AMM - Concept and Vision

http://people.uwm.edu/amm/
Why Materials & Manufacturing?

Manufacturers produced $56 billion worth of economic output in 2016, accounting for over 18% of the state’s gross domestic product.

2nd highest manufacturing concentration of any state in the nation

16% of all Wisconsin workers

Manufactured goods account for 86% of Wisconsin exports


Food, beverage and tobacco products: $8,218
Machinery: $8,176
Fabricated metal products: $6,533
Chemical products: $4,607
Paper products: $4,605
Electrical equipment and appliances: $3,654
Computer and electronic products: $3,090
Plastics and rubber products: $2,790
Motor vehicles and parts: $2,763
Printing and related support activities: $2,659

Sources: 2016 U.S. Bureau of Economic Analysis and the U.S. Census Bureau

460K+ employed by Wisconsin manufacturing companies
BEST SOLUTIONS require BEST RESOURCES

Availability
Affordability
Accessibility
Sustainability
What is AMM?

Multidisciplinary teams of academics and researchers from various WI institutions working together with industry practitioners on solving materials and manufacturing problems facing WI companies for economic and social benefits.
AMM’s Vision

To be the go-to-organization for companies and entrepreneurs in WI to understand, validate, and exploit advanced materials and processing technologies for economic and social benefits at low risks.
AMM’s Mission

- Engage and leverage WI intellectual and engineering resources to:
  - solve high-priority industry challenges
  - create new business opportunities

- Create pipelines of workforce talents with excellent research & problem solving skills

- Create and disseminate knowledge among stakeholders
Solving R&D problems and validating new opportunities with higher accuracy, shorter timelines, lower costs; while creating a pipeline of high-skilled workers and talents.

**AMM**
will **connect**
engage & leverage
WI intellectual and engineering resources

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**Academic and engineering resources are abundant**

> 400 faculty researchers  
> 100 related research labs  
> 1000 involved students

**Resources can be leveraged for economic benefits**

> $24B annual contribution  
> $18B (75%) to industry  
> 23-to-1 economic ROI  
> 167,000 jobs supported

**Existing infrastructure for Industry/University collaboration**

> $1.7B in research  
> 25 engineering consortia  
> 10 industry outreach centers
Accessibility

AMM will serve as a hub connecting various public and private resources with easy access.
Sustainability

Identification & Concept Development
- CoE researchers
- Research partners
- Entrepreneurs

Assessment & Evaluation
- Industry consortium
- Embedded faculty
- Industry partners

Reinforcement & Sustainability (education and training)
- Outreach organizations
- Certificate programs
- Technical colleges
- On-site training
- Internships

Implementation & Integration
- Embedded faculty & graduate students
- Applied engineering programs & schools

Project Execution & Control
- Embedded faculty
- Graduate students
- Project managers

Project & Resource Planning (knowledge, people, technology, equipment)
- University partners
- Industry partners
- Research partners
- Government labs

Technology Transfer & Scalability
- CoE Consortium
- IP management
- Startups & entrepreneurs

AMM will lead all areas of the advanced materials development cycle: identifying needs and opportunities, creating knowledge and transforming innovations into sustainable and profitable technologies.
Accelerated development & integration of new materials and processing technologies at lower risks through a sustainable pool of resources: people, knowledge, facilities & equipment.
Key Opportunities

4-yr Academic Institutions
- Statewide leadership roles around established missions and strengths with greater impacts

2-yr Technical Schools
- Engage in new materials and processes being developed by researchers for future industry use
- Prepare for workforce skills needed for the industrial use of new materials and processes in production settings

Faculty
- Resources for accelerated paths to achieve personal career and professional goals
What differentiates AMM?

**AMM’s Mission**
AMM will offer WI industry comprehensive and sustainable solutions to grand challenges in advanced materials and technologies including fundamental and applied research, assistance in technology transfers and scaling up designs, and the education and training of the workforce.

**AMM’s Structure**
AMM research and education platforms will be built on a network of multidisciplinary faculty collaborators from various academic and research institutions in WI.
Building AMM

CoE/AMM
Finding the “Big Ideas”
Funding the “Big Ideas”

CoE/AMM

Lightweight Materials  Composite Materials  Functional Materials  Additive Materials


University  WEDC  Industry
What will AMM offer?

- Students
- Facilities
- Funding
- Space
- Events
- Training
- Precompetitive Research
- Contractual Research
- Lab & Consulting Services (RM²N)
Suggested Thrust Technologies

- Surface Materials and Technologies
- Additive Materials and Manufacturing
- Multi-structure & Multifunctional Materials
Cross Functional Technologies

- Composites
  - Design for composites
  - Machining and Fastening (joining)
  - Mass production (process optimization)
  - Recycling

- Computational Materials Design and Validation

- Additive Materials and Manufacturing

- Surface Materials and Technologies

- Multi-structure & Multifunctional Materials
AMM Guiding Principles

- Recognize global mega trends shaping the scope and scale of future innovation demands
- Build strategic relationships based on fair value propositions for all stakeholders
- Exemplify stewardship best practices in conducting and managing funded research
- Researchers are thrust engines for innovation, fueled by creativity, and steered by industry needs
- Conduct projects focused on industry benefits rather than projects outcomes
- Recognize and overcome friction forces impeding value streaming between partners
Benefits of early participation
(CoE Partners and Consortium Members)

- Shaping AMM’s focused scope, operating models and mechanisms
- Benefiting from the initial investments made to establish the CoE (e.g. funded pilot research projects and CoE facilities)
Membership Cost

- The AMM Steering Advisory Board has recommended a reduced membership cost of $25k/year for a limited time (max 3 years) to be offered to a limited number of industry members.

- Membership costs will be subsidized by the CoE with the expectation that industry members will be active participants in building the CoE research portfolio, operating models, and future resources.

For further information please contact Dr. Nidal Abu-Zahra at nidal@uwm.edu or (414) 229-2668.
Industry Membership Benefits

Access to Research:
- Assistance with identifying regional/national resources for specific company R&D needs
- Assistance with identifying and connecting with experts/collaborators on specific company needs
- Access to non-proprietary data/information generated by CoE AMM-funded precompetitive projects for company-specific contractual projects
- Participation in large-group state and federal funding proposals submitted by the CoE AMM

Access to Student Talent Pipeline:
Assistance with identifying/recruiting students with relevant skills for company needs, including internships, co-ops and employment

Access to Training Current Workforce:
- Assistance with developing/customizing on-site training courses and workshops

Opportunities to Guide the CoE AMM/Projects Undertaken:
- Voting seat on the CoE AMM steering advisory board
- Voting on precompetitive research projects funded by the CoE AMM/Consortium
- Voting on sharing information and licensing technologies with non CoE AMM members
- Non-exclusive IP licensing, at no cost, and exclusive IP licensing at additional cost

Access Facilities and Equipment
- Access to shared space for collaborative group research and scaling-up projects
- Free access to CoE AMM facilities and equipment
- Discounts on the use of instruments and equipment available at partnering institutions
- Participation in exclusive CoE AMM technical meetings and presentations of funded CoE AMM projects

Opportunities to Collaborate
- Participation in exclusive networking and recruiting events for CoE AMM members and affiliates
- Participation in CoE AMM technical workshops, seminars, conferences and symposia

Cost: $25,000/year; three-year commitment
### Suggested KPIs

#### INPUT
- Institutional infrastructure and support
- Researchers: Number, Capabilities, Motivation
- Company Partners: Capabilities, Motivation
- Resources: R&D expenditure; Budget and income; Donations and grants (matching)
- Collaboration agreements

#### IN-PROCESS
- Joint project setting (deliverables, milestones …)
- Relevant research (multidisciplinary research)
- Frequency of formal meetings between stakeholders
- Budget status
- Mentorship for projects
- Governance
- Assessment methodology & frequency (customer satisfaction survey, ROI)

#### OUTPUT
- Publications (joint)
- Theses (MS/doctoral)
- New technologies developed
- New scientific knowledge
- Trained staff/faculty
- Trained students
- Spin-offs
- Workshops, seminars conducted
- Invention disclosures
- Royalty & licensing income

#### IMPACT
- Productivity growth/cost savings/cost avoidance
- Number of new-to-company opportunities in new markets
- Recruitment/Satisfaction of graduates
- Satisfaction of employers
- Curriculum development
- Success of spin-offs
- Net increase of jobs
- Increase in cooperation
- Academic mobility (promotion?)
- In-situ training (foreign campuses)
History and Timeline

- **Presented Concept to WEDC**
  - Apr 2\(^{nd}\)

- **AMM Whitepaper to WEDC**
  - Apr 20\(^{th}\)
  - May 2\(^{nd}\)

- **1\(^{st}\) Cluster Meeting at UWM**
  - May 22\(^{nd}\)
  - May 4\(^{th}\) : 2\(^{nd}\)
  - May 18\(^{th}\) : 3\(^{rd}\)
  - June 4\(^{th}\) : 4\(^{th}\)
  - June 15\(^{th}\) : 5\(^{th}\)

- **1\(^{st}\) Campus Visit**
  - Sheku Kamara
  - Milwaukee School of Engineering
  - June 29\(^{th}\) - MSOE

- **1\(^{st}\) Company Visit**
  - Erica Grant
  - Badger Mining Corp
  - Taylor, WI
  - Jul 29\(^{th}\) - A.O. Smith
  - Aug 24\(^{th}\) - UW (MERC/AMIC)
  - Jun 24\(^{th}\) - Grainger Institute

- **1\(^{st}\) Advisory Board Meeting (UWM)**
  - Nov 6\(^{th}\) – Northeast Wisconsin TC
  - Oct 9\(^{th}\) – UW-Stevens Point
  - Sep 21\(^{st}\) – UW-Eau Claire (RM2N)
  - Sep 21\(^{st}\) – Waukesha County TC
  - Sep 14\(^{th}\) – Fox Valley TC
  - Sep 9\(^{th}\) – UW-Eau Claire
  - Sep 9\(^{th}\) – UW-Stout
  - Aug 29\(^{th}\) – Marquette U
  - Aug 24\(^{th}\) – UW (MERC/AMIC)
  - Jun 24\(^{th}\) – Grainger Institute
  - May 22\(^{nd}\) - MSOE

- **1\(^{st}\) Workshop (UWM)**
  - Oct 18\(^{th}\)
  - Nov 8\(^{th}\) – 3\(^{rd}\) Advisory Board Meeting (MSOE)
  - Oct 4\(^{th}\) - 2\(^{nd}\) Advisory Board Meeting (MATC)

- **1\(^{st}\) Advisory Board Meeting (UWM)**
  - Oct 2\(^{nd}\) – Modine Manufacturing
  - Sep 28\(^{th}\) – Astronautics
  - Sep 26\(^{th}\) – Badger Meter
  - Sep 25\(^{th}\) – A.O. Smith
  - Sep 24\(^{th}\) – HellerTytonn
  - Sep 21\(^{st}\) – Plexus
  - Sep 17\(^{th}\) – Briggs & Stratton
  - Sep 17\(^{th}\) – Serigraph
  - Sep 14\(^{th}\) – Rexnord
  - Aug 30\(^{th}\) – Amalga Composites
  - Jun 29\(^{th}\) – Briggs & Stratton
  - Jul 29\(^{th}\) – A.O. Smith
  - Jun 8\(^{th}\) – Badger Mining Corp
AMM Steering Advisory Board Members

Vicki J. Martin
President
Milwaukee Area Technical College

Buckley Brinkman
Executive Director/CEO
WI Center for Manufacturing & Productivity

John Schiessl
VP of Core Engineering
Generac Power Systems

Brian Witt
Senior Manager - Engineering Centers of Excellence
Ariens Company

Marv Klowak
Global VP – R&D
Briggs & Stratton Corp.

Robert Heideman
Senior VP - Chief Technology Officer
A.O. Smith Corporation

Michael Miller
Director of Product Development Engineering
HellermannTyton US

Joseph Hamann
Director, Advanced Engineering
Rexnord Corporation

Mohammad Al-Omari
Manager-Advanced Materials and Process Development
Kohler Company

Fred Begale
VP Engineering
Badger Meter

Sheku Kamara
Dean of Applied Research
Milwaukee School of Engineering

Dane Morgan
Professor of Engineering
UW-Materials Science and Engineering

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Michael Miller
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Modine Manufacturing Co.

Scott Jansen
Executive VP and COO
Employ Milwaukee

John Borg
Professor and Chair
Marquette University

Steven Russek
Chief Engineering Scientist
Astronautics Corp Of America

Vicki J. Martin
President
Milwaukee Area Technical College
THANK YOU

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