

## Suggested IMI Focus Area

As an alternative to picking an IMI that is designed around specific technology, I would suggest that at least one of the IMIs be formed around a mature industry. Almost by definition, a mature industry is solidly fixed into well-established past practices and improvements are incremental at best. Changes come very slowly and the majority of operations have an investment policy that is based more around repairing leaking roofs rather than recapitalizing to improve productivity. Mature does not mean outmoded, since industries like metalcasting are vital to defense, transportation, energy and most of our manufacturing base.

The growth opportunities of focusing on a mature industry are significant. Particularly now when major OEMs are looking to source components close to assembly facilities. The challenge is that components must still be purchased at a total-cost world competitive price. To achieve a manufacturing renaissance in a mature industry is almost impossible without transformative thinking that is led by a focus such as the proposed IMIs.

There are many U.S. industries that can be classified as mature. The cast metal foundry industry can be used to illustrate the benefits of focusing an IMI on a mature industry.

### A Mature Industry's Demographics:

- The first manufacturing plant in the new world was the Saugus Iron Works (an integrated foundry) established in 1642 near Lynn, Massachusetts.
- There are currently 2,010 foundry in the U.S. down from 2,336 five years ago.
- Employment in the industry is 200,000.
- 80% of the foundries have fewer than 100 employees and there are only a handful of operations with more than 500 employees.
- 2011 shipments of metal castings totaled \$29.45 billion.
- Ten years ago the U.S. was the world's largest producer of casting and today it is third behind China and India.
- More than 90% of all manufactured goods and capital equipment use castings as engineered components or rely on castings for their manufacture.



## **IMI Opportunities to Improve a Mature Industry**

- Most U.S. metal casting plants only produce the rough castings, which then requires components to move through separate machining, heat-treating, coating and subassembly plants.
- There is little need to bring TRL3 to TRL6 technology to a mature industry. Bringing existing TRL7 to TRL9 technologies from other industries will have an immediate benefit.
- Foundries are high energy users. Existing plants should be able to reduce energy costs by 10% to 15% and new plants taking advantage of the best technologies should see a 25% to 30% energy reduction.
- There are very few foundries that have scrap rates less than 3%. Most are 5% to 10%. With the IMI addressing process variations, industry scrap rates should be cut in half.
- The best operations in the industry have initial sample and repeat order fulfillment times at are less than 25% of the average times. Working with the Manufacturing Extension Programs (as is being done in Minnesota) the average should be closer to the current best times.
- One major focus for the IMI would be on safety. The industry's accident incident rate is three times the rate for all manufacturing firms.
- As expected from a mature industry, the foundry industry has a number of collaborative efforts with universities, community colleges and many focused societies such as the American Foundry Association. The industry also supports an Institute that is excellent at delivering the 101 entry level courses. All of these would be associated with a foundry focused IMI. The IMI should deliver 201 and 301 advanced level learning that is done in laboratories or at manufacturing plants to help improve core competencies.
- The IMI should have a very direct benefit in bringing advanced materials to the production floor. Austempered ductile iron is a good example of a material that has tremendous benefits but there is reluctance to be fully utilized by designers and producers.
- The industry has been slow to fully embrace the benefits of computer simulations of their process. An IMI should be very instrumental in moving this technology to all foundries.
- The foundry industry is a natural collaborator with the National Additive Manufacturing Innovation Institute. It is a possible disruptive technology for the industry and at the very least one that will dramatically impact tooling and low production runs. Embracing Additive Manufacturing technologies will improve responsiveness, development and lead-time and potentially lead to tool-less manufacturing.
- Industry equipment and material suppliers would be a major participant in the IMI. While the number of foundries has been declining, the supplier base is still leading the world. To survive, the U.S. equipment suppliers are involved in new construction around the world.

## **Summary**

This purpose of this document is to encourage the AMNPO to be very board in their thinking about IMIs. When deciding on the specific IMIs, there is less risk and more benefits in bringing a mature industry into the 21<sup>st</sup> century. Because of the many customers, suppliers, plants and institutions already working together in a mature industry sustainability of the IMI is more likely after federal dollars stop.

The mature industries are the foundations of our manufacturing economy. Without U.S. based component manufacturers, there can be no manufacturing renaissance. The information and examples from the foundry industry would apply to any of the U.S. mature industries.

## **Background on the Submitter**

Dennis Dotson has been active in the foundry industry for more than 40 years. He owns and operates an iron foundry that has received the "Metalcaster of the Year" and the "Casting of the Year" awards from the American Foundry Society. Dennis is past president of the Ductile Iron Society and in 2013 he will be president of the American Foundry Society. He is a Trustee Emeritus of the Minnesota State Colleges and Universities board. He also serves as Chair of the Advisory Board for the NIST Manufacturing Extension Program. During the past two years, Dennis has led an effort to build a game-changing, green-field foundry that will be the first of 20 new integrated foundries.