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Manufacturers

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ACM UPDATE
February 26, 2010
AS-1-022610

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The ACM Update & Calendar (and previous issues) are also available for viewing on the ACM website.

Welcome New ACM Members

Technical Metal Finishing

29 Capital Drive

Wallingford, CT 06492

www.kzgouponline.com

Al Matarese, Managing Director

Business Development

- The Business Team met on February 24th at Trumpf Inc's Customer Center in Farmington which was one of the best attended meetings of the past years. Bruce Fiedorowicz (Volvo Aero CT), Business Development Team Leader, opened the meeting and introduced Rolf Biekert, President of Trumpf USA, who welcomed ACM members. Bruce also welcomed ACM's newest member, Technical Metal Finishing of Wallingford, CT, who were represented by Al Matarese, Managing Director, and Phil Milidantri, Vice President.

Bruce Fiedorowicz next introduced our two guests from the Volvo Aero Corporation (Sweden), Mr. Per Begger, Senior Vice President, Purchasing and Mr. Mikael Sandgren, Purchasing Director – Components.

Per Begger opened the presentation with a brief overview of the Volvo Corporation and pointed out Volvo is *not* the automobile company, but does include the manufacture of trucks (second largest truck manufacturer in the world with Volvo and Mack brand names), buses, marine and construction vehicles. The corporation has approx \$45 billion in annual sales and employs over 100,000 people worldwide. The corporation's vision is based on four principles: quality, safety, care for the environment and a dedicated presence (best value for the customer).

Mikael Sandgren provided the overview of the Volvo Aero group, a \$1 billion (in CY2008) business employing approx 3,300 people in Sweden, Norway and the U.S.

Highlight of Mikael's comments:

-Volvo Aero has evolved from a business whose base in the 1970's was 90% Swedish military to 95% commercial aerospace, today.

-Volvo is an independent partner working with all of the major engine prime contractors (GE, Rolls-Royce, Pratt & Whitney, MTU).

- Volvo Aero's current business model is that of a Risk & Revenue Sharing partner with the engine primes, and today, 95% of their business is based on RRSP relationships.
- Volvo Aero has design responsibility for new programs in which they are a RRSP. To this end, Volvo Aero selects its own supplier base for in-house designed components. Raw materials and processes are procured using Volvo Aero specifications; older programs require suppliers to be qualified by the program's respective prime contractor.
- Volvo Aero's core competency is lightweight engineering design, with components for the GEnx engine (used on B787 and B747-8 aircraft) being the first examples to enter production.
- In addition to its large base in commercial engines, Volvo Aero also participates in space propulsion (turbines and nozzles), ground-based gas turbines and military aircraft engine programs. They designed and build the RM12 engine powering Sweden's Grippen fighter.
- Global procurement is managed by commodity groups, including castings, forgings, machined and standard components, fabrications and fasteners. Annual procurement of approx 1,400 part numbers amounts to ~\$200 million, with ~\$30-\$35 million spent in the U.S.

In summary, Mikael advised Volvo Aero continues to seek high quality, low cost sources worldwide, having specific interest in sources offering complex sheet metal (Ni, Ti) formed components and those having welding and fabrication capabilities.

Per and Mikael answered questions from Team members, who then thanked them for their time to visit with ACM and provide an outstanding presentation. Their presentation will shortly be posted on the ACM website library.

The following is their contact information:

VOLVO AERO		VOLVO AERO	
Per Begger Senior Vice President Purchasing		Mikael Sandgren M. Sc. Purchasing Director Components	
<hr/>		<hr/>	
Volvo Aero Corporation	Telephone +46 520 94006	Volvo Aero Corporation	Telephone +46 520 949 78
Engines	Telefax +46 520 94900	Corporate Purchasing	Telefax +46 520 949 00
SE-461 81 Trollhättan, Sweden	Mobile +46 73 386 20 68	Dept 9104MS	Mobile +46 76 765 64 31
		SE-461 81 Trollhättan, Sweden	
per.begger@volvo.com		mikael.sandgren@volvo.com	

- The next Business Development Team meeting will be held on Tuesday, March 23rd at 8:15am at CERC, Rocky Hill. Our guest speaker will be Mr. Samuel Cipolo, DCMA, Industrial Analysis Center, Philadelphia who will brief the Team on the *Defense Critical Infrastructure Program*: how to make sure that companies important to the US can survive some type of "natural disaster" and continue to stay in business. Please plan to attend!

- Business Team members met on February 9th, to continue their discussion, and education, on the basics of Export Control requirements. This meeting was led by Kaman's David Harris, Manager of Export and Trade Compliance; David's presentation was an "Introduction to Export Compliance". Clearly, this subject matter was far too lengthy and complex for a two hour briefing, yet David offered an overview of the governing laws, ITAR (Intl Traffic in Arms regulations), EAR (Export Administration Regulations) and laid the groundwork for a follow-on group meeting.

Key comments from David's presentation:

- An export is the transfer of any U.S. product, technology, service or assistance to a non-U.S. person, either overseas or in the U.S. Exports can occur anywhere, including through U.S. owned firms located overseas.

Focus Points

- Export regulations *apply* to everything that leaves the U.S. & the activities of U.S. persons wherever they are.
- Almost all exports of military equipment require a license.
- Some exports of advanced products, materials, equipment, and tech for civil/commercial use also may require a license, but not all exports require a license.
- Exports can occur anywhere, **even within the U.S.!**
- Exports can be
 - Transfers or release of technical information to a foreign person can be considered exports
 - Technical services/ assistance provided to a foreign person
 - ... and require export licenses

-ITAR, managed by the Department of State, addresses all *military* products, technology, services and training. It is *policy based*, and licensing is based on an internal government review. Every manufacturer of ITAR regulated products or services *must* register (cost, \$1750/yr) even if the manufacturer is a non-exporter.

-EAR, managed by the Department of Commerce, addresses commercial and dual-use products, technologies and services. EAR has (different than ITAR) descriptive controls allowing the manufacturer to determine whether a license is required; the burden is placed on the exporter.

ITAR - Registration

- A manufacturer *or* exporter of "defense articles" must register with the Directorate of Defense Trade Controls, U.S. Dept of State
 - Registration requires payment of a fee >\$1750/ year and approval of an application (30-60 days)
 - Once registered, company is obligated to comply with ITAR
 - Registration is required even for *non*-exporters (i.e., domestic sale only)
 - Registration is a prerequisite to obtaining the necessary export licenses

ITAR – Export Licensing

- Dept of State. export licenses are required,
 - Permanent exports
 - Temporary imports
 - Classified exports or temporary imports
- For:
 - Equipment (i.e., hardware)
 - Technical data (i.e., defense technical info)
- Very specific as to related parties, products, quantity, value, etc.
- 30-60 day approval is typical
- Lasts 4 years

Export Administration Regulations ("EAR") – Dept. of Commerce

- Descriptive controls - consult the regulations.
- Export Administration Regulations applies to all items non-military
 - Includes the Commodity Control List (CCL); a listing of controlled products and technologies grouped by type & characteristics
 - Export Control Classification Numbers (ECCNs) assigned to products, technologies, etc., considered sensitive, dangerous, or advanced
 - EAR99: a general-purpose category for all products & tech not considered "licensable"

EAR Controls

- Controls vary according to each ECCN
 - May be destination based (country)
 - Value or quantity
 - End-use (military, space, commercial)
- Many "exceptions" exist that provide relief from the requirement to obtain an export license
 - Exceptions only apply to a very specific type of transaction

David summarized "there is *no one way* to do this (export control program), however, training is first and foremost". A copy of his presentation (including slides shown, above) is available on the ACM website in the Business Development folder of the Member's Only Library; see [D Harris Export Ctl Present 2-9-10.pdf](#).

David Harris has graciously agreed to conduct another briefing, whose subject will be, "**How to Create an Export Compliance Program**". The meeting will take place on Thursday, March 25th at 8:00am at Connstep, Rocky Hill; your RSVP is appreciated.

Consolidated Purchasing

- The next meeting of the Consolidated Purchasing Team will take place on Tuesday, March 9th at 8:00am at Kamatics, Bloomfield.
- Suppliers having Agreements with ACM are:

	<u>Supplier:</u>	<u>Key Contact:</u>	<u>Telephone:</u>
Shop Supplies, Abrasives, Cutting Tools, etc	Turtle & Hughes	Mike Kelly Dave Howard	203-497-1529 203-497-1555
Raw Materials: Nickel, Cobalt, Titanium – Sheet, Plate & Bar Stock	Aerodyne Alloys	Kirk Smallidge	860-508-1271

Progressive Manufacturing

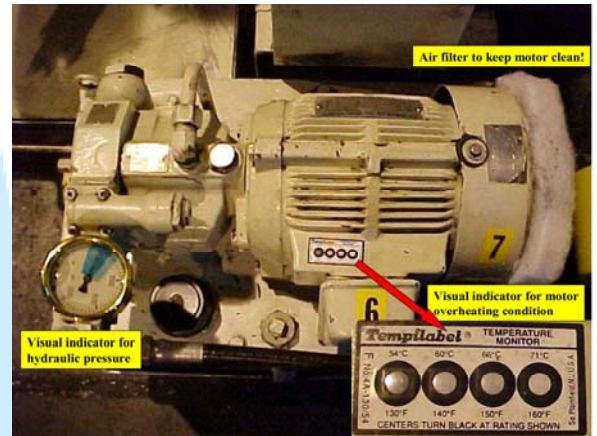
• The Progressive Manufacturing Team met at Fuss & O'Neill Manufacturing Solutions, Manchester, on February 19th where John Kravontka (President, F&ONMS) presented "Equipment Visuals & Maintenance Measures --- Leading to Reliable Equipment". John is a recognized global expert in TPM (Total Productive Maintenance) and provided the Team with many examples of the use of visuals to drive toward 'zero equipment stoppages' and improved machine productivity.

John's discussion was broad and proposed a four phase program (see, inset right). Each phase 'engineers' the maintenance process leading to the goals of increased equipment productivity and lower costs and lost time. Visuals become simple devices to provide the machine operator with cues to assess machine condition, making the operator an integral part of the daily maintenance routine. An example of using visuals is the motor (right) displaying a marked pressure gage and stick-on temperature indicator which together, provide a quick and complete status of this motor's condition. Another simple example of a visual is the 'zebra card' inserted behind a sight glass making the fluid level much easier to view; see the before and after in the photo (right below). John advised visual aids, such as the zebra card, are inexpensive and available on the web; go to www.the5sstore.com as a suggested source.

Zero Equipment Stoppages

4 Phases

1. Stabilize Failure Intervals
2. Improve Equipment Productivity
3. Maintenance Excellence
4. Predict Equipment Life



Predictive maintenance uses advanced techniques to determine the working condition of a piece of equipment and becomes an important tool in establishing condition based maintenance plans. Not all firms can afford to own the devices used to assess machine and utility condition, however all are available from contract services.

Predictive Maintenance

Use Predictive Tools while equipment is running/producing



Predictive Maintenance Tools

o Ultrasonic Analysis



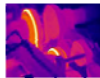
o Oil Analysis



o Vibration Analysis



o Thermographic Analysis



o Accuracy Checks

- Ball Bar
- Laser Interferometer



o Provides early warning



Allows for Planned Shutdown



Sound expensive?? Hard to do?? However, the payback for a well planned maintenance program can become quite significant as John's summary chart (right) indicates.

John Kravontka's complete presentation is available from the ACM website library; go to Members Only, Progressive Manufacturing and see, [Kravontka Visuals and Measurements Present 2-19-10.pdf](#).

As Conditioned Based Maintenance Increases

- % Planned Vs. Unplanned ↑
- % PM's completed on time ↑
- Corrective Action Work Orders ↑
- MTBF - Mean Time Between Failures ↑
- MTTR - Mean Time To Repair ↓
- Average cost to repair ↓
- Number of emergencies & impact ↓
- % Maintenance overtime ↓
- Emergency purchases & air freight ↓
- \$\$ in repair parts ↓
- \$\$ in spare parts crib ↓
- Spare parts crib inventory turns ↑
- Equipment repeatability/quality ↑
- Equipment life cycle costs ↓

- ACM has recently heard from our longtime international Kaizen consultant, Mr. Yoshihisa Doi, who advised of recent revisions made to his website. Please see the “*How to Implement*” page at www.kaizen-mc.com.

- The next Progressive Manufacturing Team meeting will take place on Wednesday, March 24th at 8:00am at Sterling Engineering, Barkhamsted. This meeting will feature a presentation by Paul Barrow, Manufacturing Manager at Sterling Engineering, discussing: “*How to get Lean Off the Ground, Engage the Workforce and Demonstrate Real Results in order to Get Buy-In*”. Paul will address: “No Fluff” results to get people on board, how to create and maintain a schedule in order to put the “continuous” in CI, how to follow up and no-Newspaper items. Please plan to attend and discuss this very practical approach!

**A Message from Jim Womack of the Lean Enterprise Institute
commenting on
“Back to Work”**

Only a month ago I wrote about going beyond Toyota. And in light of the last month's events, I suppose that must seem prescient. But actually it wasn't because I wasn't writing about Toyota. I was writing about the path ahead for our Lean Community.

I want to continue that thought process this month, based on your feedback to my request for responses. But first I do feel a need to pay brief attention to the current situation by suggesting that we all keep two points in mind:

- As I said last month: *Toyota will be fine*. I believe that around the turn of this century the company made a very human error by deciding it wanted to become the biggest auto maker quickly, a goal of no interest to any customer. Then it worked backward to do what it took to rapidly become the biggest, surpassing the "do not exceed" speed that every organization has on its instrument panel.

By stomping on the gas Toyota briefly lost touch with the core values and rigorous methods that had worked brilliantly for solving customer problems over the preceding 50 years while permitting Toyota to prosper. The result has been some bumps in the road to the future. And there are likely to be further jolts in the near term as every journalist, regulator, legislative committee, and trial lawyer in every country pores over Toyota's product safety performance.

There's not much to be done about that. But what Toyota can and will do is hansei (critical self reflection) and organizational rework to get back to basics and move on. This requires root cause analysis and testing of countermeasures that will seem agonizingly slow to outside observers. But surely we have learned that quick fixes based on incomplete knowledge with no rigorous testing aren't durable. So let's all be patient. (And, let's hope that government regulation becomes a robust, consistent process as well.)

- *Emotional heijunka is really useful in a crisis*. It's amazing how the media oscillate effortlessly between over-the-top-praise and outlandish criticism of companies. Toyota wasn't quite as good as many thought and it isn't nearly as bad as some now believe. But within the Lean Community emotional gyrations of this sort are as distracting as the failure to level demand (that is, to practice heijunka) while managing any process. So let's all calm down and get back to work on our own problems in creating lean enterprises while Toyota deals with its problems.

There. I feel better. Now I can talk about something more important. This is your responses to my challenge last month to share your concerns about where we go from here in the Lean Community. I received more than 300 thoughtful replies, totaling more than 300 written pages, from respondents working on the shop floor to the executive suite in a wide range of industries across the world. I'm deeply touched and deeply grateful.

We will soon find a way to make many of these responses available at lean.org (while guarding the privacy of the respondents.) But the volume and length of the responses has caused me to miss my

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Workforce Development

● The WorkForce Development Team met on February 18th at Adchem Mfg Technologies in Manchester. Team members discussed a variety of matters, including:

-Internet based training for improved machining skills, utilizing the online resources of ToolingU (www.toolingu.com) and Oxygen Education (www.o2ed.com), remains available to ACM members at NO COST from CBIA (CT Business and Industry Assoc) under their Federal grant. For specific information on this program, please contact CBIA's Nancy Castonguay at 860-244-1932. ACM member Alcoa Howmet (Winsted, CT) has taken broad advantage of this program and Nancy described their customized approach. Alcoa has installed the program at nearby Northwest Community College where adequate computer resources are available; they also contracted with NWCC to provide an instructor to act as a facilitator, crediting this approach with its broad acceptance and success. Team members discussed two lessons learned from the Alcoa approach; having senior management involved to encourage the program and setting aside a specific time and location for the training. Members recognized not everyone needs do this training offsite, but the need for management's involvement is key. Nancy advised that Aero Gear has utilized a 'lunch and learn' approach to provide access to a broad group of employees during a single time period. It was also noted both programs offer the student the ability to learn at their own pace, either reading the lesson or listening to the audio version; audio provides those with reading and/or language difficulty added benefit.

-Recently, inquiries from local schools have come into ACM regarding our plans for the "Future WorkForce Opportunities Fair". Members discussed basic plans for this year's Fair which has been scheduled for Wednesday, October 13th at the Hartford-Windsor Marriott Hotel (in conjunction with the ACM TradeShow). It's not too early to begin to let schools know about this date and encourage them to put the event on their calendar. The 'menu' of the ACM website provides photos of the 2009 Fair. Please be sure to discuss this event in your meetings with local school systems.

-Members continue to work with local schools, making presentations at group meetings and open houses. The following is the listing of actions, both planned and already having taken place. Please advise the ACM Office of your actions and thank you to all those who are active participants.

School	Location	Event	Date	ACM Participants	
				Name	Company
Windsor High School	Windsor	Business Partnership Mtg	9/25/09	Judy Boyle	Stowe
Windsor High School	Windsor	Business Partnership Mtg	9/25/09	Gary Zweifel	Delta Industries
A.I. Prince Technical High School	Hartford	Open House	11/5/09	Tom Ferreira, Carmen Duprey, Maria Goyzueta	C&P Machine
A.I. Prince Technical High School	Hartford	Open House	11/5/09	Jim Bowtruczzyk + 2 additional	Horst Engr.
A.I. Prince Technical High School	Hartford	Open House	11/5/09	Steve Drewes, Alan Roy, Mark Foisey	Whitcraft
A.I. Prince Technical High School	Hartford	ACM Presentation	12/21/09	Paul Murphy	
A.I. Prince Technical High School	Hartford	ACM Presentation	12/21/09	Tom Ferreira	C&P Machine
A.I. Prince Technical High School	Hartford	Students visit Facility	2/3/10	Jeff Paul, Steve Drewes, Sandy Karosi, Mark Foisey	Whitcraft
E.C. Goodwin Technical High School	New Britain	ACM Presentation	11/20/09	Paul Murphy	
E.C. Goodwin Technical High School	New Britain	ACM Presentation	11/30/09	Paul Murphy	
E.C. Goodwin Technical High School	New Britain	ACM Presentation - Parent's Open House	12/9/09	Paul Murphy	
Eli Whitney Technical High School	Hamden	ACM Presentation	11/18/09	Judy Boyle	Stowe
Eli Whitney Technical High School	Hamden	ACM Presentation	11/24/09	Jeff Paul	Whitcraft
Eli Whitney Technical High School	Hamden	ACM Presentation	12/3/09	Kristin Muschett	Habco
Howell Cheney Technical High School	Manchester	Students (Welders) visit Facility	11/18/09	Gary Zweifel	Delta Industries
Howell Cheney Technical High School	Manchester	Students (Machinists) visit Facility	12/3/09	Gary Zweifel	Delta Industries
Southwick-Tolland Regional High School	Southwick, MA	(2) ACM Presentations	12/4/09	Judy Boyle	Stowe
Westfield Vo-Tech High School	Westfield, MA	Open House: Display for Freshman	2/11/10	Gary Zweifel, Sarah Baker	Delta Industries
Windsor Locks High Schools	Windsor Locks	Career Fair	4/16/10	Judy Boyle	Stowe

-The Team was also made aware of a program offering Hartford area high school students internships in a variety of areas, including engineering and green technology; if your firm is interested in participating as a corporate sponsor, or to just get additional information, please contact Dayl Walker at 860-244-1935 or walkerd@cbia.com.



The Hartford Public School System has partnered with the National Academy Foundation (NAF) to establish three high schools focused on: engineering and green technology, insurance and financial services, and information technology.

NAF guides the start-up and implementation of career academies across the country. NAF provides industry-specific, career-exploration curricula to the local academies and provides ongoing assistance. The Foundation is a key player and supporter of small schools in the national education reform movement, a reform which formed the basis for the redesign of Hartford schools put in motion by Dr. Steven Adamowski, Superintendent of Schools.

THE COMPENSATED INTERNSHIP

Students who are successfully completing their courses are eligible for placement in a compensated internship. This internship is perhaps the most memorable and critical component in the NAF experience for high school students. It provides students with an introduction to the real world of work and offers an opportunity for them to apply specific skills learned. The internship also helps the student to make informed career decisions and to learn both technical and interpersonal skills.

There are three National Academy Foundation high schools within the Hartford Public School System:

- The Academy of Engineering and Green Technology, a NAF Academy of Engineering
- High School, Inc., a NAF Academy of Finance
- Pathways to Technology Magnet School, a NAF Academy of Information Technology

NEED FOR CORPORATE SPONSORS

Internships need corporate sponsors. Participating companies agree to provide students with a compensated internship in a career-related position. Hartford's NAF academies will require approximately 150 student internship placements during 2010. The ideal Academy Internship:

- Pays at least the current minimum wage of \$8.25
- Is scheduled for a minimum of 120 hours
- Provides a supervisor who will collaborate with Academy staff to guide the student through the work experience
- Offers opportunities for the intern to learn about various aspects of the business
- Challenges the intern to think and solve problems
- Utilizes skills learned in special Academy courses as well as specific knowledge of the industry
- Includes pre-internship preparation activities and post-internship recognition activities connected to student work experience coordinated between the Academy staff and employer supervisor.

The greatest benefit to corporate sponsors is the contribution they make to public school education by helping to create a motivated, educated work force.

Hartford Public Schools | 960 Main Street | 8th Floor | Hartford, CT 06103

Hartford Public Schools | 960 Main Street | 8th Floor | Hartford, CT 06103

How It Works

PREPARATION AND PLANNING

Academy staff prepare the students for the internship experience and collaborate with the employer supervisor to detail the experience. They provide a list of competencies which the student should learn during the internship experience. These include professional skills and 21st Century skills as well as industry specific "hard" skills. Academy staff and the supervisor coordinate placements so that there is input as to how well the nature of the assignment dovetails with the skill level and coursework of the intern.

PERFORMANCE AND SUPERVISION

The supervisor and Academy staff collaborate to ensure that the intern is having an appropriate educational experience. This is accomplished through a series of internship visits scheduled by the Academy staff and regularly scheduled reviews/discussions between the supervisor and the intern.

Academy staff prepares an evaluation. The supervisor is also asked to complete a brief written evaluation of the intern's performance at the end of the internship.



For more information about internships at the Academy of Engineering and Green Technology, please contact:

Dayl A. Walker
CBIA Education Foundation
350 Church Street
Hartford, CT 06103
walkerd@cbia.com
860-244-1935

• The next meeting of the WorkForce Development Team will take place on Tuesday, March 16th at 8:00am at Stowe Machine, Windsor.

• A "First Line Supervisor's Training" course has been scheduled with the first session on Wednesday, March 31st; starting time is 3:00pm. This course will be conducted at Volvo Aero CT, Newington. Seats will be reserved on a first come, first served basis. Contact Allen Samuel at 860-513-3205 or alsamuel@acm-ct.org to make your reservation or answer questions.

Company Visits Build Career Interests

Prince Tech Students Visit Eastford Manufacturer

By Lesia Winiarskyj Photo by Dayl Walker

On February 3, 29 students from A. I. Prince Technical High School in Hartford visited Whitcraft LLC, an aerospace components manufacturer in northeastern Connecticut. The students, part of Prince Tech's automated manufacturing technology class, spent the morning touring the facility and learning about Whitcraft's history, its engineering intern program, its products, and the processes used to make them. They met with executives, managers, and technicians and watched demonstrations of CNC machines, engineering software, and lean principles, such as single piece flow. They also participated in a tool design and programming tour as well as a tour of the facility's laser cutting department.



Last fall, Whitcraft's operations manager, Steven Drewes, attended an open house at Prince Tech, which showcased the school's automated manufacturing technology program, integrated CAD-CAM classrooms, and state-of-the-art software. "I was impressed with the school, the curriculum, the equipment that students were training on, and my interactions with the students themselves," says Drewes. "I thought it would be good if we opened our doors to them and showed them how what they are learning in class has use in the real world."

James Clarke, head of Prince Tech's automated manufacturing technology department, said his students were equally impressed. "They appreciated that everybody from the company president to those on the work floor took time to talk to them," he says. "One student remarked, 'After the tour, they didn't just get us out the door and back on the bus. They brought us back into the meeting room and asked us questions. I liked that.'"

CBIA's Education Foundation helped coordinate the visit. If your company is interested in hosting a student visit, contact us. We can help. E-mail Dayl Walker (walkerd@cbia.com) or Mary deManbey (demanbem@cbia.com)

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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



Precision Components that Travel the World

February 22, 2010

AGC Incorporated is pleased to announce the appointment of Paul Murphy as Senior Vice President Sales and Marketing. Paul will be responsible for the OEM and MRO sales and marketing functions of the company. Paul joins AGC with over 30 years of aerospace industry experience.

Prior to Paul joining AGC, Paul was Corporate Business Development Manager at EDAC Technologies, Chief Executive Officer of Senior Aerospace Sterling Machine, President of Stowe Machine and General Manager and Partner at Precision Speed Manufacturing. Paul is the current President of the Aerospace Components Manufacturers (ACM), an aerospace organization comprised of over 60 Connecticut and southern Massachusetts aerospace manufacturers and support companies.

"Back to Work"

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deadline for getting this done before this month's e-letter. So as a short-term countermeasure I would like to summarize the important themes I heard from you about the most important challenges for us to tackle together:

Theme Number One: Not one of you thought that what we need is more tools or new technical knowledge in order to move ahead. And no one suggested experiments in this area, even though I'm sure we will discover and need to test at least a few new tools over time.

Theme Number Two: Many of you identified confusion about the meaning of lean as a barrier to progress in your organization. (I confess that I was surprised.) And you tied this in part to the endless stream of strange words - all Japanese except takt, which is German - that have become "lean speak". (Again I was surprised, but for different reasons that I will explain below.)

Theme Number Three: Most of you suggested failures of management at the top, middle, and bottom of your organization as the most important challenge you face in creating a sustainable lean enterprise.

Theme Number Four: Many of you argued that teaching methods employed in most firms don't effectively teach either lean thinking or the proper use of lean tools.

Theme Number Five: A number of readers pointed to the disconnect between lean thinking and the incentives used in many firms (for employees and suppliers) to judge and motivate behavior.

I also asked you to suggest experiments we might try and then share the findings to discover a way beyond these challenges. As it turned out, you were better at identifying challenges than proposing experiments, but I actually expected that. Let me therefore suggest a series of experiments that address the challenges listed above.

Experiment Number One: Let's declare a moratorium on new tools unless and until we can develop a management context for sustaining each tool. That's an easy experiment!

Experiment Number Two: Every organization needs to agree on standard terms that express its key

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“Back to Work”

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methods and management principles for creating ever more value for customers with ever fewer resources. ("Creating ever more value for customers with ever fewer resources" is, by the way, all I have ever meant by "lean".) And it is not at all clear that these need to be standard across the Lean Community. Can we do some research on what language the most successful organizations have utilized and think further about whether standardization on language across the Lean Community is a useful path?

As for strange, Japanese words: I have used them precisely because they have no meaning in other languages. I helped choose "lean" as an overarching term 23 years ago and soon discovered that the many pre-existing meanings of this word in English created endless confusion. So when I discovered that there were Japanese technical terms available with no existing meanings in English or other languages I jumped at the chance to use them. Maybe I should have chosen a term for lean from Esperanto instead! But what is done is done, so a more practical task is to research how organizations can reach agreement on their own lean language and use it consistently.

Experiment Number Three: Let's focus on improving the methods for teaching senior managers how to set clear, stable priorities that guide lean implementation. Many organizations have tried hoshin kanri (strategy deployment) but few have made it work. Why? And what can be done to improve results?

Let's also do research on methods that can help middle managers deploy strategic initiatives and solve problems that arise every day in every organization. We are already embarked on a vast collective experiment on doing this with A3 analysis, but as advocates of the method rather than observers of what actually happens. So let's do some C and A together to complete the Plan-Do-Check-Act cycle, so our movement won't always be long on exhortation and short on analysis of results.

Our experiments should also extend to finding ways for front-line managers to create stable, robust processes that can reduce the management overburden (muri) of constant chaos. Everyone knows about the concepts of standardized work, process capability, equipment availability, and flexibility to deal with demand variation. But hardly anyone seems to be able to apply these concepts sustainably. Why is this? What can be done?

Experiment Number Four: How can we apply lean methods to the teaching of lean itself? One of Toyota's recent problems has been training thousands of new employees each year in a way of thinking and acting that is very different from what they learned in school or in previous jobs. And many firms face crises when they try to spread lean concepts from their initial points of success to the whole organization or try to merge with or acquire other firms. What have we learned about the best ways to teach lean and about inherent limits on the rate of learning? (Knowing these would set a natural limit on the rate of expansion and provide guidance on whether proposed mergers and acquisitions are practical.)

Experiment Number Five: One of the most difficult challenges for lean practitioners is reconciling the logic of lean with reward structures, for individuals as well as departments and for other businesses along shared fulfillment streams. Failure to address this problem usually leads to zero- or negative-sum point optimization, yet few organizations seem to have found a way to eliminate this problem. What is the root cause? And what experiments can be tried to show convincingly that there is a better way?

I will try to refine and prioritize these ideas for research, again with your feedback. And I will try to find ways we can jointly conduct experiments to clear the barriers in our path to creating lean enterprises in every industry in every country. This may be a lot of work before we are through, but surely it will yield significant value for the lean movement.

With best regards and leveled emotions,

James P. Womack, Founder and Chairman
Lean Enterprise Institute, Inc.