Joining Forces to Advance Earthworks Engineering

The Center for Earthworks Engineering Research (CEER) at Iowa State University is seeking the support and active involvement of industry (e.g., high-tech companies, equipment manufacturers), public agency, and university partners in fast-tracking the development and implementation of innovative earthwork engineering and construction systems. Today’s earthwork and construction engineering problems will not be solved with yesterday’s practices; the critical need for rapid construction solutions, long-lived facilities, and sustainable infrastructure requires dramatically new technologies for earthwork operations and performance analysis. With solid partner support and a broad base of research expertise, CEER will be the country’s leading center for cross-disciplinary and fundamental earthworks engineering research.

CEER goals include identifying technology shortfalls, performing research in emerging areas, promoting accelerated development and deployment of advanced technologies, and effectively integrating legacy and innovative earthwork solutions.

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Benefits for industry partners
• Early access to updates of the CEER knowledge and technology base
• Inside track to innovation-focused graduates of a one-of-a-kind academic program
• Opportunities to collaborate with world-renowned leaders
• Opportunities to network with faculty, other industry partners, students, and innovation venture capital partners
• A voice in recommending design and target products
• Sponsoring and branding opportunities
Overview of Industry Partnerships

CEER aims to cultivate long-term relationships with public and private organizations, ultimately developing a broad network of respected expertise and a solid support base. The mechanisms for industry supporting partners are described below. (Public agency and university partners have separate mechanisms for partnering with CEER.)

Industry Partner Support and Benefits

CEER’s industry partners will support the partnership in two ways: (1) annual programmatic funding and (2) sponsorships of individual research projects.

1. Through annual programmatic contributions, industry partners become members of CEER’s industry advisory board. Businesses can choose to contribute programmatically at either the Strategic Partner level or the Full Partner level, as outlined in the following table:

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<th>Size of Organization (no. of employees)</th>
<th>Levels of Annual Programmatic Support</th>
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<tr>
<td></td>
<td>Strategic Partner</td>
</tr>
<tr>
<td>Large (&gt;500)</td>
<td>$25,000</td>
</tr>
<tr>
<td>Medium (60-499)</td>
<td>$12,500</td>
</tr>
<tr>
<td>Small (10-59)</td>
<td>$2,500</td>
</tr>
<tr>
<td>Start-up (&lt;10, no IPO)</td>
<td>$500</td>
</tr>
</tbody>
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2. By sponsoring specific research projects, both Full and Strategic Partners will have opportunities to work with CEER research faculty and staff in defining project objectives and tasks and submitting proposals to federal agencies. Research funding/ sponsorships will be determined on a project-by-project basis and will require individual sponsor agreements with CEER.

Results-Oriented Vision

CEER has worked with current partners to formulate a strategic vision. That vision is Integrated Earthwork Operations (IE-Ops); illustrated at right, in which several systems of advanced technologies and methods are integrated with each other to improve efficiencies, quality, speed, affordability, environmental soundness, and long-term performance.

The IE-Ops vision can serve as a catalyst and focus for research and outreach. The vision also can provide a framework to illustrate at right), in which several systems of advanced technologies and methods are integrated with each other to improve efficiencies, quality, speed, affordability, environmental soundness, and long-term performance.

The IE-Ops vision can serve as a catalyst and focus for research and outreach. The vision also can provide a framework to illustrate the potential impacts of research-based technologies.

<table>
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<th>Potential outcomes of pursuing such a vision include:</th>
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<td>• Faster rewards for industry ingenuity and inventiveness</td>
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<td>• Accelerated deployment of new technologies</td>
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<td>• Access to the IE-Ops for a fraction of the total cost of development</td>
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Center for Earthworks Engineering Research

Building on Iowa State University’s decades-long tradition of leadership and invention in geotechnical engineering, CEER is becoming a center of excellence in earthworks-related research, outreach, and education through the development and deployment of innovative solutions and cornerstone technologies. CEER’s nationally recognized faculty, staff, and affiliates have solid research portfolios that reflect critical core competencies and records of successful long-term collaborative initiatives and positive impacts on industry.

CEER Facilities and Resources

• Mobile geotechnical laboratory equipped with advanced test equipment and satellite communication for fast response, on-site testing
• Access to supercomputing
• GIS software/research facility
• Center for Nondestructive Evaluation
• Virtual Reality Application Center
• Field and laboratory research facilities at core partner institutions

CEER Highlights

• Deployed the mobile geotechnical lab to 22 states in 5 years to conduct field research and demonstrate new technologies for more than 1,000 people
• Generated $3.4M in external research funding in 4 years and has contributed globally to research and technology deployment
• Leveraged every $1 of industry research funding with an additional $5 of government agency funds
• Integrated state-of-the-art technologies into agency specifications
• Collaborated with over 40 researchers at ISU, other universities, consulting services, 20 industry partners, and 25 state highway agencies
• Graduated 40 research-experienced professionals and provided technical communication training for CEER graduate students
• Published more than 130 research articles (peer-reviewed journal papers, conference proceeding papers, and research reports) and delivered more than 50 professional presentations on critical geo-construction topics
• Developed a multi-year national road map for developing and implementing specifications for intelligent compaction technologies in partnership with industry and state agencies
• Secured investments of $1 million in state-of-the-art testing equipment