



SFSA CASTEEL REPORTER

Steel Founders' Society of America

a publication serving
SFSA steel casting industry Members

780 McArdle Drive Unit G, Crystal Lake IL 60014

Tel: 815-455-8240 Fax: 815-455-8241

<http://www.sfsa.org>

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Casteel Commentary

The Casteel Commentary observes that for most steel foundries, the majority of their work are proprietary products. The development of the casting in conjunction with the customer has developed a particular production process and tooling that provides the components they require. Because of this we need to recognize that we are proprietary source and mutually dependent. Our customers need us to operate profitably so we can continue to reliably and quickly meet their product requirements.

SFSA Launches Redesigned Website Including an Enhanced Customer Education Resource

The SFSA website now has a new look and improved functionality. The goal of the redesign was to modernize the website and to improve the experience for our site users which are steel casting producers, casting buyers and designers, and Government and Academia. Web stats show that the steel foundry directory and the casting designer resources were the most visited pages on the existing website. Therefore, one of the key developments for the new website is the customer education center at <https://www.sfsa.org/education.php>. The center has expanded on the casting design and purchasing information from the prior revision to provide a more comprehensive resource for customer markets. As an example, SFSA staff with the marketing committee have developed and released a series of open letters addressed to steel casting customers. The intent is to provide customers with an unbiased third party perspective based on facts related to steel castings. The letters are drafted by the Society and then vetted through committees. To date, SFSA has compiled "Welding Steel Castings", "Understanding Steel Casting Failures", and "Models and Dimensions". Additional letters and content will continued to be developed and added to the website.

Board Approves Glenn McQuarter as Master Foundryman

A component of the SFSA artisan program, which was created to develop the skills we need in the new workforce, is the implementation of a Masters' recognition. One way we can demonstrate the value and raise the profile of the critical skills needed to make steel castings is to recognize the craftsmen responsible. These masters will be able to guide the training and qualifications for future artisans. Members may nominate one of their highly skilled workers for the honor. Nominations are reviewed by the SFSA Board, who award the title to nominees.

Max Holman, President of Bay Cast, Inc. nominated Glenn McQuarter for Master Foundryman recognition. In his 29 years of dedicated service at Bay Cast, Glenn has worked in all capacities at the foundry and has been instrumental to the success of the company. Glenn has presented several papers at the T&O and has served as both eastern division chairman and national T&O chairman.

The board unanimously approved the nomination and Glenn will be recognized by SFSA at the 2016 T&O conference.

SFSA would like to encourage every member to please send at least one nomination letter to Raymond Monroe and include:

- Full name and contact information for the nominee and person submitting the nomination
- Master's category and brief work history for the nominee
- Major achievements of the candidate
- Contributions and major career accomplishments that demonstrate their qualifications and skill
- Endorsements and recommendations from peer and foundry colleagues

SFSA Spring Leadership Meeting

The SFSA Spring Leadership Meeting was held on May 4th-5th in St. Louis, MO and included a foundry tour of MetalTek Carondelet. If you were not able to attend, we have made the presentation slides available to all members at: <https://www.sfsa.org/meetings/spring16.php>

SFSA Fall Leadership Conference

The Board of Directors of the Steel Founders' Society of America invites you to attend the Fall Leadership Meeting September 10-13, 2016. The meeting will be held in Santa Fe, New Mexico at La Fonda on the Plaza. We look forward to attending this educational and networking meeting while enjoying the fun and culture that Santa Fe has to offer.

This year's business sessions will include the SFSA 2017 market forecast, industry roundtable, and informative presentations including:

- Rick Farrell, Tangent Knowledge – New Sales Strategies to Avoid Commoditization
- Jonathan Weisgall, Berkshire Hathaway Energy – Energy Markets
- Mike McDowell, Astech Industries – Perspective on Global Casting Market
- Larry Kavanagh, Steel Market Development Institute, Current & Emerging Steel Markets

Please visit <https://www.sfsa.org/meetings/fall16> for additional meeting information and registration details.

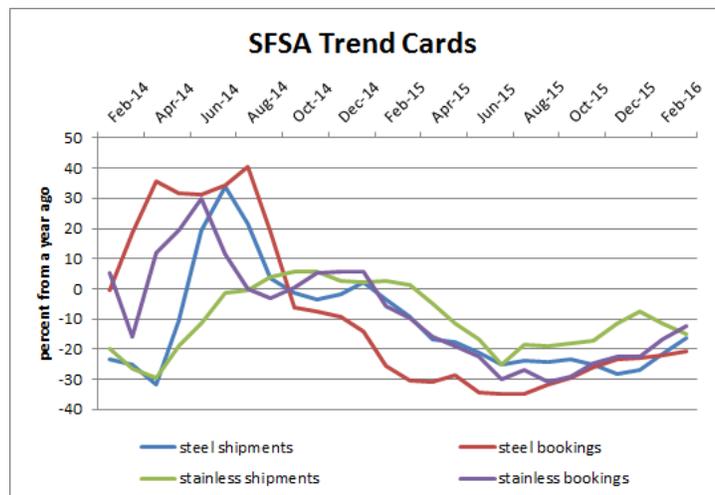


Market News

Steel foundries are suffering as business levels are quite low. Many plants are operating at unsustainably low levels of production with little indication of improving conditions soon. SFSA trend cards reflect this grim picture. Booking for steel castings were off 20% in March 2016 compared to March 2015, which was off more than 30% from March of 2014. So on average booking are down more than 50% from the high levels in mid-2014. Shipments were off 16% for March 2016 from being off 17% in March 2015 from being off 25% in March of 2014. Stainless castings are down less but they have also seen a severe downturn in orders and shipments.

Backlog, which is a measure of market activity, has fallen to low levels with the March numbers being 7 weeks for stainless and 6.5 for steel.

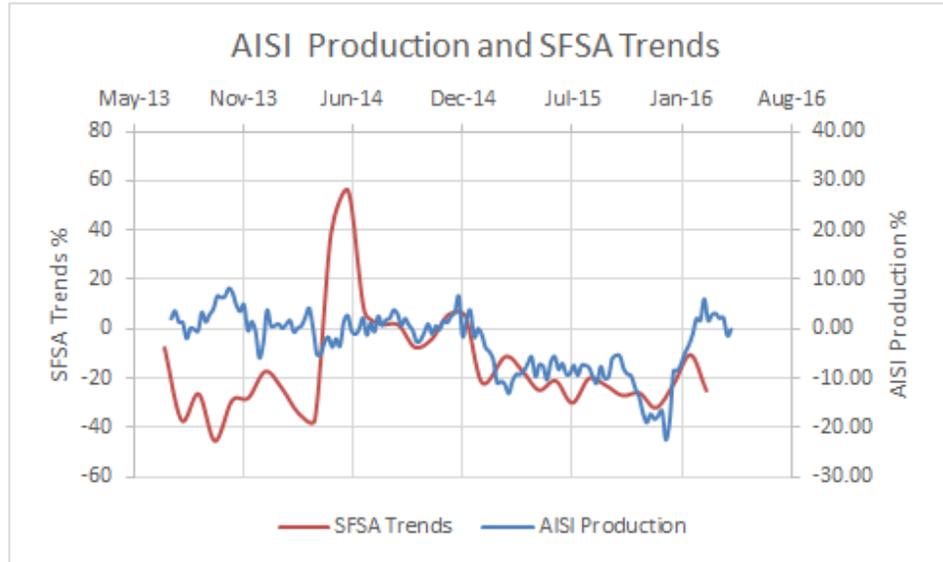
These low levels of business are consistent with the overall demand for capital goods. Orders and shipments of non-defense capital goods without aircraft are a major metric tracking the ordinary growth of the economy. These orders began to fall in late 2014 and have remained below that peak continuing to decline through March. Steel mill production does show some signs of improving business. The graph of steel casting trends and AISI steel production show relatively similar behavior



in general. The recent improvement in steel production suggests a stabilization and perhaps improvement in the steel casting market.

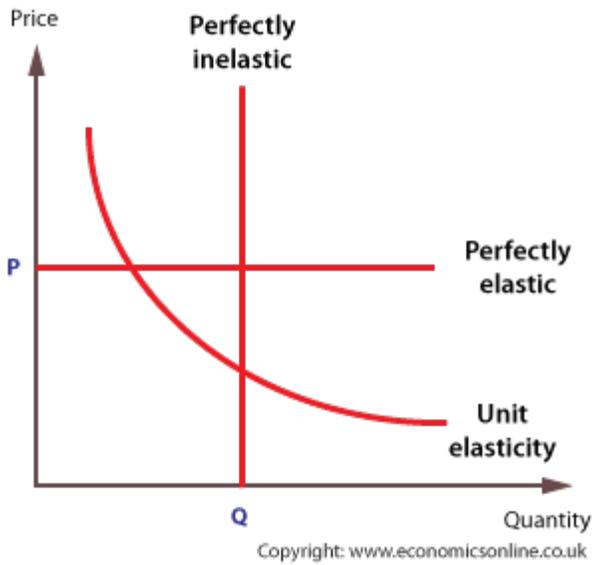
This hint of stabilizing and improving conditions is also seen in the rising prices for copper and oil in recent weeks.

Overall this suggests that steel casting demand should not continue to decline but rather should stabilize here and begin to improve although only slightly until the end of the year.



Casteel Commentary

Steel casting buyers assume that steel castings like other steel products are commodities. Commodities are uniform materials or products that have perfect substitutes from multiple suppliers. Prices for commodities are set by the balance of supply and demand determined by the cost of production and the value to the user. Steel products like 3/8-inch reinforcing bar is an example of a commodity.



Steel founders often argue that steel castings are custom products and not commodities. The engineering content of the steel casting and the unique technical and performance requirements makes these components custom products made on order. Customers organize their purchasing activity to try to make them commodities but they are not.

This purchasing activity and our educational economic understanding affects how steel foundries do business. We look at our products and apply ordinary economic wisdom to try to gain market share or product volume. This is especially true during severe cyclical downturns. We think that pricing is what drives product volume and that lowering our prices will increase our sales volume. This is in fact how it would work in a commodity market. But...

Our customers are not typically buying a product from us that is standard, produced by multiple sources in large quantities, purchased by multiple customers and meeting standardized product specifications. They are buying specific small quantities of custom products from limited sources to meet their own commercial standards. The quantity purchased is not dependent on the price but on their need for the product. They have limited suppliers qualified.

In fact, our larger customers will qualify more than one source so that they can exploit our understanding of economics and gain leverage in the marketplace. We understand that reducing the price will gain us business and our customers depend on our commitment to that idea. While a limited

number of steel casting products are bought in large enough quantities to standard specifications like railroad parts, most are proprietary products with limited demand and few qualified sources.

Looking at the graph attached, we think we are in a market with ordinary unit elasticity. Because of this, we think that quantity of our production reflects the competitiveness of our pricing. Profitability in this scenario depends on reducing costs because order volume depends on pricing. But for most of our products, this is not correct.

Most of our products are proprietary to us. We worked with the purchasing company to develop the engineering and production process to make their particular part. We have modified the tooling, the rigging, alloy formulation, heat treatment, finishing, gaging, machining and contract terms to arrange to meet their unique requirements. Qualifying another source is expensive, disruptive and risky. While our customer asserts that we must accommodate their pricing demands, often this is a negotiating tactic with little alternative if we are unwilling to meet their demand. In many ways our market is perfect inelastic.

The quantity demand is independent of our pricing in most cases so the order quantity sensitivity to pricing is low. It is true that at some price, our cost becomes a barrier to our customer's ability to get the order so we lose the business. Often though our schedule is a more critical factor to their ability to get the order than our pricing and we see this in the willingness often to provide premiums for expedited production.

Larger OEM customers seek to avoid being held captive to us as suppliers by qualifying multiple sources with multiple tools. This adds to their costs and often even with this effort they are unable to maintain multiple qualified sources.

So we should recognize that we have a mutual dependence on our customers. We need their business but they just as much need our products. They may use market conditions or alternative sources as threats in pricing negotiations but we should be aware that we often are proprietary sources for their critical components.

So we need to develop constructive relationships with our customers. We need to recognize their need for cost effective sources so that they can compete in the market place and continue to purchase from us. They need to recognize that we are a proprietary source and need to operate profitably if we are to remain capable and viable suppliers. We need to operate our business knowing that much of our product is proprietary and that product volume and quantity is less dependent on pricing and more dependent on our capability and product development.

Research Review

SFSA visited the University of Iowa (UI), University of Northern Iowa (UNI), and Iowa State University (ISU) on March 21-24 to conduct an R&D project review. Some of the current research projects presented were UI's Prediction of Porosity in Manganese Steel, ISU's Digital Surface Standard, and UNI's Reverse Engineering.

UI's research aims to develop a model for improved predictions of surface shrink and internal macroshrinkage and microshrinkage in manganese steels. The mechanism that causes internal porosity to nucleate in areas with lower solid fraction will be determined. It was observed that surface shrink occurs first then internal shrinkage starts to form at some point. The model consists of these two stages in porosity formation. Current porosity prediction algorithm does not accurately predict total shrinkage because it only accounts for pressure and does not take into account porosity formed after feeding efficiency is reached. UI's model defines feeding zones not just by liquid fraction but also by pressure for each time step. This allows for a more accurate prediction. Development of the density curve and accurate prediction of surface shrinkage is still on-going.

Recent work on the development of a digital surface standard involved quantifying the effect of several variables that could affect visual inspection results. Considering the worst and best levels of environmental conditions, human capabilities, and condition of casting being inspected, the percent of making Type I (indications that are really not abnormalities) and Type II (abnormalities that are missed) error was measured. For the worst case (worst levels for all factors), the Type I error was 93% and Type II error was 82% while for the best case, it was 18% for the former and 30% for the latter. Refinement of method in distinguishing the underlying geometry is still being done. Future work also

includes completion of the standard for industry implementation and development of tools to help foundries and their customers to understand specification criteria.

One of the projects that UNI presented was on their reverse engineering work of an impeller. The 3D model of the part was successfully created and mold and cores were printed.

A complete list of on-going research projects can be found on the SFSA website at <https://sfsa.org/research.php>

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

SFSA Trend Cards (%-12 mos. Ago)	12 Mo Avg	3 Mo Avg	March	February	January
Carbon & Low Alloy					
Shipments	-23.2	-19.3	-25.0	-10.5	-22.5
Bookings	-27.9	-22.2	-25.0	-16.5	-25.0
Backlog (wks)	7.7	6.9	7.5	7.0	6.1
High Alloy					
Shipments	-16.4	-18.3	-25.0	-10.0	-20.0
Bookings	-22.7	-15.0	-20.0	0.0	-25.0
Backlog (wks)	7.3	7.3	8.0	7.0	7.0
Department of Commerce Census Data					
Iron & Steel Foundries (million \$)					
Shipments	1,590.4	1,518.3	1,497	1,520	1,538
New Orders	1,599.3	1,621.7	1,643	1,667	1,555
Inventories	1,993.7	2,019.7	2,015	2,021	2,023
Nondefense Capital Goods (billion \$)					
Shipments	78.1	75.8	75.3	74.9	77.2
New Orders	76.2	74.3	71.7	72.4	78.7
Inventories	175.7	174.9	175.2	174.6	174.8
Nondefense Capital Goods less Aircraft (billion \$)					
Shipments	68.7	67.1	66.9	66.6	67.8
New Orders	68.3	67.5	66.9	66.9	68.7
Inventories	119.8	118.3	118.4	118.1	118.5
Inventory/Orders	1.8	1.8	1.77	1.77	1.73
Inventory/Shipments	1.7	1.8	1.77	1.77	1.75
Orders/Shipments	1.0	1.0	1.00	1.00	1.01
American Iron and Steel Institute					
Raw Steel Shipments (million net tons)	7.2	7.1	7.4	6.9	7.0