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To: meprfi <meprfi@nist.gov>
Subject: MEP Competitive Awards Program RFI Responses

Over the past eight years Enterprise Minnesota has interviewed 400+ manufacturing executives in our annual State of Manufacturing® (SOM) survey, and held 12 or more focus groups with manufacturing executives to obtain their opinions on the challenging issues, opportunities and perceptions of Minnesota's economy. In addition, Enterprise Minnesota conducts 11 monthly CEO Council meetings each averaging 10 manufacturing member CEOs. In response to MEP's Request-For-Information we have drawn on this data and knowledge to address questions one through four.

1. What are the key problems and issues facing small U.S. manufacturers and their competitiveness and opportunities for growth in the near-term (1-2 Years), mid-term (-5 year) and/or long-term (>5 years)?

Manufacturers overwhelming identify workforce as their main challenge for growth and competitiveness, in the short, medium and long-term. Our survey captures data by company size and rural location versus metropolitan. When viewing the data for small, very small and rural manufacturers the findings are particularly troubling.

With the continued retirement of Baby Boomers and the shrinking pool of potential employees to draw from, the workforce issue will continue to worsen. All industries are facing the same dilemma, so supporters of manufacturing must be much more active in solving the issues associated with a challenging workforce environment, versus admiring the problem.

The 2016 SOM survey shows that 71% of the respondents said it was difficult to attract and retain new workers in contrast to 40% six years ago. Rural manufacturers show the workforce challenge is eight percentage points higher than for metro companies. Some regions in Minnesota show the difficulty percentage is above 85%.

Our survey shows disparity between rural and metro-based manufacturers. Firm location is an issue for 29% of rural manufacturers versus only 7% metro. This leads to 52% of manufacturers located in rural areas cannot find applicants versus 34% in the metro. Both metro and rural employers find that 52% of applicants do not have the needed skills or education.

Our survey also shows that 57% of manufacturers need machine operators and assemblers. Fifty-nine percent of current opportunities require formal technical training, while entry-level careers remain in the 20-30% range. Manufacturers participating in focus groups verified that the job and career opportunities of the future require skills gained through formal technical training.

In summary, an eye opening survey finding shows that only 22% of the small and very small have employee growth expectations, whereas 50% of mid-sized companies expect to add employees. The focus groups verified that the small rural based companies struggle to find qualified replacements for retirees.

Only 29% of surveyed manufacturers feel they are addressing their inability to recruit, hire and train through process efficiency and automation utilization. We feel the opposite percentage is where automation should be strategically integrated with continuous improvement.

2. What advanced manufacturing technologies are and/or will be needed by small U.S. manufacturers for the companies to be competitive and grow in the global marketplace in the near-term (1-2 years), mid-term (3-4 years) and/or long-term (>5 years)?

Based on the workforce challenge that will only accelerate in future years, as addressed in Question 1, there are not enough bodies today nor will there be in the future to address the "body pipeline" shortfall to serve the industry's needs. For survival very small, small and medium sized companies need access to intelligent technology that integrates seamlessly with their continuous improvement efforts.

There has been significant advancements in intelligent robots called by many terms. Cooperative robots can work jointly with other robots and with human operators, to jointly perform a common task or complimentary task(s). Complex algorithms have enabled machine learning. The integration into more machine applications is the basis of Artificial Intelligence which is readily definable and available. Cognitive robotics is concerned with endowing a robot with intelligent behavior by providing it with a processing architecture that will allow it to learn how to respond to complex situations.

The goal is simple to state but complex to implement. Automation and integration is more than just adding a robot. It is analyzing the entire manufacturing process and developing an automation solution that will complement its integration with process improvement efforts. When achieved, companies will see greater throughput and employees will see greater career growth opportunities. While large manufacturers are employing these systems unfortunately, very small and small manufacturers do not have the resources to do so and will be left behind.

3. What technologies and/or business models are important to small U.S. manufacturers as they choose and participate in any particular supply chain?
   And,
4. What complimentary business services, including information services, are and/or will be needed by small manufacturers and/or MEP Centers to take full advantage of advanced manufacturing technologies at the company or supply chain level?

Being deliberately and strategically thoughtful in their approach to all aspects of their business will be the key to the growth of small manufacturers. The Business Model must start with a defined strategy and plan that is long-term, forward looking, committed, purposeful with clear direction connecting their organizational competences to their customer needs. Technology, such as intelligent robotics, and new business services might be important to succeeding in pursuing new supply chains but may also be misdirected without an organizationally embraced strategy.

Small manufacturers tend to concentrate their perceived growth efforts on internal operations through a start and stop implementation of continuous improvement. This internal focus does

not address the key growth elements of pursuing and attaining new customers and or new markets. It does not validate the quality management system that might be necessary to penetrate new markets. It does not define the workforce and leadership talent needed to pursue, obtain and serve new customers. How often have we seen manufacturers implement new technology, systems or software only to fail because the initiatives were isolated to tactical "hows" versus organizational planning and commitment to secure competitive advantage and produce measurable, valuable and sustainable results?

Thoughtful and systematic planning is how MEP Centers could/should/must help small manufacturers achieve sustainable growth. The plan builds the foundation on which to build the continuous improvement, quality management system, revenue growth initiatives and development of talent to assure success. Consistency of how centers help clients plan would be beneficial to small manufacturers across the USA. Guidelines for consistency could/should follow 1) Formal growth strategy plan 2) Targeted sales development to assure profitability 3) Engage and unleash your people through communication, involvement and skills development and utilization and 4) implement process improvement and use of system to enhance and assure growth opportunities come to reality.

Thank you the opportunity to respond,
Enterprise Minnesota

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