hosted a college student during a recent job shadow day. Here, the associate engineer - who works in A350 Loads -- explains how a thrust reverser system functions to freshman engineering student Adrian Cruz. (Photo by Randy Stambook)

Not exactly thrilled

The MESA Alliance automatically assigns students a participating company to visit. But when Kiedra Taylor -- an aerospace engineering major in her second year at City College with plans to transfer to a four-year university -- first learned she would be heading to Goodrich, she was not exactly thrilled.

"After I signed up for Shadow Day, I got an e-mail saying: 'Congratulations, you're going to be going to Goodrich!' The first thing I thought of was tires. Are they serious? They're sending me to a tire company?" Taylor said. "Then, I Googled the company to find out what was going on and I was shocked. There is such a wealth of information on the web site and Goodrich is into so many things. It turned out to be an almost perfect fit for me because Goodrich is not focused on any single solitary item, it's into so many great things that are strategically connected."

Taylor, who is a little older than the typical second-year college student, said her age enabled her to have a greater appreciation for the work being done at Aerostructures.

"I can remember the initial excitement of going into space and discovering new things. I've always been interested in that. I like being part of something huge and the best way I can do that -- and be on the cutting edge -- is to be in aerospace," she said. "I truly believe we'll develop a science that will allow a colony of people to live on another planet. I hope my grandchildren will be a part of that; I want to be part of the science that gets that started for them."

Taylor, like the other MESA students, was paired with a member of Aerostructures' Associate Engineering Rotation Program - which gives recent college graduates hired by Aerostructures the opportunity to rotate through a variety of disciplines for a year before choosing a particular area as a career path. But before joining her assigned associate engineer, she and the other students were given a tour of Chula Vista's Test Labs, as well as Buildings 1 and 61. And being in close proximity to a 787 Dreamliner thrust reverser under assembly made a lasting impression on her.

"Building 61 was an eye opener. To see these products online is one thing. But to stand next to one is something totally different. And to get to touch the product was great," she said. "When I go back to school and I'm sitting in class solving problems, I'll have a better idea of what I'm learning . . . I'll know what I'm learning will be used for. And to sit with my shadow-mate was very interesting. He joked about how quiet it is here, but it's like a shiny new toy for me."

Taylor's shadow-mate was Michael Scamardo, a design/project engineer who joined the associate engineering program in July. He is currently working in the GTF program on bird strike testing, managing the project coordination. And he made sure that Taylor's time at Aerostructures was a good representation of what engineers do here on a daily basis.

"A light at the end of the tunnel"

"I gave her an overview on what I'd been working on with the GTF -- the bird strike tests, why we do them, and the goals of the upcoming tests. We also looked in TeamCenter at engineering changes I'd done while in Building 61," he said. "I then walked her through the check process, taking her to the manufacturing and stress engineers to get their approval signatures. It was good to show her the various steps we go through, to show that it isn't just one person looking at it, that it's multiple people going through the whole check system."

That fact that he is not all that far removed from being a student himself also gave Scamardo insight into ways to make Taylor's visit as meaningful as possible.

"I was able to encourage her that there was 'a light at the end of the tunnel,' that there's actual real-world application to what you're studying," he said "There are things you end up using in industry from your modeling, structures and thermodynamics classes. It actually does have a purpose down the line and hopefully that provides a little motivation to finish and get that piece of paper in your hand."

Taylor didn't need any convincing. Just a few hours at Aerostructures gave her a goal to shoot for.

"I'd love to be able to intern here. And I think it would be an awesome place to work when I graduate," she said.

Coming soon . . .

New Aerostructures president discusses his new assignment

On Dec. 18, Goodrich announced a leadership transition at Aerostructures -- with Marc Duvall (formerly vice president/general manager of Operations, Airbus Programs and Supply Chain) succeeding Greg Peters as president.

A detailed interview with Duvall about his immediate priorities and goals over the next several months, what he sees as the greatest challenges and opportunities facing Aerostructures at this point in time, and how we can best navigate the difficult year ahead will be featured in the January issue of *Around Aerostructures*.

Around Aerostructures also sat down with Peters, who is beginning a new assignment leading the corporation's operational excellence efforts, to discuss where we stand along the Lean journey he helped launch and what words of encouragement he has for his successor.

Watch for the January issue of *Around Aerostructures* later this month.

Tuition, fees, and room and board at public universities has jumped 46 percent in the last decade . . . but the *Goodrich Aerostructures Scholarship Program* can help

The cost of a college education has increased dramatically in the past 10 years. According to data from the non-profit *College Board* -- which tracks college costs -- tuition, fees, and room and board at four-year public schools rose from an average of \$10,440 in 1999-2000 to \$15,210 last year. For private four-year schools, costs rose 28 percent in that period. Fortunately for Aerostructures employees, financial assistance is available. Each year, college-bound children of employees have a chance to compete for up to three four-year scholarships paying up to \$4,000 annually for tuition and fees associated with tuition -- plus \$1,000 in discretionary funds annually. Up to seven scholarship grants of \$1,000 annually are also available.

If you have a high school senior at home, you have until *Wednesday, March 31* to submit a 2010 Goodrich Aerostructures Scholarship application. In Chula Vista, completed applications and official high school transcripts must be returned to Liz Young at Mail Zone 99-B in Building 99. At all other locations, submit completed applications to local Human Resources departments.

In Chula Vista, applications are available at the following locations:

- Building 99 lobby
- Building 107 main, south and Purchasing lobbies
- Communication Centers in Buildings 1, 29, Cafe 33, 50 and 61



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More details to come!

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Goodrich

Blood Drive

Wednesday, January 20, 2010

6:30 am to 4:30 pm

Location:

BLDG #107, South Lobby Parking Lot from 6:30 am – 4:30 pm

To make an appointment, please log onto the Goodrich Home page under “What’s New” or contact Ashley Ridge at (619) 691-2271

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