Advanced Manufacturing Demonstration Facility

Debra Franklin, Director of Strategic University Initiatives, Wichita State University

Moderator: Robert Creighton, AMP SoCal

AMP SoCal Webinar Series: Episode 8
April 6, 2018  10:00 a.m. – 10:45 a.m.
About AMP SoCal

• The Advanced Manufacturing Partnership for Southern California (AMP SoCal) is a collaboration of more than 150 different organizations.

• Its goal is to strengthen the industrial ecosystem for aerospace and defense manufacturers.

• AMP SoCal is led by the University of Southern California (USC) Sol Price School of Public Policy - USC Center for Economic Development.

• AMP SoCal supports the aerospace and defense manufacturing industry within the 10-county Southern California region.
Logistics

• All audio will stream through your computer speakers.

• Please submit your questions anytime throughout the presentation in the chat box, located on the bottom of your screen.

• Webinar recording and slides are posted within one week of the event.

ampsocal.usc.edu/webinars
Today’s Speaker

Debra Franklin, M.B.A.
Director of Strategic University Initiatives,
Wichita State University
Advanced Manufacturing Partnership for Southern California (AMP SoCal) Webinar

Advanced Manufacturing Demonstration Facility

April 6, 2018
Agenda

• About Wichita
• Alignment of Economic Inputs with Industry Clusters
• Prioritization of Catalytic Public Sector Investments
• Wichita State University Resources to Support Technology-based Economic Development
  • Makerspace
  • Advanced Manufacturing Demonstration Facility
  • Prototype UAS
  • Innovation Campus / Innovation District
  • National Institute of Aviation Research (NIAR) Assets
WICHITA RANKING

Wichita Ranks 3rd among metros for percentage of advanced industry jobs

—Brookings analysis of data from Moody’s Analytics

21 engineers per 1,000 employees
AVIATION’S IMPACT ON KANSAS

44% U.S. general aviation built in Kansas

20% state’s budget attributed to aviation

$7.1 billion Economic Impact in KANSAS

$5 million State funding for collaborative aviation R&D

Return 8 on investment
### NSF AERO R&D RANKINGS

#### AERO R&D EXPENDITURES

<table>
<thead>
<tr>
<th>Rank</th>
<th>University</th>
<th>Expenditures (Million)</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Georgia Institute of Technology</td>
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<td>Utah State University</td>
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<td>3</td>
<td>University of Colorado Boulder</td>
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<td>4</td>
<td>Wichita State University</td>
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<td>5</td>
<td>Purdue University, West Lafayette</td>
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#### INDUSTRY FINANCED AERO R&D

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<tbody>
<tr>
<td>1</td>
<td>Wichita State University</td>
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<tr>
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<td>3</td>
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<td>4</td>
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<tr>
<td>5</td>
<td>Mercer University</td>
<td>3</td>
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</table>

Source: National Science Foundation Higher Education Research and Development survey 2016
VISION: South Kansas Regional Collaboration will develop:  
Advanced manufacturing research, development, and demonstration capacity to poise South Kansas to be a global leader in advanced materials and their commercialization.

Primary Catalytic Public Investment Research and Innovation:
• Advanced materials, prototyping, and automation.
• Industrial commons.
• Innovation district development.

MISSION: Grow the region’s economy, leading to more jobs and a better quality of life for our citizens.

Competitive Regions Align Economic Inputs with Industry Clusters
Blue Print for Regional Economic Growth
(BREG) Three Organizing Components

• **Cluster Strategies**
  • Industry-driven initiatives to generate jobs based on collaborative actions

• **Cross-cutting Initiatives**
  • Region-wide initiatives to create advantages for all industries

• **Implementation Partnership**
  • Organization with a charter to help markets work by aligning inputs with outputs:
    • **Build Clusters**: Bring together members of each industry cluster
    • **Support Cluster Actions**: Provide coordination and technical assistance
    • **Initiate and Support Regional Initiatives**: Coordinate development of crosscutting initiatives
    • **Track & Report Progress**: Track and report to the region on our progress
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Regional Collaboration Leads to Success

Competitive Regions Align Economic Inputs with Industry Clusters
MAKERSPACE: GOCREATE

- Opened April 2017
- Community Prototyping
- Located in Experiential Engineering Building
- Open to entire community
- Membership-based (membership assistance available)

**Studios**
- 3-D Printing
- Metal
- Wood
- Plastic
- Textile
- Electronics
- Software Design
Advanced Manufacturing Demonstration Facility

3D EXPERIENCE CENTER

- Partnership with Dassault Systemes & Hexagon

- Advanced product development and manufacturing of next generation materials and technologies
MULTI-ROBOTIC ADDITIVE MANUFACTURING (MRAM)
BUILDING ON THE FOUNDATION TO ENABLE THE FUTURE

Innovate the Future of Product Development and Advanced Manufacturing

- Immersive Technologies
- 3DEXPERIENCE®
- Additive Manufacturing
- Robotics

Wichita State University
ENABLING THE DESIGN PROCESS OF ADDITIVE MANUFACTURED PARTS

An “End2End” design process using 3DEXPERIENCE PLATFORM – unified CAD-modeling, simulation and optimization environment with simplified Workflow

- Preprocessing for Topology Optimization
- Conceptual Topology Optimization
- Parametric Sizing Optimization
- CAD-Reconstruction of Conceptual Design Proposal and non-linear FEA -Verification

* As Is - Using the Optimization Module of ABAQUS CAE (Tosca)
AMDF DEMONSTRATION PROJECT

Key Mission Requirements:
- Modular Design: Hybrid CTOL + VTOL (HTOL), Pure VTOL, Pure CTOL
- Ability to cruise at 50 mph with 55 lbs weight
- Ability to perform Search and Rescue with a Gimbal system
- Ability to drop a payload of 5 lbs
- HTOL Endurance: 4 hours + 10 minutes Hover
3D Printing Tunnel Components
CFD accurately predicts flow separation at high angles of attack and is validated using Wind Tunnel flow visualization results.
T-Pull Test – Preliminary Joint Validation
Wing Overview-Completed Design

- Novel Stressed Skin Design
  - Skin doubles and tooling for spar and rib alignment

- Quick Configuration Change Capability
Structures Overview – Pylon Skin

- Primary Structure – 4 Ply CFRP laminate [45,0]s
  - Dry weight: 1.05 lb
- Metallic components – 2024-t6
- Skin – 2 Ply CFRP [45,0] with 2 ply doublers [0,45]
  - Dry weight: 0.60 lb
- Total weight of pylon structure: 1.65 lb
sUAS Display at the EEB Open House
Innovation Campus Development (Innovation District)
Campus Master Plan
NIAR LOCATIONS

NIAR Headquarters
Wichita State University
1845 Fairmount St, Wichita

Aircraft Structural Test & Evaluation Center
Kansas Coliseum
1229 E. 85th St N, Park City

National Center for Aviation Training
4004 N Webb Rd, Wichita

Electromagnetic Effects & Environmental Test Labs
Air Capital Flight Line
3501 S Oliver St, Wichita
NIAR LABORATORIES

Advanced Coatings  Aging Aircraft  Ballistics/Impact  CAD/CAM  CIBOR  Composites  Computational Mechanics

Crash Dynamics  Electromagnetic Effects  Environmental Test  Full-scale Structural Test  Human Factors  Mechanical Test

NDT  Oil Analysis  Research Machine Shop  Reverse Engineering  Virtual Reality  Beech Wind Tunnel  Robotics & Automation
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