Discover the latest advances in sand casting technologies at the 2022 Sand Casting Conference. Led by experts in green sand casting and chemically bonded molds and cores, this conference will provide practical tools to improve your processes. You'll learn how other metalcasters are perfecting their sand casting operations and have the opportunity to benchmark your own.

Register today at:
www.afsinc.org/2022Sand
CONFERENCE AGENDA
MONDAY, SEPTEMBER 12, 2022
Noon – 1 p.m.
REGISTRATION

GREEN SAND CASTING
Session Chair: Jerry Thiel
University of Northern Iowa, Cedar Falls, IA
1 – 1:15 p.m.
WELCOME/INTRODUCTIONS
Pete Gravunder
Badger Mining Corp., Berlin, WI
1:15 – 2 p.m.
KEYNOTE: SANDOLOGY 4.0, CREATING THE METALVERSE
Tom Prucha
MetalMorphasis LLC, Rochester Hills, MI
From digital data collection, distributed information sharing, adaptive machine controls and artificial intelligence-based decision-making, we are on the cusp of creating our own “Metalverse.” What is needed to implement this revolution in sand control and aggregate based manufacturing? First, we need to move towards more performance-based tests that are quantitative, conducted either in real-time online or augmented via lab testing. This means moving beyond the traditional Mold and Core Handbook focus test and should integrate into process simulation modeling. The results need to be shared across the value chain. With the potential for thousands of data inputs we need to be able to discern the key signals that are predictive. This will allow for better control and adjustments via knowledge-based algorithms. However, this will require investment, training a workforce with new skill sets and funding into research and development allowing sand-based technology to meet customer expectations and stay competitive against competing manufacturing approaches.

2 – 3:15 p.m.
PANEL: NEW METHODS FOR ADDITIVE CONTROL IN GREEN SAND
Dr. Sam Ramrattan, Dr. James Springstead, and Dr. Andreas Decher
Western Michigan University, Kalamazoo, MI
The composition of green sand molding mixtures for iron foundries is crucial to green sand properties development and casting quality. The optimal parts of sand, clay, water, and carbonaceous additions are constantly changing and has to be controlled in working foundries. Mr. Brian Rachwitz, with more than 30 years of foundry experience, will lead a panel in identifying the need for additive control in high-production green sand. Dr. James Springstead will discuss a new digital methodology to measure active clay. Dr. Andreas Decher will identify the latest technologies for foundry water control. Dr. Sam Ramrattan will present an automated method for quickly measuring organics in green sand.

3:15 – 3:45 p.m.
CONTROLLING MULLER SAND MOISTURE WITH MOISTURE SENSORS INSTEAD OF COMPACTABILITY: A CASE STUDY
James Furness & David Paulson
Furness-Newburge, Inc. Versailles, KY
A brass and aluminum foundry needed to replace its muller’s decades old moisture control system. Replacement with a compactability control system was cost prohibitive. Advances in optical sensing technology created an opportunity to provide a more economical option for moisture control. These precision optical analyzers required no sand sampling equipment and could be installed directly over a sand belt. Optical analyzer measurements achieved a 0.999653 linear correlation with sand lab moisture measurements. Control challenges at this facility included large fluctuations in return sand moisture and no sand batch weight measurement. Production control charts and histograms demonstrate the system’s effectiveness. This case study illustrates that optical moisture analyzers provide an appealing alternative to compactability systems for green sand moisture control.

3:45 – 4 p.m.
BREAK

4 – 4:45 p.m.
DISCUSSING THE IMPACT OF HYDRAULIC OIL ON GREEN SAND PROPERTIES
Liam Miller
Minerals Technologies Inc., Hoffman Estates, IL
Foundries have long suspected that contamination of a green sand system with hydraulic oil could cause casting defects. This presentation provides a review of past and recent publications and laboratory studies on the subject of hydraulic oil contamination.

4:45 p.m.
DAY 1 CONCLUDES

TUESDAY, SEPTEMBER 13, 2022
7 – 8 a.m.
BREAKFAST/REGISTRATION

GREEN SAND CASTING (CONTINUED)
Session Chair: Jerry Thiel
University of Northern Iowa, Cedar Falls, IA
8 – 8:45 a.m.
ELIMINATING THE NEED FOR CORE WASH TO CONTROL IRON PENETRATION BY CHANGING AGGREGATE SIZING
Al Jacobson
Grede Casting, St. Cloud, MN
Iron penetration into drag and lower cavity cured surfaces is a common and costly defect for many green sand foundries. To stop this iron penetration, foundries often apply a graphite coating to the core prior to molding. The labor, material and equipment costs associated with applying this coating are substantial.

Most foundry sand people know that higher GFN core sand will reduce or eliminate this iron penetration, but once the breakdown into the green sand system other issues develop. Lower permeabilities can result in gas and pouring defects. Higher green sand surface area that existing muffing capabilities cannot properly coat with clay can cause sand inclusions, dimensional shifts, shrink, mold tear-up, etc.

This case study will show how a high-production automotive jobbing foundry eliminated the need for coating cores by using a higher GFN sand and how they mitigated the negative effects to their green sand system.

8:45 – 9:15 a.m.
GREEN SAND DATA STORAGE AND ANALYSIS USING MICROSOFT POWER BI
Scott Hiles
Kohler Company, Kohler, WI
Data display and analysis does not necessarily require investment in dedicated data analysis software. This presentation will be a demonstration of gathering data from many disparate sources into one report using readily available Microsoft Power BI software and using the data to daily monitor and control a greensand system. Examples will also be given of using sand property data to target defect action items.

9:15 – 10 a.m.
SILICA SANDS
Neil Kniseley
Badger Mining Corp., Berlin, WI
Kniseley will discuss the importance of sieve distribution and how it impacts tensile strengths, permeability, and resin usage, and ultimately, how proper sieve distribution can reduce casting defects and improve casting quality.

10 – 10:15 a.m.
BREAK

10:15 – 11 a.m.
DEVELOPMENT OF IN-LINE AUTOMATIC GREEN SAND PROPERTIES TESTER CONTRIBUTING TO STABILIZATION OF GREEN SAND PROPERTIES
Jim Wensom
Sinto America, Grand Ledge, MI
Scrap and defect reduction is extremely critical in casting production. In the green sand molding process, the first step to a quality casting is making a consistent and precise sand mold. Maintaining steady sand properties is invaluable for continuous production of quality molds. One roadblock to holding sand properties within tolerance is the fluctuation of moisture (compactability) caused by a multitude of factors such as ambient temperature, humidity, delivery time, production pauses, etc. during transportation from muller to the molding machine. It is also difficult to observe real-time fluctuations of sand properties by taking a limited number of manual measurements, which, in turn, makes it hard to correlate defects caused by sand, because the actual sand properties of the mold are unknown. In order to get more accurate sand properties direct-ly at the time of molding, an automated and precise measurement of sand immediately before the molding machine is required. In-line automatic green sand properties measurement devices may greatly increase the ability to maintain ideal molding conditions and reduce casting defects.

11 – 11:45 a.m.
PANEL DISCUSSION—PNEUMATIC VS 3-RAM COMPACTABILITY TESTING: TRENDS, EFFECTS, AND EXPERIENCES
Nathaniel Bryant
University of Northern Iowa, Cedar Falls, IA
Chuck Gerth
Amsted Rail, Granite City, IL

From digital data collection, distributed information sharing, adaptive machine controls and artificial intelligence-based decision-making, we are on the cusp of creating our own “Metalverse.” What is needed to implement this revolution in sand control and aggregate based manufacturing? First, we need to move towards more performance-based tests that are quantitative, conducted either in real-time online or augmented via lab testing. This means moving beyond the traditional Mold and Core Handbook focus test and should integrate into process simulation modeling. The results need to be shared across the value chain. With the potential for thousands of data inputs we need to be able to discern the key signals that are predictive. This will allow for better control and adjustments via knowledge-based algorithms. However, this will require investment, training a workforce with new skill sets and funding into research and development allowing sand-based technology to meet customer expectations and stay competitive against competing manufacturing approaches.
Compactability of green sand is one of the most widely adopted testing methods employed by the foundry industry. A compactability target is often used to ensure that discharged molding sand is adequately prepared prior to molding operations. There are two AFS methodologies that are used to measure the compactability of green sand, namely the 3 and 3.5 compactability techniques, it is not understood, though, if there are differences in the compactability result depending on which method is employed. Foundry participants from the AFS Green Sand Molding Committee measured their operating sand system’s compactability with both techniques simultaneously to understand this effect. Further, some influence on other green sand properties was seen based upon the technique used to create the standard AFS 2x2 specimen. The trends observed, along with some of the participants’ experiences will be discussed on the panel.

11:45 a.m. – 12:45 p.m.
LUNCH

CHEMICALLY BONDED CASTING TECHNOLOGY
Session Chair: Scott Giese
University of Northern Iowa, Cedar Falls, IA

12:45 – 1:30 p.m.
EVALUATION AND COMPARISON OF TEMPERATURE DEPENDENT MECHANICAL PROPERTIES OF CHEMICALLY BONDED SANDS
TBA

Sand core mechanical properties are widely used in the foundry industry as an indicator of core integrity and quality. These properties typically include room temperature strengths. While room temperature mechanical properties are an important indicator for Core/Mold handling and initial resistance to molten metal, the mechanical properties of bonded sand change significantly with an increase in the temperature of sand. Understanding the temperature dependent mechanical properties may provide a better understanding of bonded sand behavior when subjected to high temperatures. Temperature dependent mechanical properties of bonded sand can further be used in stress simulations for higher accuracy in prediction of final casting quality, and may be useful for predictions of defects such as hot tears. However, while significant research has been conducted on comparison of chemical binder systems for room temperature mechanical properties, there is very little data on high temperature mechanical properties for chemically bonded sand from different binder systems. Trials were conducted at the University of Northern Iowa to evaluate different chemical binder systems for their effect on high temperature mechanical properties of sand. The binder systems evaluated included conventionally used organic and inorganic resins in the industry. The binder system used was observed to have a significant effect on high temperature properties of a sand core. The results from the research are discussed in the presentation.

1:30 – 2:15 p.m.
LOW EMISSION SHELL SAND
TBA

2:15 – 3 p.m.
IoT FOR CORES & MOLDS
Nathaniel Bryant
University of Northern Iowa, Cedar Falls, IA
Ashley Marks
John Deere, Waterloo, IA

Recent advancements in sensor technologies have opened new opportunities for data acquisition in the foundry industry. The Internet of Things (IoT) describes a wireless communication network between physical objects through embedded sensors. Physical objects, in this case, could be foundry equipment, sand molds or cores, or even workers. These sensors acquire data in real time and can transmit it to a database where analysis could be conducted with artificial intelligence or machine learning to discover trends and optimize processes. To investigate the use of advanced wireless sensors at an industrial scale, the University of Northern Iowa partnered with John Deere Foundry. Applications explored included embedded sand core sensors and environmental sensors to monitor the efficiency of their casting cooling line.

3 – 3:15 p.m.
BREAK

3:15 – 4 p.m.
EMBEDDED SENSORS FOR GREEN SAND MOLD DATA ACQUISITION
Nathaniel Bryant
University of Northern Iowa, Cedar Falls, IA

Green sand molding methods are subject to an inherent amount of process variation that can cause various casting defects. Controlling green sand systems is nuanced and depends heavily on the concentration of each component within the green sand. Determining the related variation in molding practices can predict successful castings and thus provide insight into optimal formulations. Foundries striving to advance towards manufacturing 4.0 depend on high frequencies of data acquisition for real time, data driven decision making. Embedded sensor technology can collect process data at levels that were previously impossible. Examples of process data that can be collected include temperature, pressure, moisture, volatile organic compounds, humidity, vibration, shift, and rotation – to name a few. The University of Northern Iowa has developed a low-cost, introductory level technology to track various process data in a green sand mold. The gathered data can be transmitted wirelessly for analysis and documentation. Possibilities for individual or serialized mold data now exist due to the cost-effectiveness of the proposed sensor packages. In this presentation, a few sensors and their capabilities will be shown specifically as an embedded green sand data acquisition unit.

4 – 4:45 p.m.
USING TEMPERATURE DEPENDENT PROPERTIES OF RESIN COATED SAND FOR SIMULATION OF CORE FRATURES IN ALUMINUM CASTINGS
Jerry Thiel
University of Northern Iowa, Cedar Falls, IA

The defect was initially recreated and explained using a simulation software. Once the root causes were determined, possible solutions were evaluated and implemented to fix the defect. Resin coated sand cores are widely used in the automotive industry for precise dimensional tolerances and surface finish. Resin coated sand also offers higher hot strength when compared to other chemical binders, hence making it possible for hollow and light weight cores. However, depending on the sand to metal ratio, certain applications may have issues with fractures on the surface of these cores during solidification of the alloy, leading to fins on the surface of the casting. These defects were previously observed across both sand and die casting applications. This case study investigates the root cause(s) behind a veining type defect that was found in an Aluminum casting with a resin coated sand core, used in the automobile industry. Several resin coated sand samples, including the baseline sample which caused the defect, were evaluated for high temperature thermal expansion and mechanical properties.

4:45 p.m.
DAY 2 CONCLUDES

5:15 – 7 p.m.
EVENING RECEPTION

WEDNESDAY, SEPTEMBER 14, 2022

7 – 8 a.m.
BREAKFAST

CHEMICALLY BONDED CASTING TECHNOLOGY (CONTINUED)
Session Chairs: Scott Giese
University of Northern Iowa, Cedar Falls, IA

8 – 9 a.m.
Panel: Common Issues with Aggregates and Chemically Bonded Sand Processes
Jark Olszak
LAEPE REICH, Trussville, AL
Aaron Kaboff
HA International LLC, Westmont, IL
Russell Hector
ASK Chemicals, Dublin, OH
The Cured Sand & Aggregates committee would like to hold a panel session discussing common issues with aggregates and chemically bonded sand processes.

9 – 9:45 a.m.
3D PRINTING IN THE FOUNDRY: WHAT’S NEXT?
Brandon Lamoncha
Huntwood Products, Columbus, OH

Brandon Lamoncha, the Director of Additive Manufacturing at Huntwood Products, will show the current state of the production environment, touching on Direct Phenolic Binder, IOB, and Robotic Extraction of printed parts. As the world’s largest 3D print service center for the foundry industry, Brandon will explain what the opportunities, challenges, and what the future holds for the sand casting industry utilizing 3D Printed Molds and Cores.
9:45 – 10:30 a.m.
ECONOMIC AND ENVIRONMENTAL MOTIVATION OF CHANGE: INORGANIC BINDER SYSTEMS FOR US FOUNDRIES
Kelley Kerns
HA International LLC, Westmont, IL

Inorganic binder systems have obvious advantages for environmental and employee working conditions. Looking at the full view case for IOB, the cost-benefit considerations becomes clear that the decision for inorganic binders is a financially viable option as they have had long tradition in the foundry industry and are increasingly used worldwide. Is now the time for the U.S. foundry market? Considerations for performance, supply chain, regulatory, capital equipment, environmental-economic value, as well as current applications in aluminum casting and future developments for reclamation, Additive 3D, high pressure and iron casting applications will be reviewed.

10:30 – 10:45 a.m.
BREAK

10:45 – 11:15 a.m.
TBA

11:15 – 11:45 a.m.
3D SAND PRINTING TECHNOLOGY IN THE FOUNDRY INDUSTRY
Dr. Yoya Fukuda
Kimura Foundry

Kimura Foundry America, Inc. is a new-age, high technology foundry. In November of 2018, Kimura Foundry America opened in Shelbyville, IN, for production of low quantity/prototype castings. Kimura proudly manufactures a wide variety of metal castings, with a customer base reaching to all corners of the world. One item that makes Kimura Foundry America a high-technology foundry is the 3D printers that they use to print their cores and molds for castings. Four binder jet sand 3D printers and high speed casting simulation software and various inspection capabilities, including in-house CT scanning, enables the foundry to deliver high quality castings with very short lead times. These printers use Kimura’s own patented artificial sand to help ensure a quality casting.

11:45 a.m. – 12:45 p.m.
LUNCH

ENVIRONMENTAL, HEALTH & SAFETY
Session Chair:
Jeff Krause
HA International, Westmont, IL

12:45 – 1:15 p.m.
INTRODUCTION
Jeff Krause
HA International, Westmont, IL

1:15 – 1:45 p.m.
WHAT DOES SUSTAINABILITY LOOK LIKE IN 2022?
Dana Cooper
Cooper Hayes LLC, Stevensville, MI

1:45 – 2:15 p.m.
FOUNDRY BINDER CARBON FOOTPRINT: OVERVIEW OF SUSTAINABILITY FROM THE EUROPEAN PERSPECTIVE
Dr. Matthias Mentzel
Frederik Lietz, HA Group CSR

HA Group is currently about three years into its Corporate Social Responsibility (CSR) journey. Their presentation will provide an overview of their journey to date – which is admittedly far from complete – from the perspective of an EU-based supplier to the industry. This presentation will explore why and how HA Group began its journey and describe the company’s approach toward implementing a global CSR program. Presenters will discuss what they think HA Group did well, and what they would do differently if they were starting over. The presentation will give other businesses, particularly suppliers and foundry groups, a better feel for the CSR journey ahead, and provide examples how to approach the topic in general.

2:15 – 2:45 p.m.
GREEN METAL - WHAT IS IT?
Robert Baird
General Motors, Carmel, IN

This presentation will explore contributors to your facility’s carbon footprint associated with metal, from sourcing to processing methods. Ideas will be offered to see how carbon footprint can be dramatically affected by your decisions and this knowledge then can help you make strategic decisions for the future.

2:45 – 3:15 p.m.
ADDRESSING NET ZERO IN FOUNDRIES - STRATEGIC PLAN OPTIONS
TBA
KERAMIDA Inc., Indianapolis, IN

3:15 – 3:45 p.m.
BREAK

3:45 – 4:15 p.m.
ESTIMATING CO2E FROM INBOUND/OUTBOUND LOGISTICS
Speaker TBA

4:15 – 5 p.m.
MANAGING CUSTOMER ESG REQUESTS
Anastasia Kyramidou
KERAMIDA Inc., Indianapolis, IN

The fast-paced world of Environmental, Social and Governance (ESG) is having direct impact on companies, and accordingly both a direct and indirect impact on the supply chain who must support their client’s growing requests. The scale of demand for ESG-related requests is considerable and will only increase in the future as companies develop and implement methods and tools that allow them to achieve ESG goals and evaluate their own and their supply chains’ ESG levels. This presentation will explore different types of ESG customer requests and how companies can engage in a process that will allow them to respond to different types of requests.

5 p.m.
CONFERENCE CONCLUDES

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TAX DEDUCTION OF EXPENSES:
An income tax deduction is allowed for expenses of education, including registration fee, travel, meals and lodging, undertaken to maintain and improve professional skills (see U.S. Treasury Regulation 1.162.5).

HOTEL INFORMATION:
Hilton Milwaukee City Center
509 W Wisconsin Ave, Milwaukee, WI 53203

HOTEL RESERVATIONS:
Standard room rate of $159/night+taxes/fees. Attendees can reserve directly with the hotel by calling 414-271-7250 and requesting the AFS room block. The hotel's check-in time is 3 p.m. Check-in prior to the hotel's published check-in times are subject to availability. Check-out time is noon.

AFS Membership:
Are you attending the Networking Reception on 9/13/22? ☐ Yes ☐ No
How did you hear about this event?
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