Aerospace Components Manufacturers, Inc.
The World’s Aerospace Alley!
P.O. Box 736, 1090 Elm Street, Rocky Hill, CT 06067
(860) 513-3205  FAX (860) 529-5001
www.aerospacecomponents.org
E-mail: alsamuel@acm-ct.org
The ACM Update & Calendar (& previous issues) are also available on the website in the About ACM menu

ACM Update
January 27, 2017

Welcome New ACM Member

FMI Chemical, Inc.
4 Northwood Drive
Bloomfield, CT 06002
www.fmichemical.com
Bob Margolis, President

ACM starts out CY2017 with 111 member-firms!!

MEMBERSHIP
The World’s Aerospace Alley!

<table>
<thead>
<tr>
<th>Company</th>
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Business Development

- The Business Development Team met on January 12th at The Lyceum in Hartford. Team Leader Bruce Fiedorowicz (GKN) welcomed and thanked members for their interest, as exhibited by the best attendance at a Business Development Team meeting in a long time. In his opening comments, Bruce reflected on the last year which saw Airbus deliver 688 new aircraft, Boeing deliver 748 new aircraft and both corporations had their already large backlogs increase by CY2016 sales of an additional 731 aircraft for Airbus and 668 booked by Boeing. Bruce also introduced Bob Margolis, President of FMI Chemical (Bloomfield), ACM’s newest and 111th member firm!

Next, Bruce introduced the meeting’s guest speaker, William Reid, Pratt & Whitney Strategic Sourcing Manager, Airfoil Castings, Forgings & Mill Products (William.v.Reid@pw.utc.com).

Bill Reid began by advising that in addition to the long list of material responsibilities already in his job title, he now has the added responsibility for structural castings. Bill manages seven strategic sourcing managers whose basic tasks are to ‘get the contracts in place and manage their execution’. He provided an overview of P&W’s current production schedule; the military F135 program will deliver 98 engines in CY2017, 110 in CY2018 and continue to increase to deliveries of ~200 engines per year by CY2022. The commercial Geared Turbofan (GTF) family has a growing sales backlog of well over 7000 engines and will deliver over 500 in CY2017, 950 in CY2018 and 1,165 engines in CY2019.

Reid stressed how P&W is putting everything in place to be production capable to support these rates, with every part now dual-sourced. In Bill’s specific area of responsibility, strategic contracts have been negotiated as far back into the material supply chain as metallic ore mines and mills, in addition to the traditional forging and casting houses. Having such far-reaching agreements allows P&W to “aggregate the buy and link value-streams” to establish a level of confidence in an adequate supply and long term price stability. Of great significance is a relatively new policy at P&W which requires the entire material supply chain to be either P&W LCS (laboratory controlled source) or AS9100 approved; waivers, common in the past, will no longer be approved other than in very rare cases. P&W is tasking metals distributors to be their LCS points-of-contact and to provide corrective action plans for cases where LCS or AS9100 is not possible. Further, it is P&W’s expectation for the entire material supply chain to become qualified as PWGold!

Update on Industry Meetings / Tradeshows
- PNAA (Pacific Northwest Aerospace Alliance) Conference, Seattle, Feb 13-17
- Sikorsky Supplier Programs Conference (invitation only), Palm Beach Gardens, FL, March 29-31st
- MRO Americas, Orlando, April 25-27th
- Eastec (Eastern States Exposition, West Springfield, MA, May 16-18th

Allen Samuel presented the ACM Annual Business Survey which aggregates CY2016 results of ACM member firms and compares their projections for CY2017 regarding Sales, Market Content, Employment and Factory Size. Al noted a ‘non-scientific’ nature to the survey, given a different number of companies, and different companies, respond each year. Yet, according to Al, the Survey’s trends should accurately reflect the local aerospace industry. The Survey’s data was based on inputs received from 65 ACM firms plus Al’s conservative estimate for 15 additional firms. In summary, were all (111) ACM firms to respond, Total Sales exceed $3 Billion, with a 9.5% increase projected for CY2017; annual Sales between ACM members is ~$100 Million; total Factory space exceeds 8 million square feet; and, Total Employment exceeds 9000 persons with a 6% increase projected by the end of CY2017.

Note, data presented in the numeric summary (below) indicating “% Sales by Market” and “% Sales U.S. vs Export” has been updated and is more accurate than the chart included with the Meeting’s Minutes.
ACM Survey Results – Year to Year Sales and Employment

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<tr>
<th>CY 2016</th>
<th>CY 2017</th>
<th>% Change</th>
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<td><strong>SALES &amp; MARKETS</strong></td>
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<tr>
<td>$'s-Total Annual Sales: $2,360,791,359</td>
<td>$2,585,890,877</td>
<td>9.53%</td>
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<td>$'s-Sales Volume w/ UTC: $472,434,131</td>
<td>$531,442,649</td>
<td>12%</td>
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<tr>
<td>$'s-Sales Volume w/ General Electric: $390,049,798</td>
<td>$332,421,934</td>
<td>15%</td>
</tr>
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<td>$'s-Sales Volume w/ Rolls-Royce: $101,749,208</td>
<td>$113,032,248</td>
<td>11%</td>
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<tr>
<td>$'s-Sales you RECEIVE from OTHER ACM members $43,045,000</td>
<td>$45,000,000</td>
<td>5%</td>
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<tr>
<td>$'s-Sales you PLACE with OTHER ACM members $46,677,230</td>
<td>$52,564,991</td>
<td>13%</td>
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<td>Based on Total Annual Sales:</td>
<td></td>
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<tr>
<td>% Sales Commi Aerospace 44.38%</td>
<td>44.91%</td>
<td>1.20%</td>
</tr>
<tr>
<td>% Sales Military Aerospace 29.96%</td>
<td>30.05%</td>
<td>0.30%</td>
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<tr>
<td>% Sales Ground Turbine 4.93%</td>
<td>4.85%</td>
<td>-1.70%</td>
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<tr>
<td>% Sales Other 20.73%</td>
<td>20.19%</td>
<td>-2.58%</td>
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<td>Total 100.00%</td>
<td>100.00%</td>
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<tr>
<td>% Sales in U.S. 81.50%</td>
<td>83.10%</td>
<td>1.60%</td>
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<tr>
<td>% Sales Export 18.50%</td>
<td>16.90%</td>
<td>-8.66%</td>
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<td>Total 100.00%</td>
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<th>CY 2016</th>
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<th>% Change</th>
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<td><strong>Sales per Employee (average)</strong></td>
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<tr>
<td>All Firms Responding: $299,765</td>
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<td>Manufacturing Firms, only: $214,461</td>
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<th>CY 2017</th>
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<td><strong>PLANT FACILITY</strong></td>
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<td>Square Footage</td>
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</table>

ACM’s Firms Do over ~$100 Million of Business with each other, Annually!
ACM’s Firms have over 9,000 Employees!
ACM’s Firms Generate ~$3 Billion in Annual Sales!
The next meeting of the Business Development Team will take place on Wednesday, March 8th at 8:00am at The Lyceum (227 Lawrence Street) in Hartford.

**Mitsubishi delays MRJ deliveries by two years**

By: Mavis Toh, Singapore  
January 23, 2017

Mitsubishi Heavy Industries has confirmed a two-year delay to the MRJ regional jet programme, the fifth time its schedule has been pushed back since launching in 2008. The first MRJ90 is now targeted to be delivered to All Nippon Airways in mid-2020, from a former goal of mid-2018.

“The change is due to revisions of certain systems and electrical configurations on the aircraft to meet the latest requirements for certification,” says MHI and Mitsubishi Aircraft in a joint statement. It emphasized that the design changes will not affect the aircraft’s structure, nor its performance, fuel consumption or the functionality of its systems.

Mitsubishi has commitments for 427 aircraft, comprised of 233 firm orders, 170 options and 24 purchase rights.  
SOURCE: FlightGlobal PRO

**ANALYSIS: Big two saw 2016 orders fall, but output hit new high**

BY: Max Kingsley-Jones, London  
January 12, 2017

There is no sign of any let-up in airliner production as Airbus and Boeing continue to raise output to record levels, despite what looks likely to be a sustained fall in new aircraft orders. Between them, the big two airframers achieved a slight rise in overall output last year from 1,397 deliveries to an industry record of 1,436 aircraft, but combined net orders declined almost a quarter.

Although Boeing saw a slight decline to 748 deliveries from 762 in 2015, it was still firmly in charge in output terms. Airbus's production increase more than offset the Boeing drop, as its production rose to 688 aircraft from 635. This means that overall output across the mainline manufacturers' plants has consistently increased every year since 2011. Although Airbus still trailed its rival by 80 units, it has narrowed Boeing's market-share advantage from almost 55% to 52% in 2016. This was helped by the European manufacturer's busy December, during which it shipped an impressive 111 aircraft.

Airbus will disclose its detailed 2017 production plans in February, but its chief operating officer for customers John Leahy said at its annual press conference in Toulouse on 11 January that production would be "at least over 700 aircraft". Boeing is expected to match or exceed 2016's output, so combined production will be heading towards 1,500 units or more this year.

But while output is rising, the same is not true of net orders, which have fallen almost 25% to 1,399 units: Airbus's tally fell a third, while Boeing's dropped 13%. Airbus again led the sales race with 731 net orders, giving it a 52% share, compared with 668 for Boeing. The US manufacturer booked a hundred fewer orders than in 2015 and fell short of its commercial aircraft orders goal, having set a target of about 740 for the year.

---Continued on Page 11---
Pratt’s production surge brings major changes to state’s aerospace suppliers
By: Howard French January 16, 2017

Colin Cooper, CEO of Eastford’s Whitcraft Group and longtime ACM member, once described Connecticut’s aerospace industry as “a mile wide and an inch deep.”

What he meant by that, Cooper said, is that smaller suppliers like his company would see low-volume demand for a few parts that required complex manufacturing techniques but had limited financial rewards. That’s changing significantly, Cooper said recently, due to increased production of engines like Pratt & Whitney’s geared turbo fan, used on aircraft including the popular Airbus A320neo line. Whitcraft makes more than 200 parts for each of those engines, he said. The company signed a 10-year, $234 million contract in 2015 to supply parts and assemblies to Pratt.

Pratt President Robert F. Leduc predicts production will surge over the next 10 years or so to as much as $1 trillion in engine contracts — a level not seen since World War II.

Hand-in-hand with the growing demand, Cooper said, is a need for more highly skilled workers. His company draws from a wide area — from Norwich to Manchester and even across the state line from Massachusetts. Whitcraft has around 500 workers at three plants, about 350 at the main Eastford plant. That’s an increase of more than 30 workers from just a year or two ago — and the company’s still growing. Whitcraft makes sheet metal components and assemblies at its Eastford plant, as well as precision machined parts and assemblies at its Connecticut Tool plant in Plainville and its Dell Manufacturing facility in Farmington.

At one time, Pratt and other major manufacturers provided their own apprentice programs, taking inexperienced new hires and training them to be highly capable aerospace workers. “Fifteen years ago or more, that’s how things were,” Cooper said. The bigger companies gradually dropped such programs as part of efforts to trim costs, forcing subcontractors like Whitcraft to start apprenticeship programs of their own.

More recently, Cooper said, the state’s educational system has begun training workers through state-backed programs. Cooper praised the state for its efforts, which now extend from the technical high schools through engineering programs at the University of Connecticut.

But Connecticut and its industries need to go a step further, he said, teaching middle school students and their parents about the benefits of an industrial career and the realities of 21st century manufacturing. “We need to show them that today’s manufacturing is a career path, and the work is done in clean, well-lit, quiet” environments, he added. Plants no longer fit the picture of the dark, noisy, and grimy workplaces of the past.

The state’s sometimes-criticized use of tax abatements and financial incentives to retain major companies also is important, he said. “We get approached all the time,” Cooper said, by states seeking to lure his business out of Connecticut. And despite its reputation as a costly place to do business, the Nutmeg State is a highly desirable location for companies like Whitcraft, Cooper said.

One reason is the proximity to the companies that subcontractors deal with, such as Pratt, Stratford-based Sikorsky Aircraft, and United Technologies Aerospace Systems in Windsor Locks.

The second major factor, he said, is the state’s still sizeable reservoir of highly skilled workers. That’s why, Cooper said, it’s vital that the state continues to support and expand its manufacturing-related educational programs.

If he had any advice for the state legislature as it grapples with ongoing fiscal issues, he said, it would be to make certain that Connecticut continues to fund fully and enthusiastically support those educational initiatives. “It’s absolutely critical and vital,” Cooper said.

SOURCE: JournallInquirer.com
Progressive Manufacturing

- The Progressive Manufacturing Team will meet on Wednesday, February 22nd at 8:00am at Eversource Energy (107 Selden Street, Berlin, CT); enter Main Bldg near Dutch Point Credit Union. Eversource experts will provide an overview of its 2017 energy efficiency programs, as well as a glimpse into how Connecticut manufacturers are using these programs to make their plants and processes the most efficient in world. The presentation will provide attendees with case studies on how manufacturers used the energy efficiency programs to improve their bottom line.
Note: This meeting is open to ALL ACM members!

- The Progressive Manufacturing Team will meet on Wednesday, March 22nd at 8:00am at The Lyceum (227 Lawrence Street) in Hartford.
This meeting, organized in response to member’s requests, will discuss varied issues of ERP (Enterprise Resource Planning) Systems, including, what are ERP systems and how are they deployed; how best to “grow” from a small, perhaps older system, to a more modern ERP software package; current systems being used at ACM members; sharing of experiences, insights and recommendations regarding MRP in general, and specific software systems.
A detailed agenda will be sent to members via email; please Save this Date!!

Purchasing

- The next meeting of the Purchasing Team will take place on Tuesday, March 21st at 8:00am at Consolidated Industries in Cheshire, CT.
As has been the Team’s practice, this will be an informational meeting to present another of our ACM member firm’s manufacturing and/or processing capabilities. Please take the opportunity to attend, participate and learn about Consolidated Industries advanced forging capability.

- Please contact Team Leader Kirk Smallidge (United Performance Metals) at ksmallidge@upmet.com or the ACM Office if you wish to host a meeting and present your firm’s capabilities to the Team’s members.

Workforce Development

- The WorkForce Development Team met at Accuturn Manufacturing in South Windsor on January 18th. Team members reviewed the current incumbent worker training courses being offered:

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<th>No. of Days</th>
<th>Date (End)</th>
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<th>Participants</th>
<th>Provider Company</th>
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Please advise the ACM Office of your training requests at 860-513-3205 or alsamuel@acm-ct.org.

Members discussed a variety of issues, including participation by ACM firms at local high schools to create awareness about modern aerospace manufacturing careers, and how to best promote the November 2017 ACM Future WorkForce Opportunities Fair to schools and simultaneously reach-out to parent organizations.

- The next meeting of the WorkForce Development Team will take place on Thursday, March 16th at 8:00am at Har-Conn Chrome Co. in West Hartford.
I hear it all the time. "We can't find people to fill our positions..."

As a professional involved in Manufacturing for the past twenty years, I've noticed a few trends in the industry. One of these trends is the dwindling supply of qualified CNC Programmers, Setup Machinists, and Machine Operators. Since I've spent a lot of my time training people over the last 16 years, I thought I'd share some insights on what it takes to not only hire good people, but also retain them. (Which is arguably more important than the initial hiring.) In the interest of disclosure, this post is aimed at the Management of a manufacturing company. I'll be doing a follow-up post that will be directed at Machinists and Programmers that are looking for ways to advance their careers in their chosen industry. So if you're one of the latter group of folks, please be patient. I do think it is valuable to consider both sides of the coin, so you may gain some insight from this post as well...

What are you offering? Pay is important, but I'd argue that it is only a small part of the overall equation.

I find there to be a vast difference between different areas of the country, but also different mindsets of management and ownership with regards to how much various positions should earn. It would be easy for me to say "just pay people more...", but that of course is an easy answer to give. One of the issues that I find most curious, is the attitude I've encountered at numerous shops that an "Operator" isn't worth very much. While this can be attributed to a lack of skill on the part of a new hire, it also says a lot about the culture of the company, and the lack of opportunity for advancement for many of the young people starting out in our industry. Say what you will about Unions, but the reason many of them started was to provide a framework for advancement, and to ensure that people earned a living wage. It also brought about things like the 40-hr work week.

Of course pay is important, so let's start with that.

I hear many shop owners and managers say "well, this is all we can afford to pay for a starting wage". Why? Is it due to your culture (don't want to upset existing employees?), or just the bottom line? I understand the pressures of price and the value proposition of manufacturing. I also see a lot of shops that are stuck in the 80's or 90's mentality, and have refused to update their technology, or buy new machinery. Even worse, many of them do buy new machines, but let their operators dictate how efficient those machines are being run. From turning down the feed rates, or simply setting the Rapid Override at 10-25%, these attitudes (or in some cases pure laziness) are hamstringing your company. How many hours does your spindle run per shift? And is the actual "running" of that machine at maximum efficiency?

I deal with a lot of shops where the planners and management are expecting 70% spindle utilization, but are maybe getting half that, if they are lucky. Obviously there is a major disconnect somewhere. If that spindle was cutting twice as many chips per hour, or you were shipping twice as many parts, could you afford to pay your people more? Of course you could. And the offset in higher wages would be more than made up in higher overall profits for your company. This is what makes Cell Systems (that are properly managed) so attractive. It is possible to get 90% spindle utilization (or more) out of a well-run system. My friend Jason Vice ran a cell system for years, and clocked 96% spindle utilization on a regular basis. (The 4% was weekly scheduled maintenance, and is absolutely essential.) That machine was only down 4 hours per week. There are 168 hours in a week, but the rest of the time, that spindle was cutting chips, 24-7. (Pallet changes notwithstanding.) So what does that kind of efficiency bring? That Cell System paid the entire shop's payroll on a weekly basis. For around 20 Machinists. That's saying something. When Jason left, their spindle utilization dropped by 20-30% on a weekly basis, almost instantly. Even though Jason stayed on to help train the new cell operators. (Plus, it took 3 guys to do the work that he was doing by himself.) How much money was lost because the owner didn't want to give a couple dollar an hour raise? Of course, getting to the point where a cell runs at that kind of efficiency requires knowledgeable, skilled people, and a willingness to invest in technology.

—continued on Page 10—
News from ACM Members
Please forward significant company news and announcements to Allen Samuel at alsamuel@acm-ct.org for posting on the ACM website and publication in the UPDATE

UNITED PERFORMANCE METALS ANNOUNCES INTEGRATION OF FOUR ONI AFFILIATES


As a result of the integration, UPM's inventory will include stainless steel, duplex stainless steel, Prodec®, nickel alloys, cobalt alloys, cobalt chrome moly, titanium, aluminum and alloy steel in coil, sheet, strip, plate, bar and near net shapes. The newly formed high performance metals company serves a broad range of customers in industries including, but not limited to: aerospace, fastener, medical, power generation, oil and gas, and semi-conductors among others.

“We are committed to long-term success for the customers and markets we serve,” says UPM President Tom Kennard. “The merger of our companies allows us to offer a broader range of products and services through integrated sales and operations, providing quality solutions to each customer we serve.”

UPM uses proprietary FIRSTCUT+® Processing Services that include cut-to-length, leveling, slitting, edging, chamfering & facing, shearing, laser cutting, laser gauge measurement, water jet cutting, plasma cutting, sawing, precision cold saw cutting, precision blanks, first stage machining, heat treating, ultra-sonic testing, boring, trepanning, and deburring.

Headquartered in Cincinnati, Ohio, UPM has facilities in: Oakland, California; Los Angeles, California; Hartford, Connecticut; Chicago, Illinois; Cincinnati, Ohio; Greenville, South Carolina; Houston, Texas; with international facilities in Singapore, Hungary, and Northern Ireland.

For more information, call 888.282.3292 or visit www.upmet.com.

DoD Announces Award of New Advanced Robotics Manufacturing (ARM) Innovation Hub in Pittsburgh, PA

I’m very pleased to announce that Connecticut is part of the team led by Carnegie Mellon University that was selected by the DoD to lead the Advanced Robotics Manufacturing (ARM) Institute. I would like to thank all of you for your strong support on this effort which was absolutely critical to the success of our proposal. Amongst the states included, Connecticut is very well represented by our industry, academic, government and nonprofit partners. Robotic manufacturing is becoming increasingly important to our aerospace and shipbuilding industries and I anticipate that Connecticut will play a leading role in this new national institute.

It will take several months for the new institute to become operational. In the meanwhile, we will keep you posted on all developments. We will also begin planning events to help organize Connecticut ARM activities.

Thank you again for your strong support. We look forward to working with you on this new initiative.

Professor Michael Accorsi
Senior Associate Dean
School of Engineering, University of Connecticut


ACM looks forward to supporting UCONN in this effort!
Here are the reasons you can’t find a CNC Programmer or Machinist.
—Continued from Page 8—

So yes, pay is important. It is after all, a person's (and potentially their family's), livelihood. But that pay should also reflect the skill level of the person you are hiring. There is nothing wrong with asking someone at a high level of skill to prove their worth. But there should still be a path for growth for that person. Don’t expect that as a high level employee gets hired, that their wages will remain static. Especially if they are investing their own time and money in learning new skills, or making you more money. Set goals for them, or involve them in the process of setting goals for wage growth. You would be amazed what an extra dollar or three per hour will gain you in loyalty.

The same thoughts should apply to the newest employees you hire.

How many times have you experienced churn at your shop? You bring a guy or gal in at the bottom, then invest time and money into integrating them into your culture, just to see them leave for a few more dollars an hour? Frustrating right? Here are the reasons I see this happen, from an employee’s perspective:

If your starting wage is really low, there is ample reason for your employees to look elsewhere. Periodically you should look at the starting wages for new hires and journeymen in your area, and see if you are below, at, or above the local market.

That said, money is not the most critical factor for lower-level employees. Opportunity for growth, and being praised for doing a good job are far more important. A sincere "Good job!" goes a long way towards keeping the good employees around. I have been in many shops that ruled their workforce by threat of CAM. (Corrective Action Memo) Rather than investing in their shop's culture, and making sure that all their employees had the resources to do their job well, the employees lived in fear of screwing up and being yelled at. That is not a recipe for success. If someone is working harder than everyone else, or doing an especially good job, you can reward them just by telling them what a great job they are doing. Besides praise, consider a reward system like small cash-based awards for the people that make great suggestions, or improve shop processes. At one of my first jobs, I suggested some improvements that cut nine minutes off a 45-min. machine cycle. The owner came up to me a week later, and sincerely thanked me, and then handed me a $50 bill. I also got a dollar an hour raise the following month. That $50 was nothing to him, but it meant an awful lot to me. Far more meaningful though was the praise I received.

What is the wage ceiling at your shop, and how does a junior operator get up to that level? How many years should it take? Or does it depend on the level of skill and work ethic that employee brings to the table? If there is no more opportunity for advancement, be it learning new skills or earning more money, then you risk losing that employee. What other opportunities are available for them to grow? Does your company pay for training or college? What about more responsibilities? Almost immediately when I started as a machine operator working in Aerospace, I had a desire to get into the programming office as a CNC Programmer. I left that company after a year and a half, once I realized that it would have taken me 15+ yrs to get an opportunity at programming in that company's culture. Evolve your culture, or let it choke your productivity. The choice is yours.

Technology is our future. But you must train your people to take advantage of it...

Are you investing in the technology to remain competitive, and training the skills to take advantage of the new machines and controls? Automation is what will make you competitive in today's market. We as a country cannot compete with Chinese or Indian wages. But through buying state-of-the-art machines and software, we don't have too. On the flip side of that coin though, the machine shop model of "Operators" doesn't work. Just paying someone $12 bucks an hour to load parts, deburr, and push a button is going by the wayside. In place of that model, Operators are increasingly becoming hi-tech workers. The lines are being blurred between operating a machine, and knowing how to optimize the increasingly complex machines that make you competitive. Are you trying out new cutting tools? If you are running modern cutting tools, with modern software, then you should be cutting Titanium at 100 IPM, and Aluminum at 600-1000 IPM. You can't make money with a million dollar machine if the operator is turning down the feed rate knob.

—continued on Page 11—
Here are the reasons you can't find a CNC Programmer or Machinist.
—Continued from Page 10—

That means that you've got to have the software that support newer High Speed and High Efficiency Machining strategies. Mastercam has made some huge strides in this arena over the last 10 years. There are other software packages that are also including some HSM strategies, but Mastercam seems to be on the forefront of developing the technology, and making it accessible to the average programmer. Other companies like Celerative Technologies (Makers of Volumill) offer a plug-in for many of the popular CAM programs on the market. For a small investment, it is possible to stick with your current CAM system, and yet add new HSM capabilities. HSMWorks has incorporated that strategy into the name of their product, and they also do a decent job of removing metal quickly.

It can be scary to program a job at 2-5 times the feed rates you are used to running. Scary for the Operator, scary for the Programmer, and scary for the Owner or Manager. But that shouldn't stop you from trying. The same can be said for incorporating robots into your operations. As the price of robots come down, and the technology becomes more accessible, the benefits for incorporating them into your shop become ever more apparent. As much as people need jobs, nobody enjoys repetitive monotony. Doing the same thing, over and over, day in, day out, gets old. So the idea that one higher-skilled employee can tend two, three, or ten machines that are loaded by robots becomes more feasible. That said, to get there, you'll have to invest in the capital expenses, but also in the employees that will become a mixture of Machine Operator and Engineer.

In addition to the newer machines and software that is needed, you should also think about retiring old machines when the value in them has been used up. An old machine, with an old control, is an anchor around your neck. I’ve heard so many times "but those machines are paid off. Why would I want to get rid of them?". Because the new machine you could put in its place would net you 10 times the productivity. It might take some painful months of growth, or a big loan from the bank to get there, but I promise if you don’t the shop owner down the street will. And you'll be left shutting the doors, and calling the auctioneer.

"It is not necessary to change. Survival isn't mandatory." -W. Edward Deming

Once you've made the decision to invest in new software or machines, you need to train your employees to take advantage of the new capabilities. Look to the Machine Tool Builder, the Software Developer, or a 3rd party consultant to get your employees up to speed. From formal classes to seminars, webinars to online courses, there are resources available to take advantage of these new tools. Invest in your productivity and your people, to see your profits soar. Look at your culture, make sure that your people are treated well and have opportunity for growth. You'll be glad you did.

SOURCE: LinkedIn

ANALYSIS: Big two saw 2016 orders fall, but output hit new high
—Continued from Page 5—

The combined sales performance equated to an industry book-to-bill ratio of just below one, with Airbus slightly above unity and Boeing slightly below. This was after adjustment for cancellations, which almost doubled in 2016, to 398, from 220 the year before. Airbus fared worse, suffering 218 order terminations – although a third of these were order swaps.

The industry net book-to-bill ratio has consistently been greater than one in recent years, and exceeded 2:1 in 2013 and 2014. Airbus has consistently been above one for the past six years, but Leahy acknowledges that the 1:1 ratio "looks like it can't be [achieved]" this year.

Flight Ascend Consultancy chief Rob Morris sees the industry heading for a sustained period with the ratio below unity, given the huge order backlogs at Airbus and Boeing. "In 2017 – and probably into 2018 and potentially 2019 and beyond – we would expect book-to-bill to be below one as production rates increase at both manufacturers and net order volumes remain close to or even below 2016 levels. As much as anything, the lower order volumes will be a reflection of limited near- and even medium-term slot availability, meaning airlines will simply wait a few years before ordering new aircraft, thus avoiding committing to high escalation clauses which would increase their pricing."

—continued on Page 12—
ANALYSIS: Big two saw 2016 orders fall, but output hit new high
—Continued from Page 11—

The overall year-end backlog declined for the first time since 2009, albeit only slightly, to 12,589 aircraft from 12,626 a year earlier. Airbus has maintained a lead over its rival, holding a 54% market share.

While overall net orders have varied dramatically over recent years from a low of 413 in 2009 to a high of 2,888 in 2014, Leahy emphasizes that Airbus has been managing its output consistently upwards. "People talk about the end of the cycle, but it depends what cycle you're talking about. I've got to admit, there is an orders cycle, there always has been. But the order and delivery cycle used to be matched almost one-to-one with about a two-year lag," he says. "But if I look at deliveries now, I don't see a cycle. [Airbus has] 14 years of increasing our production. And this year it will be another increase and record, but does that mean orders are going up again? Most likely not."

Morris describes the commercial aviation industry as "enduringly cyclical", noting: "Orders reflect the demand cycle. Production volumes reflect the supply cycle. If production volumes remain stable, there must be some other supply-side cycle. It's probably economic life, as we have seen through this cycle."

Boeing has led in the delivery stakes now for the past five years, and looks set to maintain this for at least a couple more. Airbus commercial aircraft president Fabrice Bregier reaffirms earlier statements that he expects Airbus will be ahead again from 2019, although he concedes that he was not aware of his rival's latest output forecasts.

Airbus will be encouraged that it is back in front in the single-aisle market, having dropped behind in 2015, but it still trails its rival significantly in the higher-value widebody stakes. In 2016, Boeing delivered 258 twin-aisles – 80% more than Airbus – which is still in ramp-up mode on the A350 and shipped a total of 143 widebodies.

"The most important measurement of market share is deliveries, which derive revenues. In this context we estimate Boeing achieved around 56% market share of commercial jet delivery value, compared with Airbus's 44%," says Morris.

"This year Boeing is again set to beat Airbus in this particular metric with a 53%-47% split. Parity is actually reached in 2018 before we forecast Airbus finally achieves market leadership with 52% of the combined revenues."

Morris expects Boeing should be back at parity by 2020 as 777 rates increase with the introduction of the 777X. "From there onwards, the two will probably run close together," he says.

The one Airbus widebody type that looks set to be produced in low numbers for at least the near term is the A380. Just two new orders (with a net figure of zero) were secured in 2016 and Airbus is reducing output to 12 a year. Bregier envisages that this rate will be maintained for several years but is optimistic that production could then rise as customer demand is spurred by increasing airport congestion and "evolutions of the A380 family".

SOURCE: FlightGlobal.com
THE SPRINGFIELD BULLDOG – GONE BUT NOT FORGOTTEN
An essay by
Bruce Fiedorowicz, GKN Aerospace, Newington

BOWLES FIELD, AGAWAM, MASSACHUSETTS – As the year 1932 unfolded, air racing enthusiasts across the nation and especially here in the city of Springfield, Massachusetts eagerly awaited the unveiling of the two most talked about racing airplanes of the era. The City of Springfield was home to the fastest racing airplanes in the world courtesy of the Granville Brothers and their famous Pratt & Whitney powered Gee-Bee racers. The Gee Bee Model Z had just won the prestigious Thompson Trophy race Labor Day weekend of 1931 with pilot Lowell Bayles at the controls. (Less than three months later Bayles was tragically killed and the Model Z totally destroyed in a world land speed record attempt at Wayne County Airport in Detroit).

Robert Hall was the chief engineer, designer and test pilot for the famous Granville Brothers Gee Bee racers from 1929 to 1931 and for Bayles’ Thompson Trophy victory, however a dispute with Zantford “Granny” Granville over airplane design had led to Hall’s departure in late 1931 to go it alone. Hall went across the Connecticut River from the Granville’s operation at Springfield Airport and established Springfield Aircraft Inc. in a small corner of a leased hanger at Bowles Field in Agawam. Here he would build his own Hall’s Racers.

In the winter of 1932, with two firm orders in hand, Hall went to work simultaneously on both aircraft. His first aircraft order was for wealthy sportsman Frank Lynch who planned to fly the new high wing Hall creation around the world in a record setting attempt. As June approached Hall looked to christen the new plane by entering it in the upcoming Niagara Falls International Air Races scheduled for the last weekend in June. The plane’s wild paint scheme resembled an insect and its green and cream design resembled a Mexican locust called a Cicada. The name stuck and this plane was to forever be remembered as the “Cicada”. Hall and the Cicada finished a disappointing fourth place in the 50 mile free-for-all event, however this plane wasn’t built to be a pylon racer. Hall then flew the craft back to Agawam to ready it for the big Bendix and Thompson Trophy races as part of Cleveland’s Labor Day National Air Races of 1932.

The second airplane built by Hall was under contract for Marion Price Guggenheim of the famous New York family well known for their philanthropy and support of all things aeronautical. It was to be piloted only by Russell Thaw, the chief pilot of the Guggenheim family who owned both a Lockheed Air Express and Lockheed Vega at the time. Mrs. Guggenheim christened this new airplane the “Bulldog”, in honor of the Yale University mascot (Yale Bulldog).

This new gull-winged designed speedster was said to be “the most beautiful aircraft ever constructed”. Hall was building it specifically to capture the Thompson Trophy and it was expected to equal any other aircraft entered in the Cleveland National Air Races. This also meant that an exciting Springfield rivalry between Hall and the Granville Brothers was shaping up and the racing enthusiasts of this air-minded city of Springfield eagerly awaited the big grand-daddy Thompson Trophy race on Labor Day.

Hall chose a gull-wing design in the belief that it would produce greater longitudinal stability. His engine of choice was a Pratt & Whitney Wasp Jr. which was rated at 535 horsepower and was mated —continued on Page 14—
with a new hand-made Hamilton Standard controllable pitch propeller. The racer was painted red and black with white pin striping separating the scallops and was assigned #6 for the Cleveland Air Races.

The test program for the new Bulldog racer was to start in early August, before the craft would be turned over to its race pilot Russell Thaw. Following a rough start to the test program, the aircraft was modified no less than three times to improve its flight characteristics. When Thaw finally got the chance to fly the new ship he was not satisfied. He claimed the craft was “not his idea of a racer” and stated that he probably would not fly the aircraft at the Cleveland races. This sudden turn of events put the long awaited showdown with the Granvilles in jeopardy and threatened 50% of Hall's orders.

Hall flew the plane to Roosevelt Field in Long Island to meet with Mrs. Guggenheim to get her permission to fly the plane himself at the Cleveland races. This last hour turn of events caused both Robert Hall and Frank Lynch to miss the cross country Bendix Trophy competition the week prior to the Thompson event.

Once both the Cicada and the Bulldog arrived in Cleveland, preparations were made for both craft to enter the Shell Trophy Dash which was a qualifying event for the Thompson Trophy Race. The Bulldog qualified at 243.717 mph but the Wasp Jr. in the Cicada began to act up and the plane was kept out of the Cleveland competition.

On September 5, 1932 the greatest pilots in the world lined up for the most prestigious closed course pylon event in the world, the Thompson Trophy Race. The race was to be flown ten laps around a ten-mile course which covered the Cleveland airport and its surrounding suburbs. Over 100,000 spectators filled the grandstands and it was said that another 100,000 non-paying spectators lined the outskirts of the airport and every road for miles around.

The contestants included Jimmy Doolittle in the Granville Gee Bee R-1, Lee Gehlbach flying the Gee Bee R-2, Jimmy Wedell, Jim Haizlip and Roscoe Turner all flying the Wedell-Williams Specials, Hall in his Bulldog entry (each of these six aircraft were P&W Wasp powered), Bill Ong in Ben Howard’s “Ike” and the “San Francisco I” entry of Ray Moore built by Keith Rider (these last two entries were powered by in-line Menasco engines).

At the boom of the mortar and the drop of the starter’s flag the racers were off in a horse-race start. The Hall Bulldog #6 was the first off the ground and around the scatter pole but Doolittle’s Gee Bee passed Hall on the first lap and began pulling away. On the second lap the Bulldog was passed by Wedell, Turner and Haizlip with Gehlbach’s Gee Bee also going around Hall for fifth. Doolittle lapped the entire field in his Wasp powered Gee Bee to set a new world close-course record of 252.7 mph. Robert Hall and the Bulldog could only muster a 6th place finish at 215.57 mph.

—continued on Page 15—
Following the race, Hall believed that the pitch settings on the new experimental Hamilton Standard propeller did not permit the P&W Wasp Jr. to develop peak power during the race. P&W engineers who analyzed the sluggish performance of the Bulldog never got a chance to fix the problem. A dejected and disappointed Robert Hall had lost to the Granville’s who once again proved their ideas for the world’s fastest aircraft were correct.

Shortly after the Cleveland Air Races, a disillusioned Robert Hall dismantled the Bulldog so it would never fly again. What was once deemed “America’s most beautiful aircraft” was now a collection of scattered parts (the last remaining parts and pieces of the Bulldog were donated to a Cleveland scrap dealer during World War II).

The Cicada, however, met a much different fate. After sitting out the Cleveland races, Frank Lynch flew the craft back to Bowles Field in Agawam where it was completely gone over in anticipation of future races. A short time later, and after some minor reworking, Lynch climbed into the cockpit for a routine check flight. This would ultimately be the last flight for both Lynch and the Cicada. After roaring down the runway and becoming airborne, the plane suddenly veered to the right clipping the top corner of a hanger causing it to crash and burn in front of horrified spectators who watched in disbelief. By the end of 1932, both of Hall’s racers were gone forever……..but not forgotten!

(below), #6 sits on Cleveland’s grass field prior to qualifying in the Shell Trophy Dash, September 1932

(below), The unique paint scheme of the Hall Cicada at Bowles Field, Agawam, August 1932

Frontal view of the gull-wing Bulldog racer, Bowles Field, Agawam, August 1932
Epilogue:
Bowles Field, Agawam, Massachusetts – Owned by the Bowles family who also owned the Springfield (MA) newspapers. Congressman Henry L. Bowles acquired 346 acres on Shoemaker Lane in 1927, construction started in 1928, 5 miles SW of Springfield and about 1.25 miles SW of Agawam center. It was dedicated on May 26, 1931 and was the scene of a number of Springfield Air Races. The Granville Brothers and Robert Hall used the field for speed runs between Bowles and the Springfield Airport five miles east across the Connecticut River. The field closed during the Great Depression and was gone by 1934. (Editor’s note: ACM member company EDAC-EBTEC is located on Shoemaker Lane in Agawam a short distance from the industrial park which now occupies the hallowed ground which was once Bowles Field).

Granville Brothers – Zantford, Thomas, Robert, Mark and Edward. They are best known for the production of the famous Gee Bee racers which are synonymous with the Golden Age of Aviation. The brothers built only 24 aircraft of which only two of the original aircraft are known to exist. Their R-1 model Gee Bee was piloted by James “Jimmy” Doolittle to the 1932 Thompson Trophy. Their aircraft were some of the most controversial in aviation history. On February 12, 1934 Zantford Granville was killed piloting one of his Sportsters on a delivery flight to a customer when he pulled up to abort a landing after a construction crew breeched in his landing area. The plane stalled killing Zantford in the ensuing crash. The company filed for bankruptcy in 1935. (Editor’s note: The New England Air Museum in Windsor Locks, CT has a Gee Bee R-1 reproduction built from original 1932 drawings and at the time with the assistance of the surviving Granville’s. The Museum of Springfield History has a full-scale replica of the Gee Bee R-1 hanging in their atrium).

Robert Hall – Chief Engineer for the Granville Brothers (1929-1931) who on September 5, 1931 flew the Gee Bee Z to victory in the General Tire and Rubber Trophy Race. He left Granville Brothers to form Hall Aircraft and competed in the 1932 Air Races finishing sixth in his Hall Bulldog Special. Later in life he joined Grumman Aviation to help design and test a series of World War II aircraft retiring from Grumman in 1970. Robert Hall died in 1991 at Newport, Rhode Island Hospital at age 85.

Lowell Bayles – After his spectacular achievements at the 1931 National Air Races and despite winning the Thompson Trophy, Bayles failed to set a world speed record in that event. His Thompson Trophy Gee Bee Z was re-engined with a larger 750 horsepower Wasp radial in an attempt to establish the world speed record at Wayne County Airport in Detroit, MI. On December 5, 1931, only months removed from his Cleveland trophies, Bayle’s second attempt at a world record ended in tragedy when his plane broke up in flight at over 300 mph crashing in a ball of smoke and flames.

Horse Race Start – each aircraft entered into the Thompson Trophy Race was lined up on a starting line almost wing-tip to wing-tip. A mortar explosion along with the drop of the starter’s flag signaled the start. Planes raced to a “scatter pylon” which was placed to separate the field. Pilots thought the horse-race start to be very dangerous but the race promotors and the fans loved it.

Free-for- All Event – Designation given to a race that was open to all pilots and aircraft. Aircraft were not limited by horsepower, size or shape. Both male and female pilots were welcome in the Free-for-All races, however the Thompson Trophy Race forbid female pilots.

Cicada - are a superfamily of insects with more than 1,300 species from around the world. Cicadas have prominent eyes set wide apart, short antennae, and membranous front wings.

The National Air Races – a series of pylon and cross-country races that took place in the United States beginning in 1920.

The Thompson Trophy Race - one of the National Air Races of the heyday of early airplane racing in the 1930s. Established in 1929, the last race was held in 1961. The race was 10 miles long with 50-foot-high pylons marking the turns, and emphasized low altitude flying and maneuverability at high speeds. As the race was flown around a closed course, crowds in the grandstands could easily see much of the spectacle.

—continued on Page 17—
The Bendix Trophy - a U.S. aeronautical racing trophy awarded to the victor of a transcontinental, point-to-point race, sponsored by industrialist Vincent Bendix founder of Bendix Corporation. The Trophy began in 1931 as part of the National Air Races. Initial prize money for the winners was $15,000. The Bendix Trophy Race was last flown in 1962.

Roosevelt Field - a former airport, located 2.3 miles east-southeast of Mineola, Long Island, NY. Originally called the Hempstead Plains Aerodrome, it was used as a training field for the Air Service, U.S. Army during World War I. In 1919, it was renamed in honor of President Theodore Roosevelt's son, Quentin, who was killed in air combat during World War I. Roosevelt Field was the takeoff point for many historic flights in the early history of aviation, including Lindbergh's 1927 solo transatlantic flight. It was also used by other pioneering aviators, including Amelia Earhart and Wiley Post.

Marion Price Guggenheim – Married to Edward Guggenheim. An American family known for their involvement in the mining industry and later in philanthropy. Meyer Guggenheim, a Swiss citizen of Jewish ancestry, arrived in America in 1847. Over the next few decades, the family became known for their global successes in mining and smelting. The family possessed one of the largest fortunes in the world. They later became known for their philanthropy in diverse areas such as modern art and aviation, including several Guggenheim Museums as well as the Guggenheim Aeronautical Lab and I. M. Pei's Guggenheim Pavilion at Mount Sinai Medical Center in New York City. They sold their global mining interests following World War I, then later purchased nitrate mines in Chile. One family investment company, Guggenheim Partners, today manages over $100 billion in assets. Another family vehicle, Guggenheim Investment Advisors, oversees about $50 billion in assets.

Russell Thaw – Chief pilot to the Guggenheim family. Thaw participated in two of the cross-country Bendix trophy races, which were instituted in 1931 and held annually to promote and encourage the achievements of U.S. aviation. Flying the Gee Bee "Model R-2" - P&W Wasp, he withdrew from the 1933 race. Flying the Northrop Gamma-Wright Cyclone, he came in third in the 1935 race from Los Angeles to Cleveland, ahead of Amelia Earhart in fifth place.

Gull Wing - The gull wing is an aircraft wing configuration with a prominent bend in the wing inner section towards the wing root. Its name is derived from the seabirds which it resembles.

Yale Bulldog - a bulldog who serves as the mascot of Yale University's sports teams. The Yale Bulldog is the first live college mascot in America. The first mascot appeared in 1889.

Pratt & Whitney Wasp - the civilian name of a family of air-cooled radial piston engines developed in the 1930s, 1940s, and 1950s.

Pratt & Whitney - is an American aerospace manufacturer founded in April 1925 by Frederick Brant Rentschler, an Ohio native and former executive at Wright Aeronautical. Pratt & Whitney engines dominated air racing in the 1930's.

James Harold “Jimmy” Doolittle – Witnessed his first airplane race at the age of 14 in 1909 in Los Angeles. Winner of the 1931 Bendix Trophy Race and winner of the 1932 Thompson Trophy flying a Granville Gee Bee R-1 aircraft financed by the Springfield Air Racing Association. He announced his retirement from air racing following his Gee Bee victory in the Thompson Trophy Race of 1932. Recipient of the Medal of Honor for valor and leadership in World War II as commander leading the famous “Doolittle Raid” on Tokyo. He always regarded the Gee Bee R-1 as “the most dangerous airplane he had ever flown.” But years later, when Jimmy Doolittle was asked why he flew the R-1 at all, he replied simply, “Because it was the fastest airplane in the world.” Doolittle died September 27, 1993 at the age of 97 in Pebble Beach, California. He is buried at Arlington National Cemetery in Washington, D.C.

continued on Page 18
The popularity of air racing in the 1930’s is captured by this scene from the 1932 National Air Races – Cleveland, OH

Bowles Field dedication May 1931
with over 100 United States Army aircraft represented,
May 26, 1931