Composite Prototyping Center

Composite Prototyping Center (CPC)
Advanced Energy Conference 2018
March 27, 2018

Composite Prototyping Center

Our Mission

CPC's core mission was developed in recognition of the growing demand and opportunities in advanced manufacturing using composite materials such as carbon fiber, fiberglass, and aramid.

It is:

To take the best assets available to form a core manufacturing competency in the rapidly growing composite market, while providing companies access to essential training and workforce development, process technologies, prototype manufacturing, and test capabilities, thus enabling these companies to meet the rapidly growing advanced composite manufacturing supply chain needs of prime contractors and OEM's.

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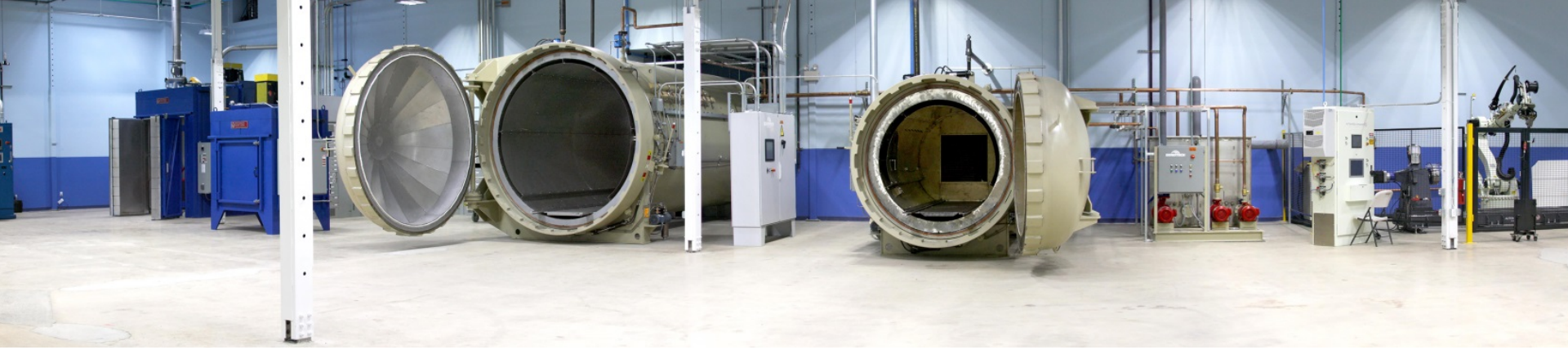
CPC's Primary Objectives

- Establish premier resources for composite prototype production for applications across diverse markets, including aerospace, automotive, energy, infrastructure, transportation, and leisure goods.
- Equip the CPC with essential production line technologies and staff the center with expert technologists.
- Assist companies to become qualified suppliers to OEMs and prime contractors for composite components / assemblies.
- Continue to secure government grants and private funding to facilitate CPC's future growth and development.
- Work closely with universities and community colleges to help develop multilevel certificate and degree programs consisting of advanced composite technologies for post secondary and undergraduate students thereby creating a highly-skilled workforce.
- Develop and conduct STEM training programs with local high schools.



CPC Manufacturing Floor

Automated Fiber Placement

Autoclaves , Ovens

Test and inspection – NDT and CMM tools and instruments

Clean Room (Class 100,000)

3D Printer

Walk-in Freezer

5 Axis CNC Routing Cell

Compression Molding, Heated Press

Hand Lay-Up with Laser projection assisted templates and kitting capabilities

Single Ply Cutting System with nesting s/w

RTM / VaRTM

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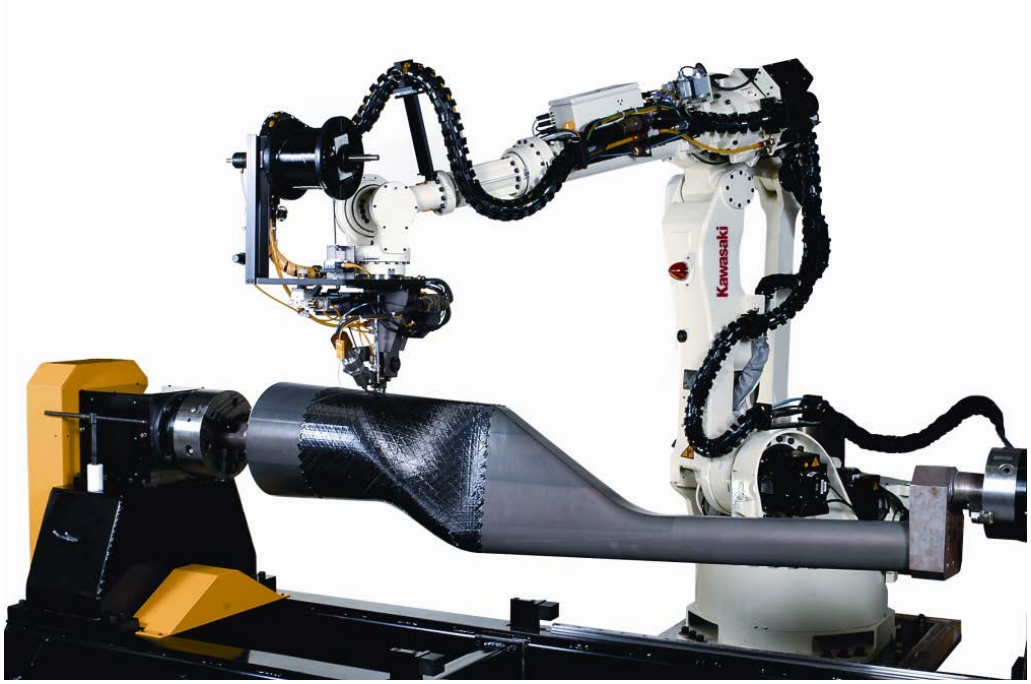
Automated Fiber Placement (AFP) Machine
Manufactured by Automated Dynamics

- Mfg. parts up to 90” long by 48” cross section/diameter
- Thermo-set Heads, 4 -1/4” tows
- Thermo-plastic Heads, 1 - 0.25” /0.50” tape
- Flat panel capable (48”x 96”)



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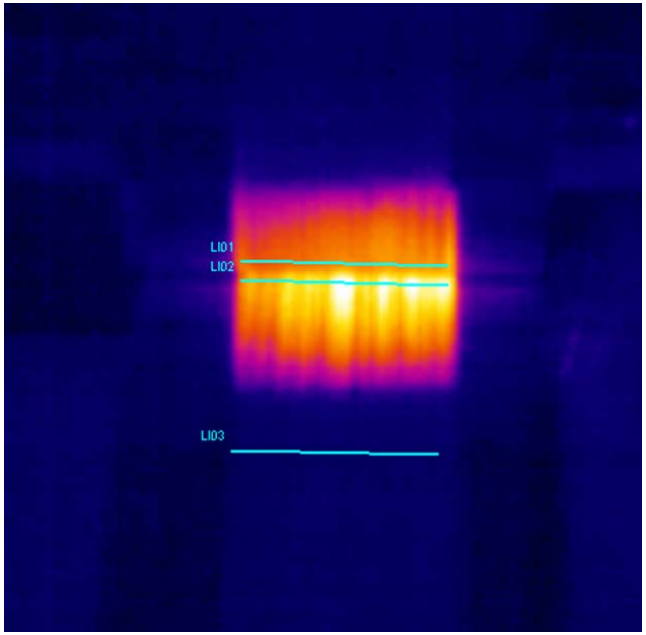
Additive Manufacturing AFP Laser Head

Advantages of Laser Heating

- Higher energy density
- Faster response time
- Greater efficiency
- Higher throughput



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Composite Training and Education

Education Curriculum and Certificate Programs:

- CPC offers introductory and composite design training courses for industry
- Stony Brook University will be offering a minor in composites (Mechanical Engineering degree)
- CPC is an approved CertTec® testing site for the Composite Technician Certification program
- CPC has launched a STEM Composites Initiative with local high schools which includes college credit from Vaughn College

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COMPOSITE TECHNICIAN CERTIFICATION PROGRAM

THE CURRICULUM

The Composite Technician Certification Program is a 60- hour course involving a comprehensive assessment of technician skills and knowledge focused on composites history, fiber reinforcements, matrix systems, and processes related to composite fabrication, inspection, damage assessment and repair common in today's industry.

Competencies Covered:

- Characteristics of Composites
- Fabrication Methods
- Testing, Inspection and Repair
- Health and Safety

CERTIFICATION

The Composite Technician Certification graduate is certified through CerTEC, a nationally recognized certifying agency.

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S.T.E.M. HIGH SCHOOL COMPOSITE TECHNOLOGY PROGRAM

THE CURRICULUM

This course is a 15 hour, four-week program taught by the engineering facility from Vaughn College and CPC Personnel. The curriculum consists of both classroom lectures and hands-on lab experience. Students that successfully complete the course will receive one college credit from Vaughn College.

- Introduction to Composites
- Design with Composites
- Analysis with Composites
- Composite Materials and Processes
- Manufacturing with Composites
- Hot Bond Repair

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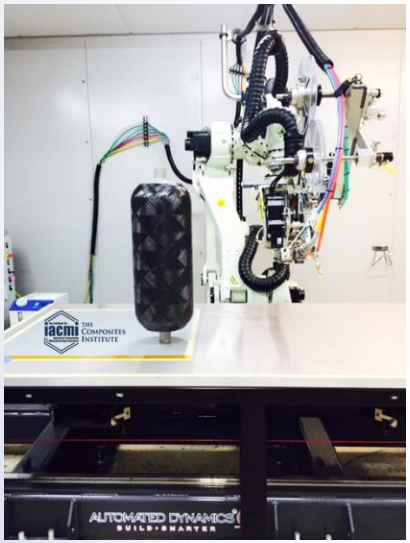
Composite Prototyping Center is the National Designee for the Department of Energy's Institute for Advanced Composites Manufacturing Innovation's Designated Center for New York and the Northeast Corridor

Plainview, NY… (October 15, 2015)
The Institute for Advanced Composites Manufacturing (IACMI) today signed a Memorandum of Understanding with the Composite Prototyping Center outlining a collaborative arrangement in which both will work to bring advanced composite materials and technologies to the marketplace. It is a major achievement for the CPC which has earned this national recognition as the IACMI's designated center for commercializing advanced composites manufacturing on Long Island, New York State and the broader Northeast corridor. The agreement provides the framework for collaboration in research, product development, commercialization, workforce training and STEM (Science, Technology, Engineering and Math) education.

IACMI 5.2 Program



- Material provider
- Resin formulation

DU PONT

- COPV design
- Mechanical properties

STEELHEAD COMPOSITES

CPC

- Automated Fiber Placement
- Program guidance

UDRI

- Mechanical properties
- Physical properties

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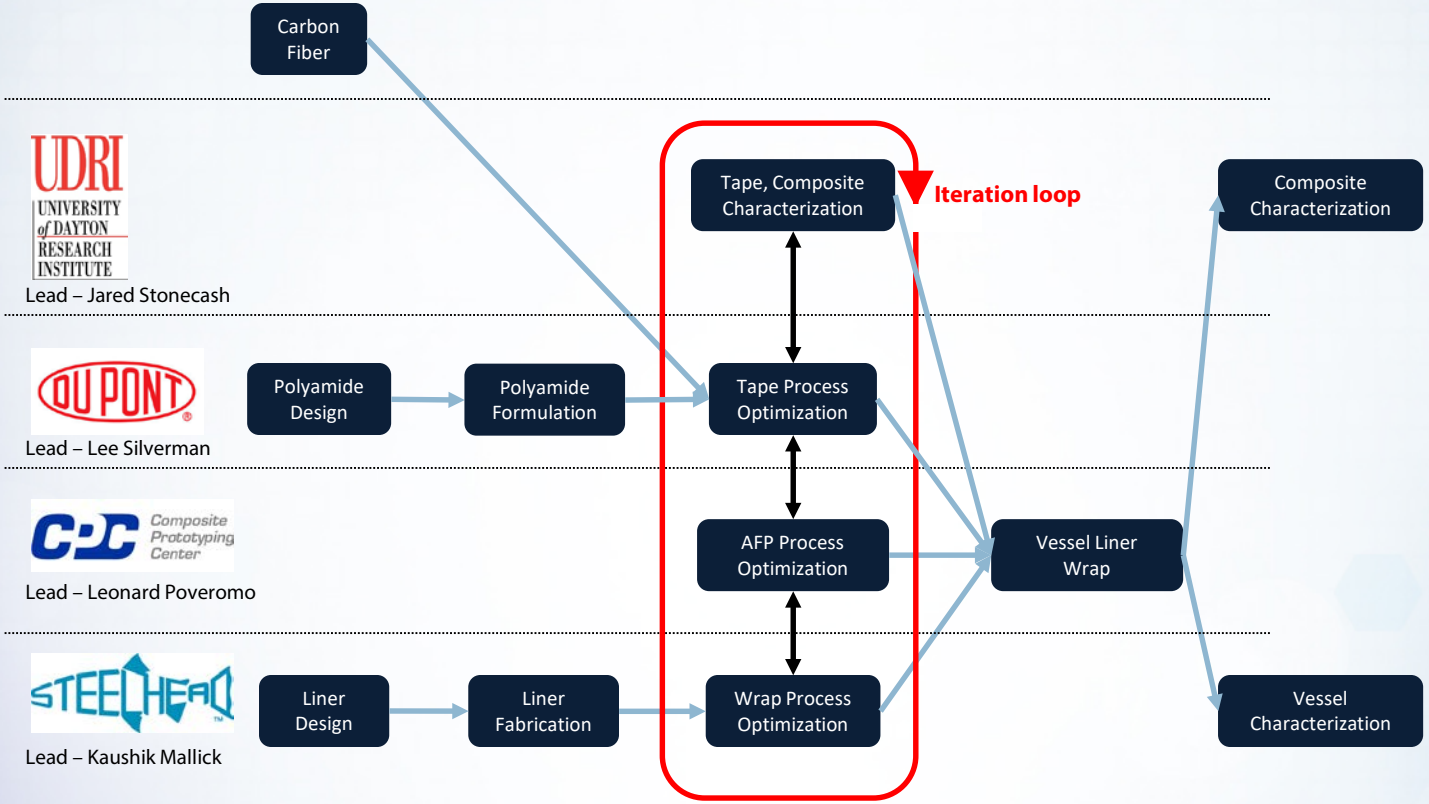
IACMI 5.2 Program Structure



X-RAY CURING OF CARBON FIBER COMPOSITES FOR STRUCTURAL AUTOMOTIVE COMPONENTS

Acknowledgment: The authors are appreciative of the co-funding provided by the New York State Energy Research and Development Authority (www.nyserda.org)

New York State
Vehicle Composites Program

RAPID CURE TECHNOLOGIES

nordan COMPOSITE TECHNOLOGIES

CPC Composite Prototyping Center

iba Industrial

NEW YORK STATE OF OPPORTUNITY. NYSERDA Supported

ESF State University of New York College of Environmental Science and Forestry

Power demands for curing carbon fiber composites for automotive components

For a non-structural automotive component (an Aston-Martin hood):

2 – Based on the recorded power demands for operating the 700 kW accelerator in the x-ray mode, using a carrier speed of 0.425m/min and a conservative dose of 30kGy with three 1.49m x 1.53m hood molds per carrier, the power draw for x-ray curing hoods in their molds would be 19kWh/hood – a 41% energy saving per hood

3 – Thermoset kinetics: the shorter the cure cycle, the shorter the storage time + the need for cold shipment and storage; x-ray curable matrix materials shipped and stored at ambient conditions indefinitely

4 – Thermoset curing = hours, many minutes; x-ray curing = <90s

5 – Non-thermal, ultraviolet curing can be used to cure coatings on hoods

POWER DEMANDS FOR CURING CARBON FIBER COMPOSITES FOR AUTOMOTIVE COMPONENTS

Autoclave Curing a Hood

X-ray Curing a Hood in its Mold

POWER DEMANDS FOR CURING CARBON FIBER COMPOSITES FOR AUTOMOTIVE COMPONENTS

Non-thermal UV Cured Pigmented Coating

X-RAY CURING OF CARBON FIBER COMPOSITES FOR STRUCTURAL AUTOMOTIVE COMPONENTS

Nordan - NYU >61km/l
Fuel Efficient Carbon Fiber Concept Car

NorCar Performance Vehicle and Chassis

X-RAY CURING OF CARBON FIBER COMPOSITES FOR STRUCTURAL AUTOMOTIVE COMPONENTS

X-ray Cured Chassis (untrimmed)

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Other Activities

Engagement with Empire State Development / MEP Network

- CPC works with the local MEP (MTRC) to leverage funding to assist SME's in supporting project work that originates at CPC
  - Four projects currently underway
  - MTRC provides approximately 40% reimbursement of project costs
  - Broad range of clean energy industries served – wind turbine, hybrid vehicles, materials development - and others (HVAC, Vision)

- CPC continues to work with MTRC to development additional training modules in composites

- CPC is a standing member of an area-wide Committee focused on workforce development issues and creating solutions to meet local workforce needs in manufacturing

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