



Industrial Ecology Center

“Shaping the Future of the Metal Casting Industry: Defining Technology Needs and Directions”

2003 Forum Report

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CERP 2003 Forum Report
Shaping the Future of the Metal Casting Industry

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I. Executive Summary

The Casting Emission Reduction Program held a Casting Requirements Forum on January 14 and 15, 2003 in Sacramento, California.

The purpose of the Forum was to bring together a diverse group of users and manufacturers of castings.

The Forum sought to gain insight into the future casting needs of the industry and the Department of Defense, and to discuss gaps in research and technology developments.

The speakers chosen for this Forum were the leaders from various fields, including foundry owners and operators, University and private researchers, automobile manufacturers, aerospace and electronics suppliers, the Department of Defense, and various trade associations.

Attendees and speakers were encouraged to engage in meaningful discussion regarding the top 5 challenges facing the U.S. foundry industry and to offer ways to meet these challenges.

The Forum was successful, from the perspectives of both speakers and attendees, in summarizing present and future technology needs to keep the casting industry strong in America.



Technikon President, Bill Walden, Welcomes Attendees and Speakers



Facilitator, Don Gaertner, shares his thoughts about the state of the US Casting Industry.

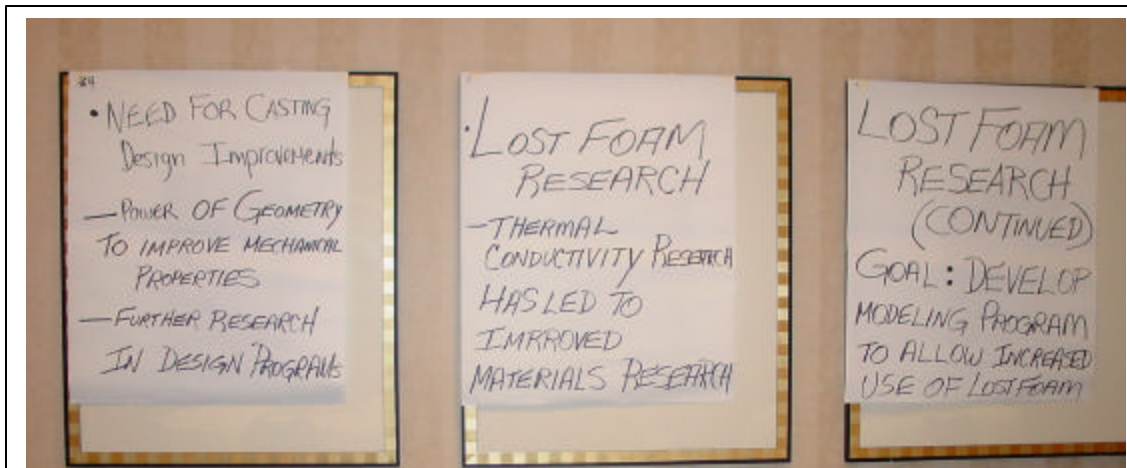
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II. Background and Introduction

The Casting Emission Reduction Program (CERP) was formed in 1994 as a cooperative initiative between the Department of Defense (US Army), the United States Council for Automotive Research (USCAR), the US Environmental Protection Agency (USEPA); and the California Air Resources Board (CARB). Its purpose is to evaluate alternative casting materials and processes that are designed to reduce air emissions. Other technical partners directly supporting the project include: the American Foundry Society (AFS) and the Casting Industry Suppliers Association (CISA).

Over \$50 million dollars have gone into this effort and CERP has supplied the EPA and the industry with the majority of Hazardous Air Pollutant (HAP) testing results for foundry processes and products. CERP was formed and funded to provide input to this very regulation. The EPA was very active in the first phase involving establishment of baseline HAP emissions. CERP developed the methods, processes, and equipment to accurately measure the complex analyte mixes that combine to form the total HAPs from foundry processes.



CERP 2003 Forum Attendees developed these research ideas to help focus discussion.

Since 1998 CERP has been actively testing replacement products and processes that significantly reduce HAP emission in the Core Making process and Pouring, Cooling and Shakeout (PCS) of Greensand and No-Bake Molds. The results of this testing has been made public through presentations, papers, articles, and finished reports, available on our website at www.technikonllc.com

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Summary of Forum agenda and purpose

The purpose of the Forum was to bring together a diverse group of users and manufacturers of castings:

- Individuals defining technology needs where metal castings are a vital part of their mission.
- Department of Defense and Department of Energy representatives and their suppliers involved in metal casting.
- Universities, trade associations, Federal laboratories and applied development centers.
- Metal casting producers.
- Environmental specialists in the metal casting industry.
- Anyone with a desire to know the direction those technologies is headed in order to prepare for the future.

The Forum sought to gain insight into the future casting needs of the industry and the Department of Defense, and to discuss gaps in research and technology developments.



Chris Hatch, US Army, talks about the implementation of Titanium Castings on the Lightweight Howitzer Programs.



Bill Walden presents a speaker award to James Simonelli, Managing Director of the California Cast Metals Association.

The speakers chosen for this Forum were the leaders from various fields, including foundry owners and operators, University and private researchers, automobile manufacturers, aerospace and electronics suppliers, the Department of Defense, and various trade associations.

Attendees and speakers were encouraged to engage in meaningful discussion regarding the top 5 challenges facing the U.S. foundry industry and to offer ways to meet these challenges.

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III. Results and Discussion



Dr. Robert Voigt, Professor at Penn State University, speaks about enabling the future of metal casting through research.

The Forum employed the use of a point person to facilitate discussion and engage attendees in a meaningful dialogue. The purpose of this dialogue was to collect ideas that would later be assembled and categorized for further discussion and action.

The Forum was successful, from the perspectives of both speakers and attendees, in summarizing present and future technology needs to keep the casting industry strong in America. The in-depth discussion that occurred after each speaker was instructive for attendees to focus on what needs to be done to enhance the understanding of the requirements for the casting industry. Many attendees encouraged a summary of the challenges and further involvement of attendees and speakers to forge ahead to meet the identified challenges.

Forum discussion results: Matrix of identified needs and challenges

Table 1 presents a matrix of the needs and challenges that were identified during the Forum proceedings.



Garry Kosteck, US Army, presents a speaker Award to the Forum's Keynote Speaker, Don Huizenga, Kurdziel Industries

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Table 1: Matrix of Identified Needs and Challenges/Action Items

Category	Description	Action Items from each category
Competition	<ul style="list-style-type: none"> ➤ Competition from other countries, with a specific concern regarding cheap imports from China and other countries that have developed a strong U.S. market. ➤ Uneven environment in which foreign countries compete with the U.S., specifically environmental controls and government subsidy of foreign casting manufacturers. 	<p>Work with American Foundry Society to request a Section 332 investigation by the International Trade Commission regarding current competitive conditions facing U.S. metal casting facilities.</p>
Education	<ul style="list-style-type: none"> ➤ Education and awareness of the general public of the importance of the casting industry to the U.S. economy and quality of life. ➤ Attracting, educating and training of future workers in the metal casting industry ➤ Government and industry support of casting education through the Foundry Education Foundation and other university initiatives. ➤ Professors will follow the Research and Development Funding, and jobs will support students ➤ Empowerment of people. Don't have rigid rules, have a clean house, a common goal. ➤ Develop new partnerships for applied research ➤ Increase dispersed research linked by Trade Associations 	<ul style="list-style-type: none"> ➤ Develop a public relations program on the importance of the metal casting industry ➤ Promote university and industrial partnerships on applied casting research.
Environment	<ul style="list-style-type: none"> ➤ Getting a better handle on environmental issues and making foundries cleaner. ➤ Impact of the Iron and Steel MACT regulation on foundries ➤ Increased regulatory pressure from EPA and OSHA. ➤ Need rational solutions and reduced compliance cost. 	<ul style="list-style-type: none"> ➤ Develop an ISO 14001 roadmap for the metal casting industry. ➤ Develop a similar safety roadmap. ➤ Continue the pollution prevention research at CERP and other organizations ➤ Adopt environmental management systems and participate in EPA programs supporting these systems. ➤ Change attitudes: don't continue embracing the status quo; environmental issues will not go away.

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Category	Description	Action Items from each category
Image	<ul style="list-style-type: none"> ➤ Improve public relations regarding the applicability and importance of castings in our daily lives. ➤ Better lobby in Washington and leadership to promote long-term success of the industry in the United States. 	<ul style="list-style-type: none"> ➤ Develop a public relations program on the importance of the metal casting industry
Production	<ul style="list-style-type: none"> ➤ Create value and be more proactive in returning value on investments ➤ Reduce costs and improve process to increase quality and profitability ➤ Casting components that meet performance requirements need to increase ➤ Traditional foundry business model is dead – a new model must be developed. ➤ Technology transfer from research institutions and universities onto the shop floor. ➤ Reduce energy consumption and costs. ➤ Embrace and promote new technologies ➤ Reduce the infrastructure costs of foundry operations ➤ Retool and retrain technicians on new technologies ➤ To be successful, new technology must apply to all areas of business – life cycle costs including environmental, energy, quality, process validation and process development. ➤ Early design and prototyping of new castings (product cycle time/time to first part) must be improved. ➤ Better understanding and control of the foundry process. ➤ Quality requirements in the electronics industry: vacuum tight, clean surfaces, no out-gassing, and sound anodized layer. 	<ul style="list-style-type: none"> ➤ Support process improvement projects that are environmentally successful and improve productivity ➤ Support energy projects such as fuel cells and other renewable energy sources. ➤ Develop rapid prototyping capability for industry ➤ Work on near net shape high quality

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Category	Description	Action Items from each category
<p>Research and Development/ Technology Transfer</p>	<ul style="list-style-type: none"> ➤ More collaboration between researchers – technology transfer ➤ Develop low cost processes and materials ➤ Develop partnerships with research organizations, universities and trade associations ➤ Increased funding for research and development – including environmental, modeling, materials, processes and new technologies. ➤ Find ways to encourage and fund investments in new technologies. ➤ Infrastructure of research of metal casting needs to be better integrated – with better technology transfer. There is a large gulf between the small and large foundries. ➤ Lost foam research: Thermal conductivity testing has led to a need for improved materials research. ➤ Mitigate the risk of using castings in critical applications ➤ Casting research at universities usually depends on individual researchers – programs need to be institutionalized. ➤ Collaborative research and development of new technologies and improvement of old is critical. ➤ For new technologies, look to the fringes of the industry. ➤ Electronics industry: castings to replace machining in chip manufacturing tools. ➤ Thin wall steel ➤ Green pathway engineering technologies ➤ Fully integrated CADD/CAM/CAE ➤ Modeling needs: gating system design, integrated engineering ➤ Improve energy efficiency. 	<ul style="list-style-type: none"> ➤ Develop a new research and development model for casting research. ➤ Develop modeling programs that will allow the increased used of the lost foam process. ➤ Further advance the integration of part design, tooling design and finished part.

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Category	Description	Action Items from each category
Lightweight Casting Efforts	<ul style="list-style-type: none"> ➤ Titanium castings: need: <ul style="list-style-type: none"> ○ Lower cost of raw materials, tooling, inspections ○ Early design and prototyping ➤ Develop lightweight materials (different alloys and thin wall research). ➤ Titanium ➤ Magnesium ➤ Improved alloy aluminum ➤ Thin wall iron 	<ul style="list-style-type: none"> ➤ Support research on methods to reduce the cost of titanium castings. ➤ Support research on lightweight materials.

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IV. Summary and Next Steps

The Forum was a success. Now the real work starts. Where do we go next? The Forum will only be considered a success if real ideas and actions come out of the 2 days spent by speakers and attendees. A follow-up Forum is being developed, to be held in early 2004, to focus on action items. We look forward to continued participation and input by those who were there, those who wanted to come, and all who want to make sure that the casting industry remains strong and viable in the years to come.