9:30 – 9:35 Welcome to CCAM (and Safety Briefing) – Joe Moody
9:35 – 10:05 Secretary of Finance Presentation and Committee Meeting
10:05 – 10:15 CCAM Overview – Joe Moody
10:15 – 10:25 CCAM Technology – Bob Fagan
10:25 – 10:40 CCALS Overview – Mark Manasco
10:40 – 10:50 Workforce Development – Bruce Sobczak
10:50 – 11:10 Intern Presentations – 3-5 minutes each
11:15 – 12:15 Tour of CCAM – Bob Fagan
12:15 – 1:00 Working Lunch and Wrap Up Discussion
CCAM Overview
Joe Moody – President and Executive Director
CCAM delivers production-ready manufacturing solutions at the speed of industry with the intellectual rigor and innovation of universities.
CCAM Membership

Industry Driven Partnership Growing Advanced Manufacturing Capabilities

- Aerojet Rocketdyne
- Airbus
- Alcoa
- Canon
- Chromalloy
- Rolls-Royce
- Sandvik Coromant
- Siemens
- NASA
- Old Dominion University
- University of Virginia
- VCU
- Virginia State University
- Virginia Tech
- Blaser Swisslube
- Chermlle Machine Company
- EOS
- Mitutoyo
- RTI International Metals, Inc.
- Buehler
- Cool Clean Technologies
- National Instruments
- Mechdyne
- STS
# CCAM Value Proposition

## Unique IP Ownership Model
- Promotes Competitive Advantage for Members

## Network of Capabilities
- Leverages Capabilities of University and Government Members
- Bridges the Gap Between Fundamental Research and Commercialization

## Collaborative Membership
- Fosters Innovation Amongst Members
- Lowers R&D Costs for Member Companies
CCAM Research Network

- 62,000 ft² Purpose Built Facility with 16,000 ft² Industrial High Bay in Disputanta, VA
  - 16,000 ft² Industrial High Bay
  - Labs: Material Characterization, 3D Visualization, Metrology Room, etc...

- 20 acre Campus with Room for Expansion

- Research Conducted Across Multiple Facilities Working Collaboratively
  - Access to Member University Expertise, Labs, and Capabilities
  - Access to Member Company

Your Leader in Delivering Innovative Solutions for Manufacturing Better Products
University Benefits

- Virginia Universities have received millions of dollars of funding from CCAM Related Activities Since 2010

- Active Intern Program – Interns Involved Directly in CCAM Research
  - 59 Students have Interned at CCAM since 2012
  - Planning 30+ Interns in 2015

- CCAM Partnership has Increased Engagement with:
  - CCAM Industry Leading Member Companies (e.g. Rolls-Royce, Airbus, Alcoa, Siemens…) and suppliers.
  - Fellow institutions of Higher Learning

- CCAM Resource Access Expands Project Potential
  - Access to Advanced Manufacturing (AM) and testing equipment
  - Access to technical expertise (e.g. surface engineering, machining, thermal spray)
SVHEC, NCI and SVAM COEs, and CCAM AMAA

- $25M Matching Funds Committed by State in 2014
- $1.5M Planning Grant Awarded By State in 2015
- $2 Million Awarded to Each CoE for Start-up
- Curriculum Development in Process (CCAM Collaboration)
- Equipment Identified and Ordered (Deliveries Underway)
- Instructor Recruitment and Development in Process
- Transitioning Soldier Training Program with Ft. Lee – First Cohort Complete

CCAM Foreign Direct Investment (FDI)

- 4 Announced FDI Companies – 3 Creating Jobs in Virginia
- 9 Additional FDI Companies being Actively Recruited

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Industry</th>
<th>Investment In Virginia</th>
<th>Value of Capital Investment</th>
<th>New Jobs Created</th>
<th>Mean Salary</th>
<th>Location</th>
<th>Size of Factory</th>
<th>Announcement Date</th>
<th>Start to Create Jobs</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kligour Aerospace</td>
<td>Aerospace</td>
<td>Engine and airframe components</td>
<td>$27m</td>
<td>155</td>
<td>$31,000</td>
<td>Henry County</td>
<td>70k</td>
<td>Jan-14</td>
<td>Jan-16</td>
<td>Announced / Delayed</td>
</tr>
<tr>
<td>Nulife Glass</td>
<td>Processing</td>
<td>Process CRT TVs into Lead Concrete</td>
<td>$6m + $4m building</td>
<td>46</td>
<td>$37,000</td>
<td>Bristol</td>
<td>130k</td>
<td>Jan-15</td>
<td>Feb-15</td>
<td>Creating Jobs</td>
</tr>
<tr>
<td>Hardide</td>
<td>Aerospace</td>
<td>Gas vapour deposition coatings</td>
<td>$7.25m</td>
<td>29</td>
<td>$50,000</td>
<td>Henry County</td>
<td>25k</td>
<td>Jan-15</td>
<td>Feb-15</td>
<td>Creating Jobs</td>
</tr>
<tr>
<td>Detectamet</td>
<td>Plastics</td>
<td>Manufacture and distribute plastics</td>
<td>$1m</td>
<td>30</td>
<td>$35,000</td>
<td>Southpark, Richmond</td>
<td>20k</td>
<td>Feb-15</td>
<td>Apr-15</td>
<td>Creating Jobs</td>
</tr>
</tbody>
</table>
• **CCAM has Demonstrated Benefits to Commonwealth of Virginia**
  – One-of-a-Kind Collaborative Research Center in North America
  – FDI Business Development Successes Creating Jobs
    • Attracting and Retaining Companies to VA and VA Universities for Research
  – Centers of Excellence Creation in SVHEC, NCI, and SVAM
    • CoEs putting in place training programs that previously didn’t exist in the regions, but are specifically demanded by Advanced Manufacturing companies
  – Internships for Next Generation Technical Leaders

• **CCAM is Able to Deliver Growth and Continued Success to VA**
  – A Partner with VTICRC and the Commonwealth on Growing the New Virginia Economy
CCAM Technology
Bob Fagan – Chief Technology Officer
## Technology Focus Areas

**Technology Focus Areas Determined by CCAM Members**

<table>
<thead>
<tr>
<th>Surface Engineering</th>
<th>Manufacturing Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machining Technologies</td>
<td>Additive Manufacturing</td>
</tr>
<tr>
<td>Welding / Joining</td>
<td>Composite Materials / Processing</td>
</tr>
</tbody>
</table>

### Coating Process Development
- Thermal Barrier, Abradable
- Hardness, Anti-friction
- Paints, Specialty

### Digital Factory
- Product Lifecycle Management
- Physical Cyber-Security
- Big Data

### Additive Manufacturing
- Structural Material
- Integrated Manufacturing
Leverage CCAM Network Resources

CCAM Process Research Floor

University Based Research Facilities

Corporate Partner Development Capabilities

NASA Langley Facilities
Commonwealth of Virginia
House Appropriations Committee
September 21, 2015
Virginia is a hub of logistics

- Pentagon and key logistics staff for the Department of Defense are in Virginia
- Fort Lee is the home of the Army Logistics University (ALU) and the Army Combined Arms Support Command (CASCOM)
- Fort Belvoir is the home of the Defense Logistics Agency (DLA)
- Richmond is the home of DLA – Aviation and DLA – Operations Research and Resource Analysis (DORRA)
- Port of Virginia offers the deepest shipping channels on the U.S. East Coast
- On-dock rail service makes the port a true multi-modal transportation hub
- Panama Canal expansion enhances Virginia’s position as a logistics hub

Virginia’s universities provide expertise critical to logistics systems

- Business – supply chain management, currency exchange issues, contract management
- Engineering – process modeling/optimization, risk management, security, human factors
- Public policy – compliance, export control, taxation, infrastructure investments
- Workforce – STEM degree programs, certificate programs, interns

Central Virginia can and should be a leader in the future of logistics

- Focal point is needed to bring public and private entities together
- Commonwealth Center for Advanced Logistics Systems (CCALS) provides the solution
A New Model for Collaboration

Key Attributes of CCALS:

- Industry-driven
- Multiple Universities
- Global Corporations
- Government Members
- Translational Research
- Workforce Development
- Enabler of Federal Funding
- Focus in Major Economic Sectors for Virginia

CCALS
Commonwealth Center for Advanced Logistics Systems

Founded in December 2012

Public-Private Partnership
Mission

- **Bridge the gap between fundamental research and commercialization**
  - Accelerate technology into markets
  - Demonstrate technology on real problems
- **Foster collaboration among diverse industry and government sectors**
  - Directed Research for the exclusive proprietary benefit of an individual member company
  - Generic Research for the benefit of all member companies
- **Lower R&D costs for member**
  - Shared facilities and personnel
  - Shared pre-competitive research
- **Train next generation of logistic technology leaders**
  - Provide market-ready experience to students
  - Connect industry with students

### Research Focus
- supply chain risk management
- logistics “big data” analytics
- supply chain enterprise systems
- logistics systems reliability
- modeling and simulation of logistics systems
- supply chain cyber and physical security
- human factors analysis in logistics

CCALS will transform businesses through a collaboration that bridges the gap between research and commercialization to accelerate delivery of new innovations and skilled workers to the logistics industries.
Members/Partners

- **University**
  - Longwood University
  - University of Virginia
  - Virginia Commonwealth University
  - Virginia State University

- **Industry**
  - Logistics Management Resources (LMR)
  - LMI
  - ORBIS America (SEP 15)

- **Government Associate**
  - Crater Planning District Commission (CPDC)
  - U.S. Army Combined Arms Support Command (Fort Lee)
  - Defense Logistics Agency (SEP 15)
  - Port of Virginia (POV)
  - Commonwealth of Virginia Secretary of Technology

- **Public Sector Partners**
  - Virginia Economic Development Partnership (VEDP)
Port of Virginia (POV) research partnership utilizing CCALS expertise:

- Mutually beneficial arrangement w embedded researcher
- Shared cost for not less than three years
- Design decision systems for vessel berthing, gate turn times, and traffic optimization based on simultaneous road closures

CIT Commonwealth Research Commercialization Fund (CRCF):

- “Aviation Drop-In Biofuels - Sustainable Supply Chain”

Cyber Security & Optimal Grid Power Flow Under a Coordinated Attack

LMI Research Institute Academic Partnership Program

Naval Aviation Warfare Center Aircraft Division (NAWCAD) Partnership

Fermata Vehicle to Grid Technology: Modeling & Simulation of Fleet Vehicle Batteries for Integrated Logistics and Grid Services

Aerial View
CCAM Workforce Development
Bruce Sobczak – Director, Workforce Development
Advancing Workforce Training

CCAM

Advanced Manufacturing Research

Workforce Economic Development

Virginia
50% of manufacturing companies plan to increase US based production over the next five years
80% of manufacturing companies report a moderate to serious shortage of qualified applicants
The Boston Consulting Group reports that within this current decade manufacturers will need to fill 800,000 jobs nationally.

Source: The Manufacturing Institute, 2014
World Class Training Center Alliances

Rolls-Royce®
Advanced Manufacturing Academy and COEs

CCAM AMAA
In Development

SVAM Abingdon
Established

NCI Martinsville
Established

SVHEC South Boston
Established

Others TBD?

Shenandoah Valley Area TBD

Hampton Roads TBD

Others TBD?
Training for Transitioning Military
CNC Machinist Program – for transitioning soldiers

- 162 modules of on-line
- 300+ hours hands on lab
- OSHA 10 Safety Certification
- 4 NIMS Certifications earned
- Completion in 5 months
Employer Participation

- Rolls Royce
- Coesia North America
- Enclos Inc.
- Kosmo Machine Inc.
- DuPont Advanced Fibers Systems
- Jewett Machine Inc.
- L&R Precision Tooling Inc.
- Anderson Machine Manufacturing Inc.
- Richmond Tooling Inc.
- And others
Proven Model Ready for Expansion
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Intern Presentations