



SFSA CASTEEL REPORTER

Steel Founders' Society of America

a publication serving
SFSA steel casting industry Members

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June — 2018

Casteel Commentary

The Commentary argues that automation is not required for economic but for demographic reasons. Automation, like in Japan, will be required to overcome the lack of new workers and maintain our plants and companies.

Fall Leadership Meeting

This year's SFSA Fall Leadership Meeting is September 8-11, 2018 in Nashville, TN at the 21C Museum Hotel. Online registration is now open. Early registration rates are available now through June 30. Also, member companies sending more than one attendee will receive a \$500 discount on each additional registration.

This year's business sessions will include the SFSA 2018 market forecast, industry round table, and presentations from the following speakers:

- [Gene Marks](#), Marks Group – Growth & Opportunities, the latest trends that will dominate your business through the next 2 years.
- [Alan Price](#), Wiley Rein LLP – US Trade Policy: Issues and Trends
- [Jay Wrobel](#), US Dept. of Energy – Energy Initiatives for Manufacturers
- Skip & Martha Guimond, Guimond & Associates – EHS Regulatory Update
- Steve Cooke, Badger Alloys – SFSA 2019 Market Forecast

Optional Group Activities

Nashville Gun Club - Clay Shooting

- Clay shooting is the popular and growing sport of shooting flying clay targets with a shotgun. It's safe, exciting, challenging and fun. Hitting the target requires skill, timing and hand-eye coordination, but there's nothing quite like that feeling when you pull the trigger and see the target explode into a million pieces! Guides provide group safety instruction, with hands-on assistance as needed for the adventure. The outing is for every skill level. No experience needed.

Topgolf

- Compete in a SFSA Topgolf team competition with prizes and bragging rights at the end of the day. Players hit micro-chipped golf balls that track each shot's accuracy and distance while awarding points to teams for hitting targets on the outfield. Anyone can play Topgolf, from aspiring golf pros to those who have never walked 18 holes. Drinks and appetizers are included.

Belle Meade Plantation Culinary Tour

- Belle Meade Plantation is a fully restored and fully furnished 1853 Greek Revival Mansion. We'll start the afternoon with a tour of the mansion. Afterwards, you will spend time in one of the original plantation kitchens where guests will enjoy a culinary demonstration and taste a sampling of southern classics like biscuits with smoked country ham or muscadine wine

jelly. You will also see the largest antebellum smokehouse in the South where over 20,000 pounds of pork were cured each year. Your final stop will be the winery, for a wine tasting of the private wines exclusively sold at Belle Meade, a tradition started on the plantation in 1820.

Section 232 and Section 301 Tariffs

As of June 1, the Section 232 tariffs on steel (25%) and aluminum (10%) U.S. imports went into effect for all countries of origin except for Argentina, Australia, Brazil, and South Korea. Countries like Mexico, [Canada](#), and the EU have already announced retaliatory tariffs ([summary from NAM](#)) in response to being subject to these tariffs.

The specific products covered under the Section 232 tariffs are as follows:

“Aluminum articles” are defined in the Harmonized Tariff Schedule (HTS) as: unwrought aluminum (HTS 7601); aluminum bars, rods and profiles (HTS 7604); aluminum wire (HTS 7605); aluminum plate, sheet, strip and foil (flat rolled products) (HTS 7606 and 7607); aluminum tubes and pipes, and tube and pipe fitting (HTS 7608 and 7609); and aluminum castings and forgings (HTS 7616.99.51.60 and 616.99.51.70), including any subsequent revisions to these HTS classifications.

“Steel articles” are defined in the HTS six-digit level as: 7206.10 through 7216.50; 7216.99 through 7301.10; 7302.10; 7302.40 through 7302.90; and 7304.10 through 7306.90, including any subsequent revisions to these HTS classifications.

The HTS codes identified for steel do not include steel casting components, despite SFSA’s testimony at the 232 hearing last year. In fact, these codes were adopted from a previous 232 investigation conducted in 2001 on iron ore and semi-finished steel.

In April, at the request of President Trump, the office of USTR published a list of products potentially subject to an additional 25 percent tariff on Chinese imports to combat issues primarily related to intellectual property theft. The Section 301 tariffs have not yet taken effect pending a notice and comment process to determine whether products should be added or removed from USTR’s proposed list.

SFSA is working to collaborate with the Department of Commerce and the USTR to add steel casting related HTS codes for both the 232 and the 301. The spreadsheet (<https://www.sfsa.org/news/2018/Copy%20of%20HS%20Codes-Tariffs%20301%20matches.xlsx>) identifies known steel casting codes that are part of the 301 list and the current tariffs imposed by other countries on US exports. We are asking all members to please help us identify other HTS codes. Please send them to Ryan Moore, rmoore@sfsa.org.

US trade policies and tariffs will continue to be a key issue in 2018. At this year’s Fall Leadership Meeting in Nashville, Alan Price, a well-known attorney of more than 30 years that specializes in steel trade cases will be providing his perspective on the current and future steel trade issues. Please plan to attend!

Annual Research Review

In 2018, SFSA kicked off research in two major programs – Digital Innovative Design (DID) and with AMC’s Innovative Casting Technologies (ICT). The Research Review covers the latest steel casting research and is your opportunity to interact with the researchers and provide industry steering. The event features both Carbon & Low Alloy and High Alloy topics; it is the R&D featured at the National T&O but with no cost for the meeting. Please RSVP here. For questions, contact David Poweleit at poweleit@sfsa.org.

Foundry Intern Scholarship Registrations Due July 2nd!

Recruiting students to join our industry and grow into leadership positions remains a critical need in the steel casting industry and a strategic initiative of the Society. The SFSA Foundation aims to attract the next generation workforce by providing scholarships to student interns. To compete for the scholarships, interns are required to work at a member foundry and carry out a specific task or investigation and selected works are presented at the annual T&O conference. We encourage all members that employ interns in 2018 to give them an opportunity to receive a scholarship by registering these interns using the forms found here: [scholarships.php](#).

Quenching Meeting

The second subject-focused meeting of 2018 will support the Heavy Section Product Group with material on quenching of steel castings and a focus on quench tank design and process modeling. Quenching is a critical step in the heat treatment process to harden or strengthen steel castings, and to achieve required mechanical properties. The focus for this meeting will be on quench tank design and modeling to achieve the desired properties in your casting. The meeting is scheduled for Tuesday, September 18th and will include a tour of Highland Foundry near Vancouver, Canada.

Heat Resistant Meeting

The final subject-focused meeting will be on heat resistant alloys and will be held in conjunction with the second Future Leaders Group meeting. Heat resistant grades are used in applications where service temperatures exceed 1200°F, and require strength (creep resistance and performance through cyclical stresses) but also ability to resist attack from the environment. The meeting will cover the fundamentals of heat resistant alloys – metallurgy, manufacturing and welding; along with SFSA's current R&D on heavy section austenitics. The meeting is scheduled for October 11-12 with a tour of Duraloy Technologies.

The kick-off meeting for SFSA's Digital Innovative Design for Reliable Casting Performance (DID) was held in April. This five-year initiative aims to increase the ability for engineers to design steel castings with reliable performance, and to assist in educating buyers in the acquisition of steel castings to meet their requirements. Seven academic partners supporting this effort through the following projects:

NDT Development and Evaluation of Variability and Reliability, Iowa State University – Frank Peters and David Eisenmann

To support developing the design levels proposed, it is important to develop new NDT standards tied to performance. Current NDT methods and standards for commercial work are based on visual comparisons of workmanship standards. Experimental testing will be done to establish correlations between the NDT methods used to evaluate a casting and the resultant mechanical performance.

Solidification and Performance Modeling, University of Iowa – Christoph Beckermann

Casting solidification modeling will be integrated to performance analysis tools. This effort will enable the casting process solidification modeling results to predict local material and quality design properties to allow the component geometry to be digitally tailored to meet the performance requirements.

Material Characterization and NDT Development, University of Alabama at Birmingham – Charles Monroe, Robin Foley, John Griffin

The development of digital tools for computer modeling assessment of local design properties that are reliable will be impossible without experiments to validate the underlying assumptions in the process. Microstructural characterization of samples that are representative of the casting process will be conducted.

Welding Process Development, Lehigh University – John DuPont

Welding is a part of the production of steel castings; however, there is some misconception that this is done to “repair” the casting. This research aims to demonstrate that welds on castings do not degrade the quality and performance of the casting.

Welding trials will also be done to support the current AWS D1.1 proposal to include carbon steel castings in the prequalified base metals. The mechanical properties of common cast carbon steels welded to similar mill grades will be evaluated.

Building Construction Component Design and Testing, University of Arizona – Robert Fleischmann

Structural testing of cast components will be done to show that steel castings can be used as structural components. The effect of different quality factors on the performance of steel castings will be evaluated. Cast prototypes will be welded to hollow structural steels to demonstrate that castings can be welded to standard structural components. A design guide for designers will also be developed to make the use of steel castings less complicated.

Development of Cast Carbon Steel for Building Construction, Pennsylvania State University
– Robert Voigt

Current standards for cast carbon steels specify lower minimum strength and typical composition has higher carbon equivalent than mill products. The aim of this research is to develop a cast carbon steel that matches wrought grades used in building construction in terms of strength and carbon equivalent. This project will support the current proposal to include cast grades as prequalified base materials in AWS D1.1.

Process and Property Optimization of FeMnAl, Missouri University of Science and Technology – Laura Bartlett

Manganese steel, FeMnAl, offers excellent combinations of strength and toughness and low density; however, there are challenges, which are also common in making other manganese steels, in production of these alloys. These include melt cleanliness, large grain size, cracking during processing, and non-uniform response to heat treatment. This research will evaluate how to mitigate these issues and improve the manufacturability of this alloy. A next generation FeMnAl variant for castings and wrought products will be developed.

Steel Casting Technology Course

Thanks to the support from Tom Stevens, the repeat of the SCT Course early this year was a success. The class had 11 participants from 8 different foundries. The participants were able to visit 3 member foundries. We appreciate the support from our gracious hosts: ME Global-Tempe, Magotteaux-Pulaski, and American Foundry Group-Bixby.

Market News

Bookings for both steel castings and stainless castings were up strongly from the prior year in March, 20% for steel and over 10% for stainless. Shipments for both were over 5% above last year. Backlog has declined however so is between 6 and 9 weeks for both market segments.

Steel mill production and pricing remains positive for the past couple months. Oil prices and copper prices remain relatively high compared to the past two years.

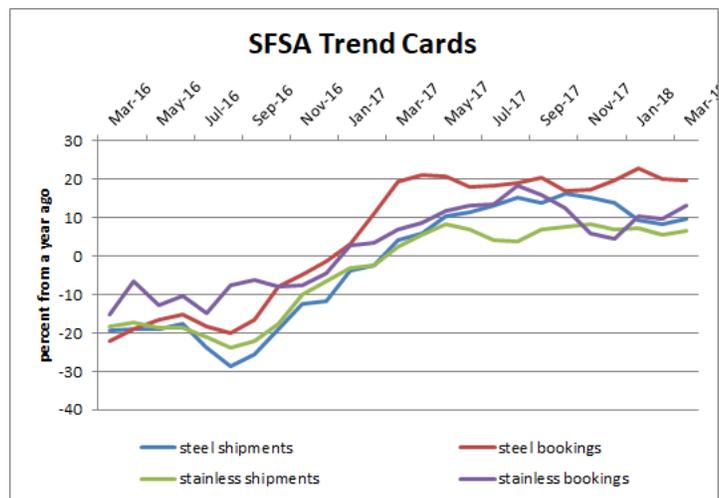
The demand for capital goods has been growing for the past year and is at new highs. Monthly reports for iron and steel casting shipments have shown slight improvement.

Recent roundtable discussions were characterized but positive market trends suggesting strong markets for the balance of 2018.

Casteel Commentary

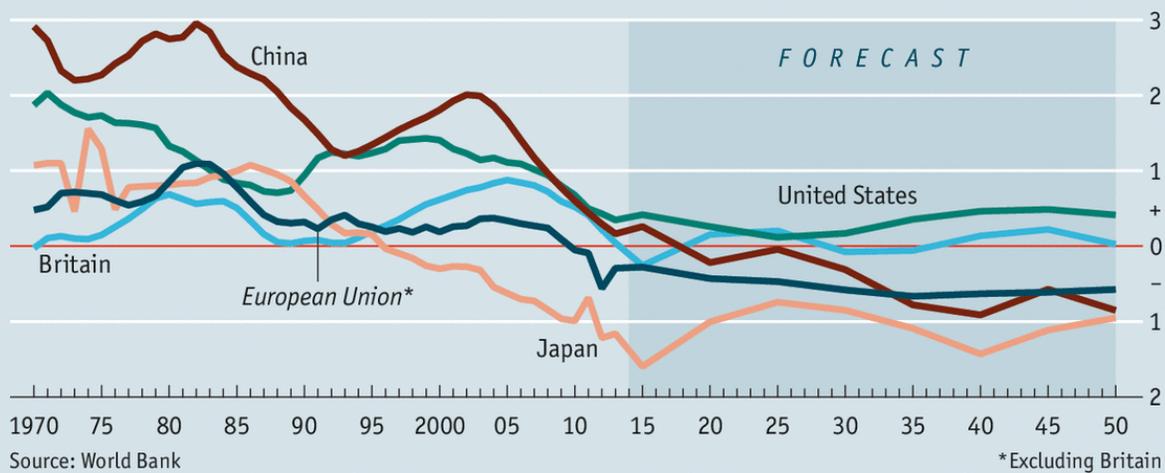
Automation must form a critical element of any strategy to succeed in our industry for the future. This is not due to the difficult work, lack of a strong work ethic, the dangers in the plant, etc. It is really the Japanese experience that will soon take over our world if not the whole world.

What do I mean by that? See below...



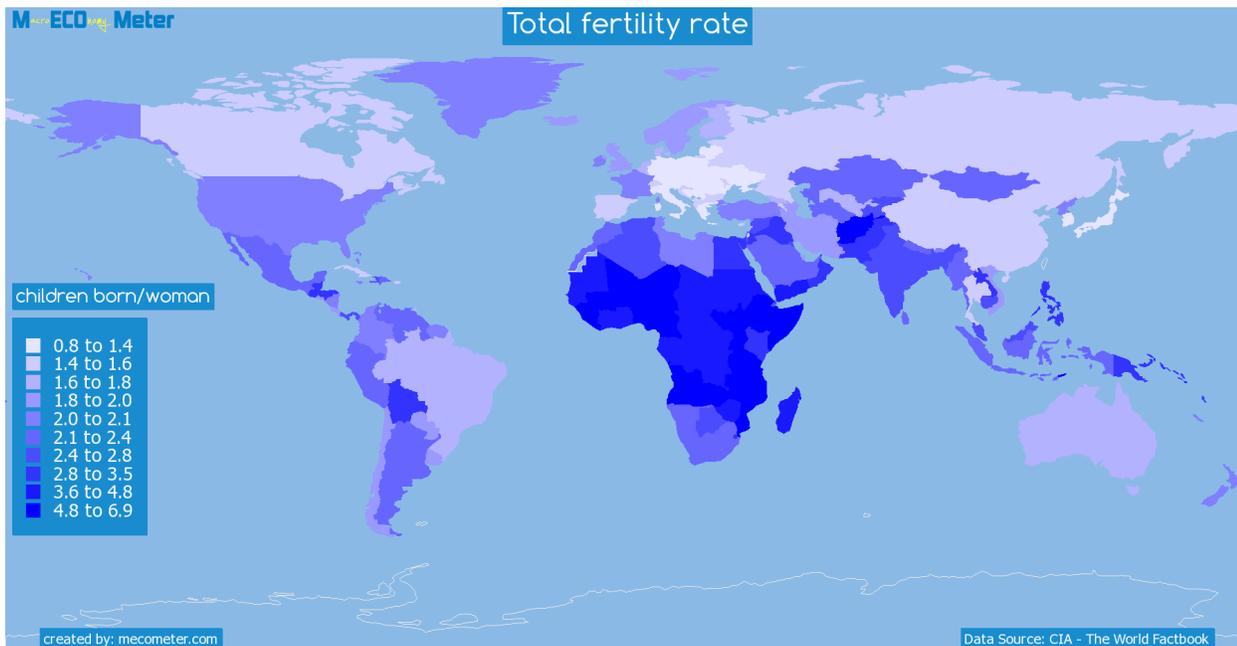
The vanishing worker

Working-age population, % change on a year earlier



Japan has not welcomed significant immigrants and their birth rate is at sub-replacement levels. The low birth rate and lack of immigrant labor led to a real crisis in finding workers for common industrial jobs. Like the rest of the developed world in the graph, Japan has peaked out in the working age population and has been shrinking since the 1980's. Much of the 6 sigma-5S program efforts in Japan was to aid in companies overcoming the shrinkage of the number of workers. Automation became a necessity, not because it was cheaper than staffing but because the factory could not staff when there were no available workers.

Prosperity and birth control will make it increasingly challenging to staff our facilities with ordinary manual workers being among the most difficult to recruit. When families had more children, there was a willingness, even a need, to find a good production job for a child that was limited in their skills and capabilities. As birth rates falls and the population ages and becomes wealthier, this source of limited skilled workers disappears. The family can support these members without their needing to find a factory job. They can work in a retail outlet or fast food restaurant without the effort of working at a demanding foundry position. Below is the fertility rate where replacement, not growth requires rates over 2.1 per woman and all the world except some poor undeveloped regions have birth rates below replacement levels. This means that we are likely to have population stability not growth with an aging population. We will have fewer workers that will be less willing to do traditional manual jobs in our plants.



It is clear that the steel foundry in the future will be substantially more automated, eliminating many of the current physically demanding and inefficient operations. Vision systems combined with solid models of parts and optical metrology will allow robotic grinding and finishing.

I can't imagine what else we will automate. Will we print a mold, pour the casting and at shakeout, retrieve the casting robotically and then finish it in a series of robotically staffed cells that knows the part and its orientation and grinds, welds, heat treats, final inspects and boxes the castings for shipments in lot sizes of one?

I don't know how but it seems clear what. We will automate or be obsolete. So I think we must see our future as using networked sensed robotic and manipulators to eliminate most of the labor required in our factories to make the steel castings we produce.

Exciting and scary, but I think the most likely future challenge.

**STEEL FOUNDERS' SOCIETY OF AMERICA
BUSINESS REPORT**

SFSA Trend Cards (%-12 mos. Ago)	12 Mo Avg	3 Mo Avg	January	December	November
Carbon & Low Alloy					
Shipments	11.2	9.3	8.6	4.2	15.0
Bookings	19.9	23.0	21.0	28.0	20.0
Backlog (wks)	8.7	8.7	8.0	8.0	10.0
High Alloy					
Shipments	6.2	7.5	5.0	6.5	11.0
Bookings	11.3	10.5	18.6	2.8	10.0
Backlog (wks)	8.6	8.5	8.5	9.0	8.0
Department of Commerce Census Data					
Iron & Steel Foundries (million \$)					
Shipments	1,301.8	1,327.3	1,329	1,331	1,322
New Orders	1,333.8	1,318.3	1,288	1,293	1,374
Inventories	1,981.3	2,030.0	2,043	2,028	2,019
Nondefense Capital Goods (billion \$)					
Shipments	72.2	74.4	74.3	74.4	74.5
New Orders	73.2	74.6	73.7	74.9	75.1
Inventories	178.8	181.2	182.1	181.1	180.4
Nondefense Capital Goods less Aircraft (billion \$)					
Shipments	64.6	66.9	67.1	67.1	66.6
New Orders	65.0	67.0	66.7	66.9	67.3
Inventories	123.4	125.3	125.8	125.5	124.7
Inventory/Orders	1.9	1.9	1.89	1.88	1.85
Inventory/Shipments	0.0	1.9	1.88	1.87	1.87
Orders/Shipments	0.0	1.0	0.99	1.00	1.01
American Iron and Steel Institute					
Raw Steel Shipments (million net tons)	7.6	7.5	7.6	7.3	7.4