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  “Tensile, High Strain Rate Compression And Microstructural Evaluation Of Lightweight Age Hardenable Cast Fe-30Mn-9Al-XSi-0.9C-0.5Mo Steel”
  “Effect of Phosphorus and Silicon on the Precipitation of κ-carbides in Fe-30%Mn-9%Al-X%Si-0.9%C-0.5%Mo Alloys”
  “Cast Connex Sources Cast Construction Part”
  “Handbook on Visual Testing”
  “Hot Ductility Behavior and Repair Weldability of Service-Aged, Heat-Resistant Stainless Steel Castings”
  “Phosphorus Mitigation in Cast Lightweight Fe-Mn-Al-C Steel”
  “Fall Protection: Failure is Not an Option”
  “Cost of Cooling”
Wow! It seems like this year is slipping by so fast, maybe I am just getting old – no comments please. I think one of the most rewarding aspects of this year has been the level of attendance at the various meetings, not so much the numbers of attendees but who has attended them. It is certainly encouraging to see not only a group of younger faces (everybody is younger to me) but, the most encouraging part is the level of contributions that have been made to these meetings from all of the attendees. This interaction is what increases the value and the quality of work that SFSA is able to produce. If you cannot listen to your customers and you are our customers then SFSA will not deliver the value that a customer deserves.

On a separate but connected issue, we are now leading up to the T&O Conference and Workshop on December 8-11, 2010 at The Drake Hotel in Chicago. You last chance to secure the reduced registration rate is November 1st. This year the T&O Conference has over 40 confirmed papers this is a program you cannot afford to miss. This conference provides information on the latest experiences, both technical and operating, of member foundries and updates on current research. If you want an overview of what is happening in SFSA then this the meeting to attend. In addition to the conference the Workshop this features presentations on melting practices and an insight into the workings of ITAR. The hidden benefits of the conference programs are the networking opportunities that occur during the breaks and Industry reception. Where else would you get the opportunity to meet with so many of your peers to discuss how you might improve your operations?

Clearly the T&O Conference and Workshop are ideal opportunities for you and your employees to get one of the major benefits of SFSA membership.

3rd Quarter 2010
The T&O Committee has worked very hard to produce a program for the 2010 T&O Conference. This year will see a record number of presentations certainly well above the 40 or so papers we normally see. This of course means that there has to be some re-jigging of the schedules such as lunchtimes and maybe even start times. Nevertheless we are sure that this will be a minor issue given the quality of the papers that will be presented. By the time you read this many of you will have taken advantage of the reduced registration rates available up to November 1.

The complete program is included at the end of the T&O News the program includes problems with chromite sand, sodium silicate, melting efficiency, update on the use of landfill gas, gate removal costs, phased array UT, combustible dust, beneficial reuse, segregation modeling, thin wall modeling, sand properties, the use of Quickcast, high alloy welding, visual inspection, etc.

2009 Conference

The winner of the Robert G. Shepherd Award for the Best Paper of the 2010 T&O Conference is;

Brent Hanquist, Harrison Steel Castings Company – “Single Vessel EAF Steelmaking”

The Best First Time Speaker Award has been won by;


Brent and Ted are to be congratulated on their efforts and willingness to share their experiences. Similarly Harrison Steel Castings Company and Badger Alloys are also to be thanked for allowing their employees to share this information with SFSA member companies.

Schumo Foundation Scholarships

Bradken Tacoma and Quaker City made the successful proposals for work programs for students who will work at their companies this summer. On the successful completion of the work program and delivery of a T&O paper the students will each receive a check for $5,000. The competition for this scholarship was high with approximately 20 students competing, final selection has now been completed. Selections for the 2011 are currently in process.
Division/Technical Meetings
Make a note in your diary when arrangements are posted for the Technical, Divisional and Product Group meetings.

Nov 16 Specifications Committee – San Antonio, TX
Dec 8/11 Technical & Operating Conference – Chicago, IL
Feb 23/24 HR/Safety – Amite, LA
Mar 16 High Alloy Research Committee – State College, PA – location to be conformed.
Steel Founders' Society of America

National T&O Conference – December 9-11 2010
Drake Hotel, Chicago, IL

Session 1 [Thursday Morning – December 9 – 9:00 am]
1.1 Developing a Safety Culture
   Lisa Bond, Bradken, Amite, LA
1.2 Clean Air System for Employees at Keokuk Steel Castings
   Allan See, Brian Wellman, Matrix Metals - Keokuk Steel Castings
1.3 Combustible Dust Rulemaking by OSHA
   Raymond Monroe, SFSA
1.4 Performance Management
   Billy Newman, Tracei Scofield, Spokane Steel Foundry
1.5 Reducing the Exposure to Hexavalent Chromium
   Aaron Wilkinson, Bradken, Tacoma, WA
1.6 Beneficial Reuse of Foundry Sand - Process Implementation and Rexnord’s Success
   Matt Shepstone, Tom Frost, Rexnord Industries LLC
1.7 Business Continuity Planning
   Paul Tomlinson, Wollaston Alloys, Inc.
1.8 DoD Investments in Castings
   Victor Pugliano, Benét Labs
1.9 3D Laser Scanning: Throughout the Foundry
   Phil Harper, Jogi Makhani, Michael Strnad, American Foundry Group

Industry Luncheon – 12:00 pm

Session 2 [Thursday Afternoon – December 9 – 1:30 pm]
2.1 Visual Inspection: Improvements through Cognitive Ergonomics
   Richard Stone, Kristopher Watts, Frank Peters, Iowa State University
2.2 Visual Inspection: Physiological and Cognitive Implications and Applications for the Casting Industry
   Richard Stone, Christopher Watts, Iowa State University
2.3 Steel Scrap - What?! How Much?! Contains What?!
   Gene Muratore, Rio Tinto Iron and Titanium America
2.4 Weld Qualification Procedures for Low-Alloy Steels
   Brent Hanquist, Harrison Steel Castings Company
2.5 Magnetic Particle and Liquid Penetrant Visual Inspection
   John Griffin, Robin Foley, University of Alabama - Birmingham
2.6 Gage R&R and Validation of a New Radiography Standard for Steel Castings
   Richard A. Hardin, Christoph Beckermann, University of Iowa
2.7 Phased Array - The Next Generation of Ultrasonic Inspection
   Monty Reed, The Crosby Group
2.8 Stainless Clad Structural Steel with 100 Year Life in Concrete
   Peter Chesney, Spray Forming International / CMC Steel
Session 3  
Friday Morning – December 10 – 9:00 am

3.1 Vacuum Induction Furnace Decarburization and Degasification  
Emilio Álvarez Miaja, Jorge León Murillo, José Jaime López  
Soria  
Fundidora Morelia, SA de CV

3.2 Prediction of Under-Riser Carbon Macrosegregation due to Shrinkage Flow in Steel Casting  
Kent Carlson, Christoph Beckermann, University of Iowa

3.3 Riser Sleeve Survey  
Malcolm Blair, SFSA

3.4 Breaker Core Optimization  
Ron Aufterhaide, Ralph Showman, Ashland Performance Materials

3.5 The Cost of Cleaning One Square Inch of Gate  
John Workman, Eagle Alloy, Inc.

3.6 Anticipating Material Losses During Part Processing  
Ryan Walery, Quaker City Castings

3.7 Energy Management  
Jeremy Allyn, Harrison Steel Castings Company

3.8 Ladle Preheating  
Jeremy Allyn, Harrison Steel Castings Company

3.9 Landfill Gas - Part II  
John Workman, Eagle Alloy, Inc.

3.10 Melting Efficiency  
Jay Triplett, Monett Metals, Inc.

Industry Luncheon – 12:00 pm

Session 4  
Friday Afternoon – December 10 – 1:30 pm

4.1 Foundry Maintenance Operations  
Robert Murillo, Pacific Steel Casting Company

4.2 Sand Mixer Modernization  
Guillermo “Willy” Oyarzabal, Fimex SA de CV

4.3 Vacuum Assisted NaSiO4  
James C. Furness, Jr., Furness-Newberge, Inc.

4.4 Sand Control Really is Important  
Barbara Allyn, Harrison Steel Castings Company

4.5 Portable Mixer  
Billy T. Bobbitt, Gary Hunt, Southern Alloy Corporation

4.6 Chromite Issues with Large Steel Castings  
Louis Luth, Northrop Grumman Newport News Shipbuilding

4.7 Filtering Experiences with Large Steel Castings  
Louis Luth, Northrop Grumman Newport News Shipbuilding

4.8 Pattern-less Molding at MetalTek International  
Roger Broman, Steve Pilgram, Chris Botkin  
MetalTek International, Carondelet

4.9 CAD/CAM Patternmaking. Effects and benefits  
Ray Mills, Bradken, London, Ontario, Canada

Discussion Session – 4:30 pm
Session 5  Saturday Morning – December 11 8:00 am
5.1 Advances in Solidification Modeling with a Cluster Computer
    Jerrod Miller, Bradken Energy Products, Tacoma, WA
5.2 Thin Wall Modeling
    Charles Monroe, Caterpillar, Inc., Champaign, IL
5.3 Where does Solidification Simulation Fit?
    Jim Smith, Eagle Alloy, Inc.
5.4 Implementation of Casting Simulation at a Heavy Section Steel Foundry
    Glenn McQuarter, Bay Cast Inc.
5.5 Development of Thermophysical Property Datasets, Benchmark Niyama Results, and A Simulation Qualification Procedure
    Kent D. Carlson, Christoph Beckermann, University of Iowa
5.6 Oxidation and Carburization Testing of Heat Resistant Alloys
    Jerry Gapinski, MetalTek Wisconsin Centrifugal
5.7 Investigation of GX23CrMoV12-1 Martensitic Stainless Steel Castings
    Jeremy Faulkender, Pittsburg State University
    Elaine Thomas, Bradken, Tacoma, WA
5.8 Alloy Modifications for Strength and Notch Toughness Enhancement in 17-4PH Stainless Steel
    Arpana S. Murthy, Simon Lekakh, Von L. Richards, David C. Van Aken
    Missouri University of Science and Technology
5.9 TTT Determination in Superaustenitic Steel using Charpy Impact Testing
    Barry King, Scott Chumbley, Iowa State University
5.10 Continuing Investigations into the Development and Processing of High Strength Cast Steels
    Rachel Abrahams, Paul Lynch, Robert Voigt, Penn State University

Adjourn 11:40 am
T & O Workshop

STEEL FOUNDERS’ SOCIETY OF AMERICA

National T&O Workshop Program - 12.08.10

2:00 PM to 6:00 PM

The Workshop program will consist of presentations on melting and ITAR (International Traffic in Arms Regulations).

**Electric Arc Furnace Melting** – Alastair Davidson Casting Metallurgy & Process Technology, LLC.

**Induction Furnace Melting** – Ted Klemp, Cayenne Systems, Inc.

Both Alastair and Ted have wide ranging experience in foundry melting operations. This session on melting will be of great value and interest to all ranges of experience in the demands of foundry melting practices.

**ITAR (International Traffic in Arms Regulations)** – Ken Sandell, Bradken, Tacoma

Over the last year or so great interest has been arisen regarding ITAR. The implications of ITAR are not fully understood or clear. Ken is probably the most knowledgeable on this topic in the SFSA membership. Find out if you are affected by this regulation and what you might need to be doing about it.

**National T&O Committee**
- K. Sandell, Chairman – Bradken Atlas
- J. Allyn, North Central Vice Chairman North Central Div. – Harrison Steel
- R. Bone, Southern Div. Chairman - American Centrifugal (ACIPCO)
- G. Hartay, North Central Div. Chairman – FALK/Rexnord
- V. Ionescu, Chairman Carbon and Low Alloy Research Committee – Bradken, London
- R. Murillo, Western Div. Chairman - Pacific Steel
- J. Okhuysen V. Southern Div. Chairman – Corporacion P.O.K.
- P. Tomlinson, Eastern Div. Chairman - Wollaston Alloy
- R. Wabiszewski, Heavy Section Product Group Chairman - Maynard Steel

3rd Quarter 2010
**Determination of the effect of radiographic indications on performance**

**Effect of Niyama values on mechanical properties - AMC**

Radiographic standards are workmanship standards; they do not indicate the effect of radiographic indications on performance. The need in the steel casting industry is to produce highly efficient designs that can optimize the properties of steel. This work is designed to develop an understanding of the effect of indications on performance followed by the development of a standard which can be used by designers to optimize casting design. This will lead to lighter and more competitive steel castings. We have been asked to develop a quantitative method for the evaluation of the effect of indication size. A draft version of a new radiographic film interpretation standard has been prepared for review, there is now an ongoing Gage R&R study to determine the reliability of interpretations using this method.

Based on the UAB and UI work it appears that the standard looks as though it is conservative. While this is encouraging an assessment of whether this produces a method that is too conservative needs to be determined.

**CCT diagrams for DSS and Superaustenitic Stainless Steels - CMC**

The required heat treatment and limiting section sizes can best be indicated by examining the CCT diagrams. Unfortunately these do not exist for some of the most recently developed alloys. This work will develop these new diagrams and assist the foundry in performing effective heat treatments. These diagrams will also assist in identifying where there may be problems in a casting design. Work on CK3MCuN (254SMO) and CN3MN (AL6XN), has shown that the reactions in these grades is extremely slow. Recent work on impact properties at NIST has shown that the toughness can deteriorate considerably when these grades are not quenched from the austenitizing temperature but are cooled and held at 1600°F for an hour, this may be linked to the chicken wire cracking phenomena. Recent work has identified the existence of a very small grain boundary precipitate. Heat treating at higher temperatures for longer times has shown that the toughness can be restored. The ongoing task is to attempt to determine where the "nose" of these intermetallic formations occur to allow foundries to determine the preferred heat treatment cycle. Members have supplied CN3MN material which is being heat treated to the new procedure developed by Lehigh, this material will then be machined into sub size Charpy specimens and heat treated at different temperatures.

The Charpy tests indicate that the nose is probably around 1600 F. Additional tests will be carried out to define the nose temperature more closely.

**Surface indications - CMC**

Specification of acceptable surface indications can be one of the most contentious issues between the foundry and the purchaser. This work will characterize surface indications and form an integral part of assessing the effect of indications on part performance. Plates and castings with indications are being collected and evaluated. It is apparent that the 3:1 length to width ratio is not a good measure for discriminating the difference between a crack and a round indication. The Gage R&R of inspection by magnetic particle appears to be poor, but not worse than other studies of this operation. Typical probability of detection of indications is 50%.

**Melting Efficiency - CMC**

The use of chemical fuels has been shown reduce power consumption by ~24 kWh/t on two 20 t on EAFs. Recent plant trials have demonstrated reductions in energy consumption of 5 – 10% by changing the melting practices.
One member has rescheduled his melting shop, initial reports suggests that by employing a continuous melting schedule instead of single day or night arrangements the savings in power might be of the order of 20%.

A volunteer to run a trial with the new ladle refractory developed by Kent Peaslee et al at MS&T is being sought. The target foundry would be one using medium to large size ladle.

**Corrosion Testing - CMC**

Some purchasers of castings are using corrosion tests as a requirement for product acceptance. The corrosion tests that are currently available have poor Gage R&R and consequently any test is more a measure of how good a laboratory is at running the tests rather than a test of the material performance. This work will examine and quantify the issues. In addition the work will also include a study of the effect of the Niyama criteria on the corrosion resistance of the 6%Mo stainless steels.

The tests on wrought grades appear to be strongly influenced by passivation time and surface finish of the specimens. However, their effect on cast grades appears to be minimal, suggesting there are other factors to be considered, e.g. segregation.

A recently developed heat treatment schedule has shown that cast materials can have similar corrosion resistance to their wrought counterparts. One of our members has adopted the heat treatment procedure and seen a drop in corrosion test failures from 12% to 5%.

Additional work is now being carried out to investigate the A262 A and E practices, this work will utilize a Designed of Experiments approach examining the behavior of CF3M and CF8M grades. A corrosion test method for CN3MN and CK3MCuN is being developed by the High Alloy Research Committee.

**High Strength Steels – AMC/SWC**

High strength steels (YS>170ksi) have been largely ignored by users and producers alike. The Department of Defense is funding a project to examine the possibility of producing high strength steels that will compete with titanium. It is anticipated that these steels will be processed conventionally and be 4 to 10 times less expensive than comparative titanium castings. Several trial heats have been prepared for testing. The development work to date has been concentrating on the development of "17-4" grades. The High Alloy Research Committee strongly supported the development of a Co modification to this grade.

Penn State are continuing this work under the SWC program which will examine the 13-8 Mo and Eglin steels. Eglin Steel appears to show some remarkable properties in the HIP'd condition (UTS 240 ksi, El 15% ~40ftlbs @ -40°F).

**Use of Solidification Simulation for Vendor Approval - MTI**

A significant amount of work has been completed in the development of thermo-physical data for more reliable prediction of shrinkage in the high alloy grades. Instrumented plates have been cast for grades; CD4MCuN, CD3MN, N3M, CW6MC and CN3MN. The thermo-physical data is available to all SFSA members free of charge and can be downloaded from the SFSA website. API has now approached MTI requesting that data sets be developed for C5, C9 and CA15.

**Visual Examination – SWC**

An initial review of this the issue of visual examination has shown that there is an underlying problem. This problem is associated with the fact that humans will tend to stop inspecting a part after they have seen the 6th part. They then tend to look only in the areas where they might expect to see an indication. It was pointed out at the last T&O conference that trying to inspect to 1/16” is not practical and the most likely resolution is of the order of ¼". Using a simple calculation based on the surface inspection Gage R&R result of 50% then it might be expected that have a certainty of locating an indication it would be necessary to inspect the casting multiple times. Assuming a 50% probability of detection then it would be necessary to circulate a casting through the repair/inspect cycle 5 times to detect 97% of the indications. Initial work in foundries has shown that there may be a problem in the selection of inspectors.
A27 Lower limits on S and P are being balloted to bring these composition limits into line with current industrial practice.

A217 The restricted chemistry has been balloted and approved to prevent the supply of C12A as C12.

A297 The addition of CT15C to A297 is being balloted, this material is already included in A351.

A703/A781 The revised text regarding grade substitution has been approved at Sub Committee level.

A1058 - Standard Test Methods for Mechanical Testing of Steel Products - Metric
This standard has been published in volumes of ASTM standards for steel.

Composition limits
Committee A01 has suggested that composition limits should recognize the current product analyses rather than maintain what might be considered obsolete limits.

ISO
Thirteen New Work Items were identified at the TC17SC11 meeting in June 2010. These items will include the revision of existing standards and the development of new standards.

The ISO TC17 Task Group has now been instituted as a permanent committee and will now be called the TC17 Advisory Group. This group has developed a number of procedures that deal with the withdrawal of standards, how to address inactive sub committees and other issues related to improvements in the transparency of the ISO TC17 process.