Gilson Snowboards Summer Snow Day

written by Lauri Moon | June 30, 2016

Best Practices for Creating an Innovative, Advanced Manufacturing Culture

written by Lauri Moon | June 30, 2016

Promoting innovative, advanced manufacturing cultures within a community involves strategic planning and effective partnership with public institutions.

(Area Development – Dan Levine: 6-16-16) Advanced manufacturing – broadly defined as the integration and utilization of new technologies to improve products and processes – is a sector that Oxford Economics estimates now accounts for 44 percent of all U.S. manufacturing

employment and supports 19 percent of U.S. GDP through its operations, supply chain, and payroll.

Companies all too often must choose between introducing advanced manufacturing equipment and processes into existing plants or shutting down operations and beginning production somewhere else. Consequently, many communities are anxious to support manufacturers that are modernizing plants rather than risk seeing those plants close.

At the same time, forward-thinking manufacturers understand that partnerships with public entities can accelerate and ease the cost of introducing complex new equipment and production processes into their plants. By examining two best-in-class examples, this article highlights ways in which supportive public-private partnerships can be established to help facilitate the promotion of advanced manufacturing. Each partnership helps companies improve productivity through either advanced manufacturing skills training or by offering advanced technological research development. This productivity improvement is the key to company survival, wage growth, and regional competitiveness.

Companies all too often must choose between introducing advanced manufacturing equipment and processes into existing plants or shutting down operations and beginning production somewhere else. During a recent engagement, Oxford Economics calculated that productivity in the U.S. advanced manufacturing sector is an estimated $226,071 per worker — more than twice the productivity of a worker in non-advanced manufacturing ($106,143).

Higher worker productivity is typically associated with higher wages and educational attainment (or higher skills training), and our data supports that assertion. In a non-advanced manufacturing plant there are approximately three workers with no more than a high school education for every worker holding a bachelor's degree (or higher). In contrast, that ratio is nearly one to one (high school educated worker to bachelor degreed worker) in advanced manufacturing plants. However, even in an advanced manufacturing plant, one third of all workers typically hold only a high school degree (and an equal number have less than a four year degree).

A Best-in-Class Example of *Company Training*

Let's look at *B. Braun Medical's* highly innovative program to train its existing workforce in the use and operation of the advanced manufacturing equipment that the company has been introducing to its Allentown, Pa., plant. B. Braun is one of the world's leading manufacturers of medical devices. Like many other manufacturers, managers at the Allentown plant noticed a skills gap in their existing workforce as increasingly sophisticated equipment was introduced into plant operations.

The company reviewed the key competencies that workers require in order to understand the theory of how the equipment works and the principles that govern line operations in an advanced manufacturing plant. These competencies include mechanical, electrical, hydraulic, and pneumatic functions. A *Progression Based System* ("PBS") was introduced to make sure that all employees receive basic training in each of these functional areas. The underlying strategy behind PBS is to train all workers in these core competencies, and then help the employee learn to apply this theoretical background to the operation, maintenance, and repair of equipment in the plant.

Training is divided into five levels: entry, basic, intermediate, comprehensive, advanced (with a master's level under development). The expectation is that each employee will advance to the comprehensive level. An estimated 90 percent of all current operations in the plant are covered at the comprehensive level. In other words, an employee completing the comprehensive level of training will possess the theoretical knowledge needed to understand (at the practical level) 90 percent of the plant's production operations.

Each level takes approximately one year to complete and training is done through a mix of company time and employee's time (depending on the current level of the employee). All training was initially provided by a local vocational school but has since been expanded to include the local community colleges as well. PBS has allowed B. Braun to retrain and upskill its employees, and the better skilled workforce has, in turn, helped the company reduce its operating and maintenance costs. The program is now being introduced to other B. Braun facilities in the United States.

The success of B. Braun's PBS program reflects, in part, upon its excellent relationship with the Lehigh Valley Workforce Investment Board (WIB). The WIB helped the company navigate different agencies; helped identify grants that offset

some of the training costs associated with PBS; and put the company in close touch with the community's K-12 educational leaders. Educating guidance counselors, students, and parents at the high school level about opportunities in advanced manufacturing is an important part of the company's recruitment strategy.

Key to the program's success was its design around carefully researched training needs. Too often, training providers and companies rely on anecdotal evidence or ready-made solutions without first undertaking the careful data-driven analytics necessary to ensure strategic alignment among employees, managers, training providers, and other interested partners. This data-driven foundation, in turn, accelerates the process of engagement, articulation, program development, and effective implementation strategies. The B. Braun program is a best-in-class example of a company training its core workforce in the skills needed to succeed in an advanced manufacturing environment.

A Best-in-Class Example of *University Support*

The *National Institute for Aviation Research* (NIAR) at Wichita (Kansas) State University is a best-in-class example of a university supporting advanced manufacturing in its community by providing research and development services in key technological disciplines. From its inception in 1985, NIAR was organized to research and develop technologies identified by its industry advisory board (which is comprised of the vice presidents for engineering from many of the leading aviation and other advanced manufacturing companies in Wichita).

NIAR is organized around labs that operate as independent business units. Labs open and close under the direction of NIAR's advisory board, with each lab pursuing a specific technology identified by the board. This orientation around the research objectives of local industry (an industry-centric organizational approach) is quite different from the faculty-centric organizational approach found in many other offices of research and technology transfer (in which commercialization of faculty innovation is the primary objective).

Because each lab is self-funded, its research must be highly relevant to the advanced manufacturers whom it is organized to serve. Current labs, for example, are organized around additive manufacturing, computational mechanics, composites and advanced materials, and more than a dozen other cutting-edge technologies. Large capital expenditures (for state-of-the-art equipment) are typically priced into

research and certification testing projects done for private clients, although approximately 15 percent of NIAR's budget comes from the Kansas Aviation Research and Technology Growth Initiative. The university itself funds only a small amount of administrative overhead expense.

Higher worker productivity is typically associated with higher wages and educational attainment. One recent but not atypical success story involves *Airbus Americas*, a company with a large engineering presence in Wichita. NIAR's initial relationship with the company was to provide Airbus engineers with training in composites and advanced materials. The relationship has since been expanded to include full-scale structural testing in Wichita (the first time this is being done by the company at locations outside of Europe).

NIAR provides a best-in-class organizational model for university-business partnerships in advanced manufacturing. It has applicability to any community with a large research university and a cluster of companies with common research needs. It may also have applicability to communities seeking to leverage the technological expertise found on large military bases.

For example, one can easily imagine how (former) military personnel can be organized around technological competencies that are specific to the research and certification needs of military contractors (and civilian companies utilizing comparable technologies). The establishment of such a research institute in military communities might be an important first step in attracting the advanced manufacturing operations connected to the research and testing being conducted.

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The experiences of B. Braun and Wichita State University demonstrate that best-in-class practices to promote innovative advanced manufacturing cultures within a community do not happen in a vacuum. They involve strategic planning and effective partnership with public institutions. Educational institutions — ranging from K-12 right through advanced university research programs — have a vital role to play. This article profiled effective partnerships in advanced manufacturing skills training and technological research and development. However, similar alignment is needed in energy, tax, and other regulatory arenas.

But one critical lesson learned from the B. Braun and NIAR experiences is that *best-in-class practices can only emerge when leading companies view local public partnerships as strategic and take the lead in making sure that their communities create environments that are supportive of advanced manufacturing.*

(Dan Levine is Practice Leader, Location Strategies and Economic Development, Oxford Economics, Inc.)

Automation Investment High Among U.S. Manufacturers

written by Lauri Moon | June 30, 2016

MAPI survey shows actual, planned automation investment high among U.S. manufacturers

(Logistics Management – Patrick Burnson: 6-13-16) A new report from the MAPI Foundation indicates that despite the economic slowdown in the industrial sector over the past year, the incidence of actual and planned automation investment is very high in American manufacturing.

The report is based on a national survey of U.S. manufacturers and non-U.S. manufacturers with a presence in this country and is the second in a series of studies on productivity that the MAPI Foundation is producing this year.

Written by Cliff Waldman, director of economic studies at the MAPI Foundation, and sponsored by Rockwell Automation, a global leader in industrial automation, the findings of the national survey show that the high incidence of automation investment spans various company sizes and manufacturing subsectors:

- 83% of respondents indicated they engaged in automation investment in the past five years.

- More than three-quarters (76%) plan to engage in such investment during the next three years.
- 45% indicated their automation investment was part of a broader technology upgrading and 35% said it was a stand-alone investment. The remainder of respondents indicated they engaged in both.

“Automation implementation exhibits characteristics of both capital investment and innovation investment,” observes Waldman. “While deploying machinery into a production line has characteristics of capital equipment investment, it does not appear to be as short-term oriented as capital investment.”

Waldman added, “Automation also does not appear to be an element of business expansion. Rather, *it is more like process innovation whose principal goals are cost reduction and product quality improvement.”*

“The findings in the MAPI Foundation’s second study confirm that automation is a critical driver of productivity and quality improvements for manufacturers as they seek to stay competitive in this challenging environment,” said Joe Kann, vice president of global business development at Rockwell Automation.

“The study also points out that automation investments are more often seen as part of a broader business-wide technology upgrade as opposed to a stand-alone application. This is consistent with Rockwell Automation’s vision of *The Connected Enterprise* in which operational technology is converged with information technology to drive higher levels of productivity and competitiveness,” Kann noted.

(Patrick Burnson is executive editor for *Logistics Management* and *Supply Chain Management Review* magazines and web sites.)

DCED Releases Business Services Matrix

written by Lauri Moon | June 30, 2016

Pennsylvania offers a variety of financial and technical assistance programs to support business location, expansion and industry growth. The Department of Community & Economic Development (DCED) has compiled a list of the department's business assistance programs.

IMC is part of the state's Partnerships for Regional Economic Performance (PREP) program.

DCED Business Services Matrix 2016

Technology Driving Convergence of Industries & Their Workforces

written by Lauri Moon | June 30, 2016

Packaging, processing, food service and restaurant operations are all automating

(On the Edge Blog – Keith Campbell: 5-31-16) This past week, I had the opportunity of combining my attendance at The Automation Conference and Expo, focused upon manufacturing and produced by PMMI Media Group, with a visit to the NRA Show 2016, focused upon food service and produced by the National Restaurant Association. Both events were held in the Chicago area. I expected to find some elements in common, especially workforce issues, but I was surprised to find so many common elements related to both workforce and automation.

It is but a small step from a food processing and packaging line in a low volume manufacturing plant to a food service kitchen for a caterer or institution such as a school, hospital, or military base. And it is but another small step from food service to retail restaurants. Recognizing this, it should be no surprise to find a convergence of issues driven by technological change.

Food service operations, restaurants and bars are automating using many of the same technologies found in manufacturing. The NRA show floor included exhibitors selling sensors, controllers, pumps, valves and motors. It included processing and packaging machines for performing unit operations and combinations of these machines organized into workcells. It included robots and 3-D printing. Automation systems integrators, business systems integrators, and IT companies were promoting products and services, and the Internet of Things (IoT) was a popular theme.

What appears to be an exciting growth area for these food services industries are what manufacturers would call Human Machine Interfaces (HMI), Supervisory Control and Data Acquisition (SCADA) systems, and Manufacturing Execution Systems (MES). Many of the solutions shown were based upon the use of tablets and the cloud. Suppliers indicated that increasing complexity of the industry, lack of appropriately skilled workers, and rising minimum wage standards have been causing their phones to ring off their hooks as food service and restaurant operators seek to automate.

Experience tells us that automation drives up the skill requirements of the workforce. Lower skilled tasks are often taken over by machines and software, and people in those jobs often have the opportunity to move up by acquiring new skills. The workers that remain perform higher value-added tasks such as data analysis, problem solving, troubleshooting and maintenance. As food service automates, workers will need to be upgrading their skills. Our high schools will need to be turning out graduates with different and better skills, as lower skilled jobs of the past disappear. I would caution, that this should NOT imply sending more to college! Career paths will be altered. Career pathways between manufacturing and food service may also converge.

My mind isn't made up if this will exacerbate or reduce the skilled worker shortfall for both manufacturing and food service.

Smart Manufacturing & The Internet of Things

written by Lauri Moon | June 30, 2016
(IW — Andrew Waycott: 6-3-16) There's a rumor going around, centered in Germany, that we're now in our fourth Industrial Revolution. According to this rumor (in which I believe):

The first Industrial Revolution started in England in the 18th century. Think: mechanical looms.

- The second centered on electrically-powered mass production, near the start of the 20th century. Think: Henry Ford and assembly lines.
- The third is electronics and robotics and IT. Think: computers enter the office and manufacturing space.
- The fourth is about harnessing, finally, the power of data. It's about big data and predictive analytics and artificial intelligence, and it includes Smart Manufacturing. Early computers did what humans could do, but faster and better. Smart Manufacturing puts machines in the business of real decision-making—through calculations outside the range of human capabilities. Think: the data tells us what to do.

With Smart Manufacturing, the Data Tells us What to do.

Or to state it more dramatically, the computers control the process! While the smartest person in the room is still human (depending on how we define 'smart'), machines can tell us things we don't know and could not figure out on our own.

Say we're talking about maintaining aircraft engines. In the old days, all we could do as humans was:

Analyze how frequently they failed, and work to a preventative maintenance schedule cycle slightly shorter than the average of that period.

- Wait for it to fail.
- Fix it.

It's not optimal. But now, with sensors providing considerably more data about the engine, and software that is able to analyze that data in a highly sophisticated manner, we can have a much more precise idea of when each engine needs maintenance, and what type.

Better data and better analytics give us considerably more insight into the root cause of any specific shop floor event or process. And the root cause makes all the difference, in terms of increasing efficiency and quality, while decreasing cost.

The Industrial Internet of Things (IIoT) applies Internet of Things technology to manufacturing. IIoT incorporates machine learning and big data, harnessing sensor data and automation. The big idea behind IIoT is that smart machines are better than humans at capturing, analyzing and communicating [some types of] data. Manufacturers can pick up on inefficiencies and issues sooner, and find answers faster.

A major part of the story is the drop in technology costs. The emergence of cheap connected devices, coupled with the availability and affordability of mass computing power, has been the biggest driver of Smart Manufacturing.

It All Hinges on Visibility

Visibility is the driver of ROI, in manufacturing efficiency. And Big Data and Smart Manufacturing have taken visibility to a whole new more granular level. In real time.

With greater visibility of the real workings, your shift supervisors and operators can make better, more informed decisions, all day long. There are all kinds of possibilities: messages on their phones; displays on a monitor; an overhead

dashboard that highlights your six key processes. It's all about visibility.

One Last Point About Smart Manufacturing

Just to clarify—you can, in theory, run a Smart Manufacturing plant that has no connection to the Internet. Essentially, Smart Manufacturing is about using analytics and Big Data to run your plant better (think: the data tells you what to do!).

So Smart Manufacturing isn't really about the Internet. It's about collecting and crunching data to make more informed decisions.

(Andrew Waycott is Chief Operating Officer and Chief Technology Officer, Factora)

The M4.0 Tidal Wave is Coming-Are You Ready?

written by Lauri Moon | June 30, 2016

(Manufacturing Leadership — Paul Tate: 6-7-16) "Industry is about to experience more change, across more aspects of the business of manufacturing, and in a shorter time than perhaps any period of transition in the history of manufacturing", predicted David Brousell, Co-Founder and Global Vice President of the Manufacturing Leadership Council in his opening address at the *2016 Manufacturing Leadership Summit* earlier today.

Hosted by international research and consultancy company Frost & Sullivan at the Omni La Costa Resort in Carlsbad, CA, the theme of this year's 12th Annual Summit focuses on ***Manufacturing 4.0****: The New Rules of Leadership,* and has brought together over 200 senior industry leaders from across multiple sectors of the global manufacturing sector.

Citing the results of the Manufacturing Leadership Council's recent research study

on *Factories of the Future*, Brousell continued that over the next five years the research suggests that a "tidal wave of digital change is coming" for manufacturing. This will engulf production and assembly processes, the devices and equipment on plant and factory floors, how design relates to production, how companies interact with customers and suppliers, and, perhaps most importantly, how and where leadership teams will pilot their companies in the years ahead.

On a broader scale, the impact of this digital transformation across society will be profound, he added. For example, until about 1900 observers suggest that human knowledge doubled around every 100 years. But today, he noted, IBM estimates that the build out of the Internet of Things alone will cause human knowledge to double every 12 hours!

Yet the digital transformation that is inherently part of M4.0 for the manufacturing sector, is still in its early stages in most companies, he explained. What's more, any manufacturing company that believes M4.0 is simply about investing in new digital technologies alone is missing the point.

Digital tools are critically important, of course, but M4.0 is also about "cultural change and organizing differently – understanding and successfully implementing such things as flatter organizational structures and a collaborative innovation model – as well as re-tooling leadership teams with non-traditional skills sets," he added.

The problem is that many manufacturers appear to be struggling today to fully absorb and get into position to drive and lead this new industrial revolution.

Citing another recent Council research project on *Next-Generation Manufacturing Leadership,* Brousell reports that, "While manufacturers expect to receive significant benefits from digitization, they also say their leaders have not yet fully adjusted their mind-sets, behaviors, and skills in ways that will be necessary to take advantage of the possibilities of digitization."

Perhaps that's where the biggest challenge along the journey to M4.0 may lie for many manufacturing organizations in the years ahead. Time, however, is not on the side of those who delay.

“You will not have 25 years to get on board with M4.0,” advised Brousell. “You are going to have to act fast – and with as much precision as possible.”

(Paul Tate is Research Director and Executive Editor with Frost & Sullivan’s Manufacturing Leadership Council. He also directs the Manufacturing Leadership Council’s Board of Governors, the Council’s annual Critical Issues Agenda, and the Manufacturing Leadership Research Panel.)

The Rise of Manufacturing Marks the Fall of Globalization

written by Lauri Moon | June 30, 2016

(Geopolitical Weekly – Rebecca Keller: 6-7-16) Whether you’re reading this article on a smartphone, tablet or laptop, chances are the device in front of you contains components from at least six countries spanning three or more continents. Its sleek exterior belies the complicated and intricate set of internal parts that only a global supply chain can provide. Over the past century, finished products made in a single country have become increasingly hard to find as globalization — weighted a term as it is — has stretched supply chains to the ends of the Earth. Now, anything from planes, trains and automobiles to computers, cellphones and appliances can trace its hundreds of pieces to nearly as many companies around the world. And its assembly might take place in a different country still. Opportunities for producing and assembling products and their components have spread worldwide, making it is easier for countries to climb the production value ladder. States at the bottom, extracting raw materials, can gradually move up, first making low-value components and then progressing to higher-value ones or basic assembly.

But just as technology spurred globalization and the shifts in international trade that followed, so, too, will it revolutionize how countries again do business with one another. Compounded by the economic and demographic changes taking place today, automation, advanced robotics and software-driven technologies are ushering in a new era — one of shorter supply chains that will

provide fewer opportunities for the developing world. Regions once labeled “emerging economies” may instead stagnate, and the divide between the haves and have-nots within and among nations could widen further.

2016-17 WEDnetPA Funding Applications Now Available

written by Lauri Moon | June 30, 2016

Did you know that the cost for attendance at one of IMC’s Open Registration Workshops or Onsite Training at your facility could be covered by WEDnetPA funding? Contact Lauri Moon to discuss your training needs.

Applications for the Workforce and Economic Development Network PA (WEDnetPA) training reimbursement program for Fiscal Year 2016-17 are now available. Funding is provided through the PA Department of Community and Economic Development (DCED) and administered by 27 WEDnetPA Partners throughout the Commonwealth. The goal of WEDnetPA is to strengthen the business environment of Pennsylvania by providing qualified employers (primarily manufacturing or technology-based businesses) training reimbursement funding for new and existing employees that can improve their skill level and productivity. Companies determine their own training needs and can select among a wide range of training providers (the WEDnetPA partners, third-party providers or in-house staff) as well as how and where the businesses will receive the training (onsite, offsite or online). For more information on WEDnetPA visit www.wednetpa.com or click here.

Digital Manufacturing is a Growth Sector

written by Lauri Moon | June 30, 2016

American manufacturers are investing heavily in digital technologies, pouring 2.6 percent of their annual revenue into digital systems, according to PwC. That investment “is expected to increase to almost 5 percent of revenue in the next five years, an estimated $350 billion,” says the consulting firm.

Venture capital firms have invested $3.6 billion since 2011 in start-ups developing digital technologies for manufacturers. This funding reflects “an increase of nearly 50 percent annually with start-up investment focused on manufacturing software, ERP and inventory software and robotics and sensor technology,” states the consultancy.

Of the manufacturing companies that PwC surveyed, adopting digital manufacturing technologies will lower operating costs by at least 11 percent, “mostly through efficiencies gained by automating processes and production.”