CAIIAC News

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ATLANTA, GA--On November 5, 2014, the Georgia Tech Manufacturing Institute welcomed 45 industry leaders and top manufacturing researchers to convene the first workshop for the Consortium for Accelerated Innovation and Insertion of Advanced Composites (CAIIAC). The goal of the meeting was to introduce the consortium to the invited guests and to gain input on its direction.

The overall vision of the Consortium for Accelerated Innovation and Insertion of Advanced Composites (CAIIAC, pronounced "KAYAK") is to create an innovative domestic manufacturing ecosystem to significantly shorten the time required in manufacturing development cycles and provide "right-the-first-time material yields" for broad-based composite processes. Guided by this vision, the three-fold mission is to: 1) accelerate innovation and assist in speeding up the development and deployment of advanced composites, 2) develop broad-based applications for advanced composites; and 3) encourage "invent here, build here" in the United States to improve U.S. competitiveness and sell advanced composite products globally.

Discussion items at the meeting included:

- Challenges and unmet needs regarding ICME, standardized design, scalability and composite repairs
- The vision, goals, mission and deliverables of CAIIAC
- Georgia Tech's approach to industry partnerships
- Next steps for CAIIAC

The next workshop will be held in January in Washington, D.C.

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Section 1: Overall Project Objectives

The overall vision of the Consortium for Accelerated Innovation and Insertion of Advanced Composites (CAIIAC, pronounced "KAYAK") is to create an innovative domestic manufacturing ecosystem to significantly shorten the time required in manufacturing development cycles and provide "right-the-first-time material yields" for broad-based composite processes. Guided by this vision, the CAIIAC planning committee developed a three-fold mission to: 1) accelerate innovation and assist in speeding up the development and deployment of advanced composites, 2) develop broad-based applications for advanced composites; and 3) encourage "invent here, build here" in the United States to improve U.S. competitiveness and sell advanced composite products globally.

In preparing the CAIIAC Planning Grant proposal, the team collected a large amount of data from representatives of nearly 40 organizations (see Appendix 1). They also identified technical challenges including: 1) scalable and reproducible out-of-autoclave processes and affordable tooling; 2) structural health monitoring of life cycle performance; 3) inclusion of nanomaterials for improved performance; 4) quick and reliable repairs; 5) standardized composite design and testing for faster and more affordable certifications; and 6) recycling and reuse of composites.

Section 2: Progress and Project Milestones

The CAIIAC team has been working on five major initiatives: 1) interviewing subject matter experts by phone or in person; 2) creating a set of promotional materials; 3) interviewing candidates for a program manager position; 4) organizing an informational session at CAMX Conference in Orlando, FL, on October 14, 2014; and 5) organizing an interactive workshop at Georgia Tech on November 5, 2014, to continue the CAIIAC roadmapping effort.

2.1 Interviewing subject matter experts

The CAIIAC team has interviewed several subject matter experts by phone, including Cedric Xia of Ford Motor Company, Doug Ward of GE Aviation, and John Russell of the Air Force Research Lab. The CAIIAC team is scheduling telephone interviews with additional experts in industry and government, including Tia Benson Tolle of Boeing, Joey Zhu of GE Wind, and Brian Rice of the University of Dayton Research Institute. The intent of the expert interviews was to set a priority for the six major technical challenges identified in the CAIIAC Planning

Grant proposal.

2.2 Creating a set of promotional materials
The CAIIAC team has created a one-page flyer and brochure (see Appendix 2), an information website (http://www.manufacturing.gatech.edu/caiiac-0) and a database of people and organizations interested in CAIIAC efforts.

2.3 Interviewing candidates for a program manager position
A job description has been developed and submitted to Georgia Tech Human Resources for posting. Informally, the CAIIAC team has interviewed one candidate who has a master's degree in polymer, a closely allied discipline with advanced composites. She has years of experience working in the chemical industry with additional experience with business development. Once the position is posted, we fully expect that many more candidates will apply.

2.4 Organizing an informational session at CAMX Conference in Orlando, FL, October 14, 2014
An informational session was conducted on October 14, 2014, at CAMX Conference. Presentation slides are shown in Appendix 3. The CAMX Conference is organized by the American Composite Manufacturers Association (ACMA), and the Society for Advancement of Materials and Process Engineering (SAMPE). It is arguably the largest composites event in the U.S.

2.5 Organizing an interactive workshop at Georgia Tech, Atlanta GA, November 5, 2014
A one-day workshop has been planned. See the preliminary agenda in Appendix 4.

Section 3: Summary of Project Changes

There have been a few changes with respect to prioritizing some events. The original Gantt chart and the revised one are shown below. The essence of these changes is that, according to industry and government representatives the CAIIAC team interviewed and consulted, the format of the consortium should be included in the final roadmap. In their opinion, it should not be decided at the very beginning of the Planning Grant performance period. In other words, the roadmap shall include technical & business challenges, gaps, path forward and a recommendation of the format of an industry-led consortium. (See Figure 1 and Figure 2 on the next page.)

Section 4: Problems or Organizational Issues

None.

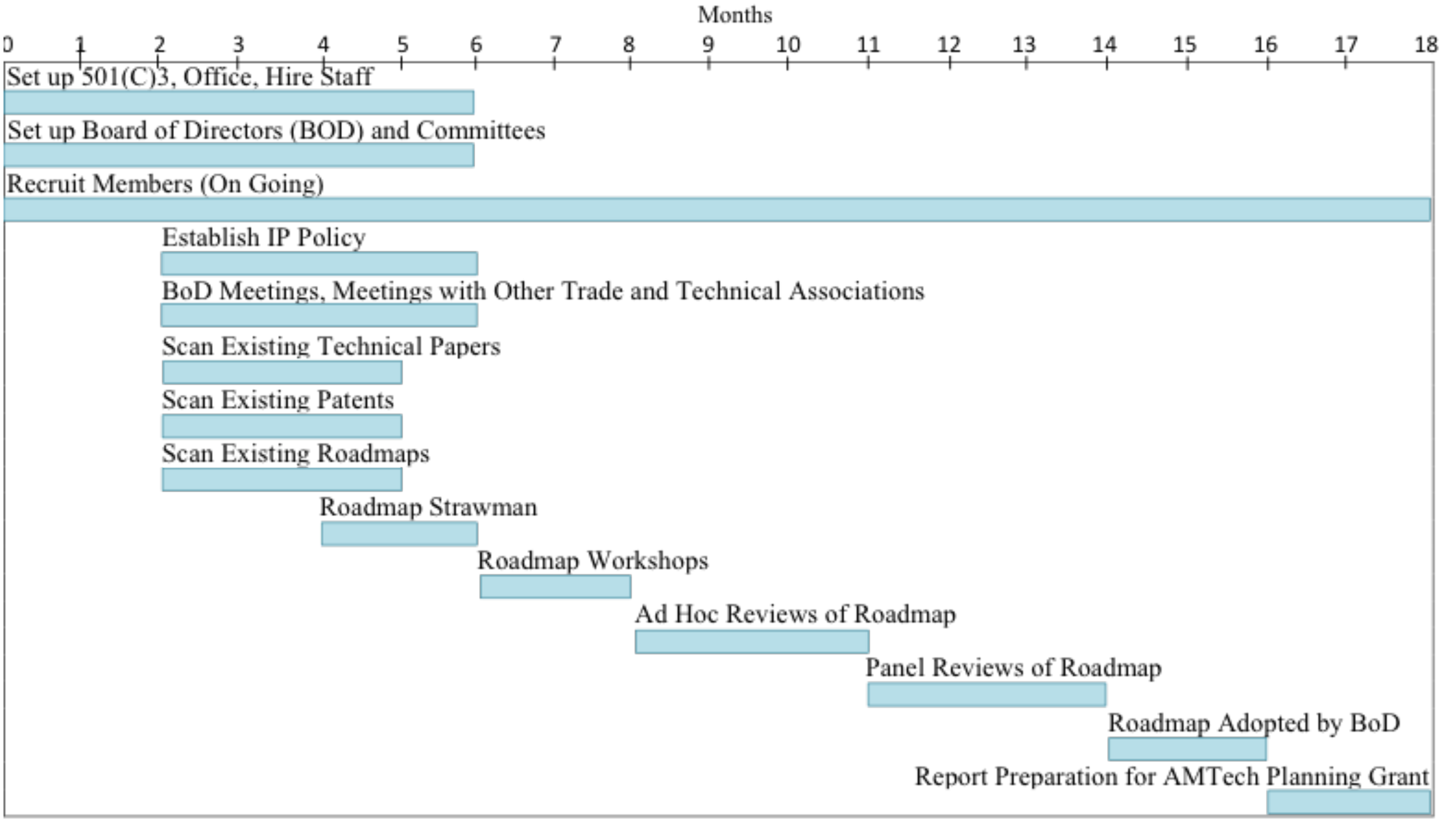


Figure 1: Original Gantt Chart (in the CAIIAC Planning Grant Proposal)

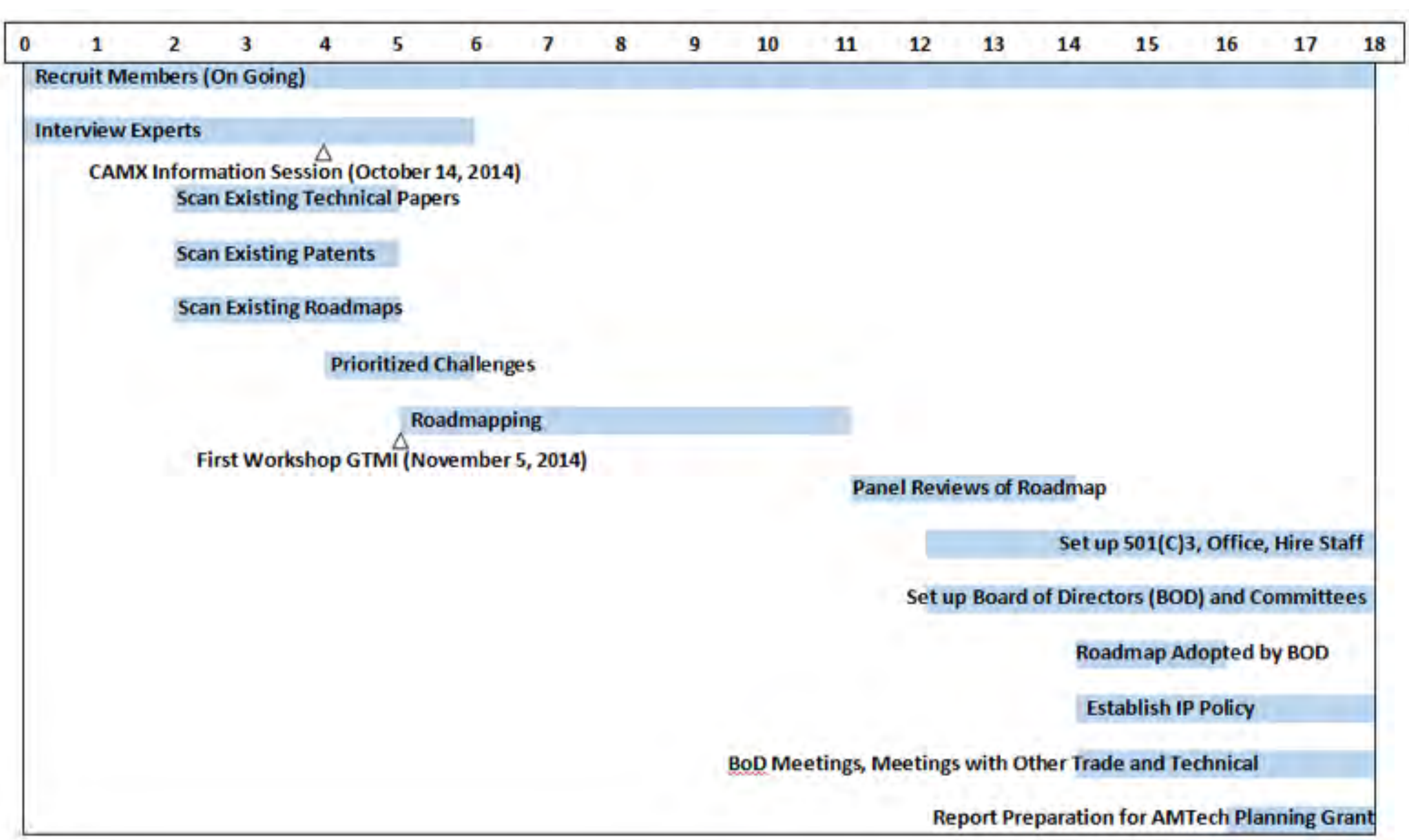


Figure 2: Modified Program Gantt Chart After Consultation with Industry Experts

Appendix I: Letters of Interest from Partners

CAIIAC has received an overwhelming response from different stakeholders of the advanced composites value chain. Through letters of interest, these companies and organizations indicated their willingness to fully participate in the industry-led CAIIAC to develop, update and execute a technology roadmap. They represent a number of sectors including aerospace, automotive, alternative energy and medical devices. These organizations include not only the major composite materials and product development companies, but also manufacturing enterprise innovation organizations such as Georgia Manufacturing Extension Partnership. Among all of the CAIIAC partners, more than 60% are small- or medium-sized enterprises.

Respondents subscribed to the new Consortium model, which is unique in at least three ways:

1) technology maturation – concurrent maturation of TRL, MRL, business cases and an ecosystem to accelerate innovation and insertion, as well as to promote an "invent here; build here" philosophy

2) full value chain engagement – involving small- and medium-sized enterprises that support OEMs in a wide range of sectors including aerospace, automotive, alternative energy and medical devices; and

3) innovative technology – a fully integrated experimental and computational approach to dramatically reduce the "time to full readiness" of novel nano-materials, out-of-autoclave processes, rapid certification and recycling of composites.

The following is a list of stakeholders who have sent letters to the CAIIAC planning committee:

- Acellent Technologies, Inc., Sunnyvale, CA
- Air Force Office of Scientific Research, Arlington, VA
- Altair Engineering, Inc., Troy, MI
- American Chemistry Council, Washington, DC
- American Composites Manufacturers Association, Arlington, VA
- ATK Aerospace Structures, Clearfield, UT
- Autodesk, Inc., Waltham, MA
- Baker Hughes, Houston, TX
- Bell Helicopter Textron Inc., Fort Worth, TX
- BCT GmbH, Dortmund, Germany
- Chasm Technologies, Canton, MA
- CMC, Inc., Jacksonville, FL
- Criterion Composites, Inc., Garden Grove, CA
- Cytec Aerospace Materials, Tempe, AZ
- Generation Orbit Launch Services, Inc., Atlanta, GA
- Genesis Engineering Solutions, Inc., Lanham, MD
- Georgia Aerospace Inc., Atlanta, GA
- Georgia Automotive Manufacturers Association, Alpharetta, GA
- Georgia Center of Innovation for Aerospace, Atlanta, GA
- Georgia Manufacturing Extension Partnership, Atlanta, GA
- Henkel Corporation, Rocky Hill, CT
- Honeycomb Company of America, Sarasota, FL
- MADE, LLC, Chicago, IL
- Manufacturing Extension Partnership of Louisiana, Lafayette, LA
- Middle Georgia State College, Eastman, GA
- Moog Composites Group, Blacksburg, VA
- NASA Langley Research Center, Hampton, VA
- National Composites Center, Kettering, OH
- NRI, Inc., River Beach, FL
- Oak Ridge National Laboratory, Oak Ridge, TN
- Optomec, Inc., Albuquerque, NM
- Ossur hf, Foothill Ranch, CA
- Owen Corning, Granville, OH
- Prosthetic and Orthotic Associates, Orlando, FL
- Raytheon, Tewksbury, MA
- San Diego Composites, San Diego, CA
- SGL Carbon, Charlotte, NC
- Sikorsky Aircraft Corporation, Stratford, CT
- SoftWear Automation, Inc., Atlanta, GA
- Southwest Nanotechnologies, Inc., Norman, OK
- Spirit AeroSystems, Wichita, KS
- Swan Chemical, Inc., Lyndhurst, NJ
- TA Instruments, New Castle, DE
- ThyssenKrupp Elevator Corp., Alpharetta, GA
- United Technologies Research Center, East Harford, CT

Appendix II: Promotional Material - One-Page Flyer

CAIIAC

Consortium for Accelerated Innovationand Insertion of Advanced Composites (CAIIAC)

Georgia Tech | Manufacturing Institute

In May 2014, the National Institute of Standards and Technology (NIST) awarded a planning grant for creating the Consortium for Accelerated Innovation and Insertion of Advanced Composites (CAIIAC) to:

- *Create a executable roadmap for the next 10 years, and stand up a consortium to implement the roadmap for the creation of a domestic, innovative manufacturing ecosystem to accelerate innovation and industry adoption of advanced composite products; and*
- *Commit to significantly shortening composite development cycles and providing "right-the-first-time material yields" that result from advanced technologies coupled with an improved understanding of business environments. CAIIAC will develop a differentiating and sustainable consortium to add unique value to its members.*

The Georgia Tech Manufacturing Institute (GTMI), in collaboration with Advanced Materials Professional Services, Florida State University, and the University of Dayton, is facilitating the creation of the Consortium. Already, 39 companies and government laboratories representing the aerospace, automotive, energy, and medical device sectors have expressed interest in participating in CAIIAC. More than 60 percent of these partners are small- or medium-sized enterprises that play a critical role in the U.S. supplier network. Starting with an industry-led roadmapping process, the new consortium aims to:

- *Accelerate innovation and deployment of advanced composites.*
- *Develop broad-based applications for advanced composites.*
- *Improve U.S. competitiveness and sell advanced composite products globally.*

Core Markets
- Aerospace
- Alternative Energy
- Automobile
- Infrastructure

Adjacent Markets
- Advanced Batteries/ Ultracapacitors
- Electronics
- Medical Devices

Generation I (1940s-1970s)
- Initial Fibers and Resins
- Metallic Designs
- Hand Layup Fabrication
- Autoclave Processing
- Destructive Inspection

Generation II (1980s-2010s)
- Intermediate Modulus Fibers
- Design and Analysis Tools
- Design for Composites
- Automation
- Autoclave Processing
- Liquid Composite Molding
- Non-Destructive Evaluation (NDE)

Generation III (2020s)
- NanoMacro - Multiscale
- Multifunctionality
- Multi-Material Systems
- Tailored Load Paths
- Out-of-Autoclave Processing
- Intrinsic Self-Sensing and Structural Health Monitoring

If you are interested in collaborating or need more information, contact GTMI Executive Director Dr. Ben Wang at 404-385-2068 or ben.wang@gatech.edu.

Georgia Tech Manufacturing Institute | 813 Ferst Drive, N.W. | Atlanta, GA 30332-0560 | (404) 894-9100 | www.manufacturing.gatech.edu

Appendix II: Promotional Material - Brochure

In May 2014, the National Institute of Standards and Technology (NIST) awarded the Consortium for Accelerated Innovation and Insertion of Advanced Composites (CAIIAC). The Georgia Tech Manufacturing Institute (GTMI), in collaboration with Advanced Materials Professional Services, Florida State University, and the University of Dayton, created the Consortium to work on issues that hinder bridging the gap between research and commercialization.

The U.S. composite industry faces several system-wide challenges, including developing:

- Affordable, scalable, predictable and reproducible composite manufacturing capabilities;
- Methods for quick and reliable repair and joining;
- Standardized approaches and tools to composite design and testing; and
- More effective means of recycling and reuse.

Road-mapping Process

Starting with an industry-led road-mapping process, the new consortium aims to identify and validate emerging crosscutting lightweight composite technologies that offer benefits across multiple industries. The Consortium will generate and prioritize major technical projects to address these technical gaps and challenges, as well as others to be included in the Consortium's technology road map. In order to effectively evaluate technical projects, the Consortium will incorporate and institutionalize an "xRL" scheme that will include Technology Readiness Levels (TRL), Manufacturing Readiness Levels (MRL), Business Case Readiness Levels (BcRL) and Eco-system Readiness Levels (ERL) across all project teams.

Market Segments

There are possibilities in several markets, including aerospace, automotive, energy and medical devices. The Consortium will focus research on:

- Ways to make composites lighter in weight while enhancing performance, such as using lightweight materials with sensors for custom-made orthotics and prosthetics;
- Fast, low-cost manufacturing;
- Improved design and testing tools for a faster qualification process to use new materials in the aerospace market;
- Finding reliable and affordable ways to join composites with other materials, such as metal in the automotive industry;
- New recycling and reuse centers; and
- Composites with multiple functions would allow for higher energy generation efficiency in the energy market.

Why CAIIAC is the Answer

Through an industry-led conceptualization and development process, the CAIIAC road map will serve U.S. industry in meeting the challenges associated with rapid innovation and deployment of advanced composites in the manufacturing process.

The CAIIAC vision will result in the transfer of low cost, rapid production cycle composite technologies along the entire value chain from consumable vendors to the fabricator and, ultimately, to the end user (i.e., aerospace, automotive, energy and medical device).

The CAIIAC team has selected compelling technical challenges to address that provide value to vendors, fabricators, and end users in all target market segments.

The CAIIAC approach addresses composite technology readiness, manufacturing readiness, business case readiness, and manufacturing ecosystem readiness across all target market segments.

Get Involved. Become a Partner.

There will be a number of opportunities to learn more about CAIIAC and participate in the process. Workshops, conference sessions and other meetings will be scheduled. To check on upcoming events, go to http://www.manufacturing.gatech.edu/caiiac.

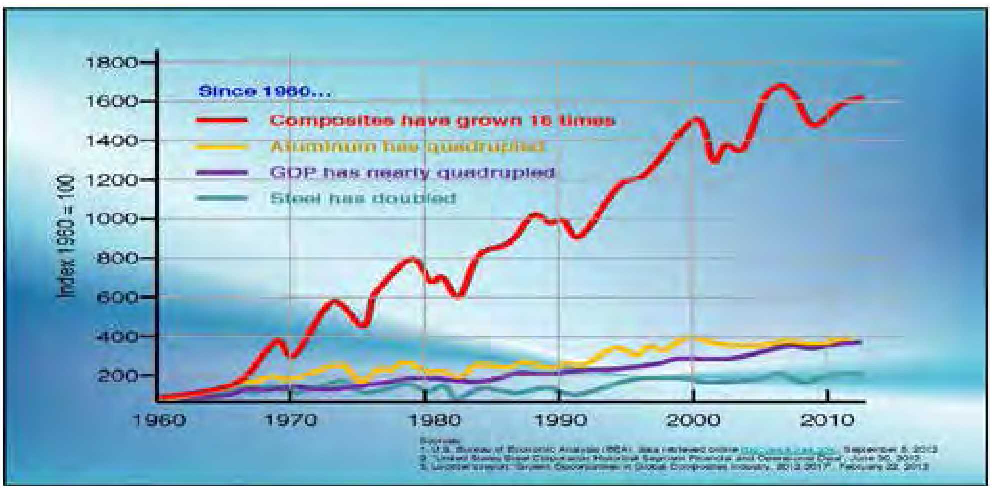
You can also contact Georgia Tech Manufacturing Institute Executive Director Ben Wang at 404-385-2068 or ben.wang@gatech.edu.

Appendix III: CAMX Presentation

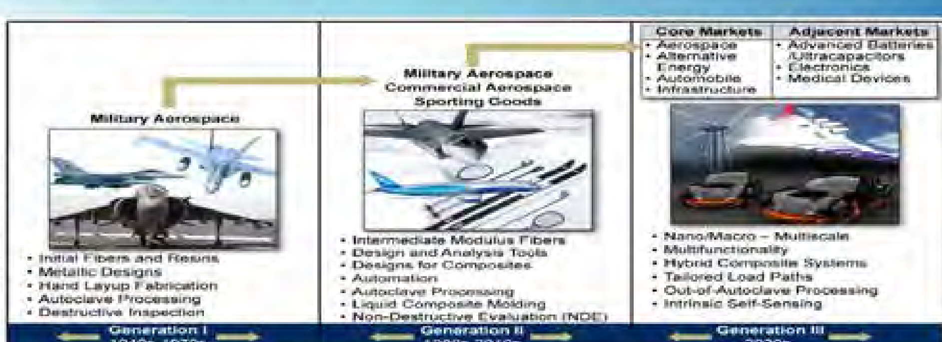
These are the slides from an informational session at CAMX Conference in Orlando, FL, October 14, 2014.

What Is "CAIIAC"?

"CAIIAC" is currently a <u>consortium concept</u> for advanced composites being validated and planned that will result from a technology roadmap exercise to be presented to the National Institute of Standards and Technology



Evolution of Composite Technologies



Grand Technical Challenges

CAIIAC Starter Set Based on Polling Key Leaders:

- Scalable and reproducible out-of-autoclave processes and affordable tooling
- Structural health monitoring of life cycle performance
- Inclusion of nanomaterials for improved performance
- Quick and reliable joining and repairs
- Standardized composite design and testing for faster and more affordable certifications
- Recycling and reuse of composites

Scalable and Repeatable Out-of-Autoclave Processing and Advanced Tooling for Shortened Development and Production Cycles

State-of-the-Art Out-of-Autoclave Processes (Partial List)

- Resin transfer molding (RTM)
- Vacuum assisted resin transfer molding (VARTM)
- SCRIMP
- Trapped rubber molding
- Bladder pressurization

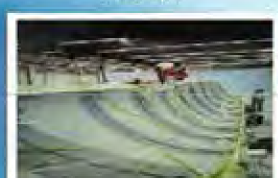
Potential Needs Possibly to be Addressed by CAIIAC

- Fast curing resins
- Automation
- Automated preforming processes
- Rapid tooling with additive manufacturing
- High rate process monitoring
- Computational modeling for process design

Out-of-Autoclave Processes - from High Maturity to Being Developed

Mature Technologies

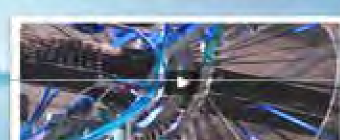
HP RTM



VARTM

Entering the Market

Pick-and-Place for Prepreg Plies



Automated Preformer

Structural Health Monitoring (SHM) for Lifecycle Composite Evaluation

Current State-of-the-Art

- Inspections and repairs are 27% of aircraft lifecycle cost
- Subsurface damage & delamination detection still in infancy
- Reliable damage detection not yet intrinsic to the structure
- Costs still high

Potential Needs Possibly to Be Addressed by CAIIAC

- Sensors, interconnects, and supporting electronics that survive the manufacturing cycle
- Embedding SHM devices in cost-effective manner
- SHM should have a minimal effect on structural properties
- Distributed testbeds that allow SHM validation

Progress in Structural Health Monitoring

Current Approach → ***Future Approach***

Sensors and Electronics Suite *ON* Structure

Sensors and Electronics Embedded *WITHIN* Structure

Additive Nanoscale Materials for Improved Performance

Current State-of-the-Art

- Carbon fiber composites remain essentially a two dimensional material
- "Z" axis properties remain troublesome leading to impact damage sensitivity and delaminations
- Cross apply stitching, 3-D weaving, and improvements in resin toughness are partial solutions
- Current composites lack multifunctionality

Potential Needs Possibly to Be Addressed by CAIIAC

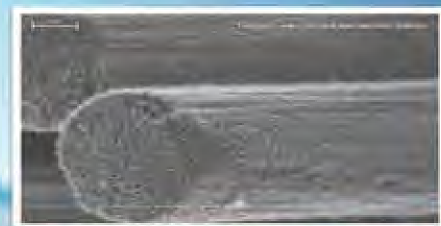
- Wide range of nano material additives are beginning to emerge
- Nano materials can be added to resin or attached to fibers
- Significant reductions in inner laminar cracking and matrix toughness are expected
- Scalable nanomanufacturing processes need to be developed and matured

Benefits of the Additive Nano Materials

Current Approach
Carbon Fiber Composite Fracture

Smooth Carbon Fiber – Poor Adhesion

Future Approach
Nanotube Coated Carbon Fiber



Nanotubes Increase Carbon Fiber Surface Area – Good Adhesion

Quick and Reliable Composite Component Joining and Repairs

Current State-of-the-Art
- Metal fasteners remain the backup of choice for adhesive bonding repairs
- Repair costs remain high for composites
- Direct bonding is currently being considered for several airframes
- Times remain excessive for composite patch repairs

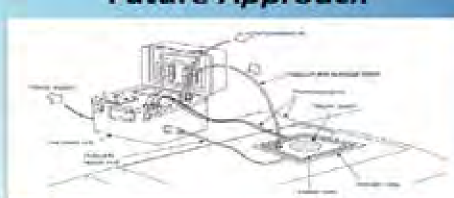
Potential Needs Possibly to Be Addressed by CAIIAC
- Simple repair processes with original structure properties
- Composite patch repair and joining that are 100% NDI capable
- Acceptable composite patch repair cycle times
- Reliable joining techniques between composite and metal components

Evolution of Reliable Adhesive Bond Repair

Current Approach

Redundant Mechanical Fasteners With Adhesive Bonding in Shop

Future Approach



Repair Patch Adhesive Bonding Done in Field

Standardized Composite Design and Testing for Faster and More Affordable Certification

Current State-of-the-Art

- Current composite designs are based on large statistical databases (i.e., "A" and "B" allowables)
- Can take up to 15 years for an inadequate mechanical property database
- Testing costs are excessively high
- Limits approved fibers, ply schedules, and resin usage

Potential Needs Possibly to Be Addressed by CAIIAC

- Develop a virtual material property (mechanical and other physical properties) verification methodology
- Develop a "verifiable" processing - structure - property models
- This methodology is based on extensive use of computational modeling with a limited amount of experimentation
- The desired result is a "certification via virtual materials testing" that can be done in a small fraction of the time required by physical testing

Dimensional Variation Control in Composite Design and Manufacturing

- Tight dimension tolerance is critical for large and complex composite structures manufacturing and assembly.
- Effective composite structure dimension variation control can be achieved through *"variation reduction by design"* using integrated computational materials and manufacturing engineering (ICM2E)

Steps to Standardized Composite Design and Testing

Current Approach

Specimen Count	Cost ($M)	Time (Yrs)
2-3	100-125	4
10-30	10-20	3
25-50	10-35	3
2000-5000	10-35	2
5000-100,000	8-15	2

(Credit: Michael "Mick" Maher)

Future Approach

Recycling and Reuse of Composites

Current State-of-the-Art

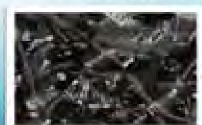
- As the composite industry grows, so will the need to recycle and reuse composite feedstocks
- Thermoset composite materials are relatively difficult to recycle
- Cured thermoset composite resins are chemically stable and difficult to separate from fibers
- Thermoplastic resin composites are easier to recycle because they can be remelted and potentially reused as injection molding feedstock
- Markets are slow to develop for recycling of composites

Potential Needs Possibly to Be Addressed by CAIIAC

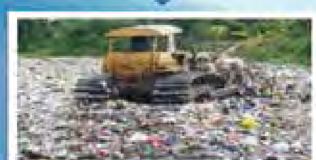
- Develop methods to obtain high constituent quality recycled feedstock close to virgin material
- Recycling costs must be low
- Initial product market niches for recycled materials must be identified to potential customers

Implementing Recycling and Reuse of Composites

Current Approach



Waste Composite Materials



To the Landfill

Future Approach

Reclaimed Composite Materials

Into Useful Structures

The potential business benefits of next generation advanced composites are compelling; however, no single company has the financial resources or the technical depth to make it a reality any time soon.

It takes a community...

Vision

- CAIIAC will create a domestic, innovative manufacturing ecosystem to accelerate innovation and industry adoption of advanced composite products
- CAIIAC is committed to significantly shortening composite development cycles and providing "right-the-first-time material yields"
- CAIIAC will enable rapid technology transfer resulting from both advanced technologies coupled with an improved understanding of business environments

Mission

- Accelerate innovation and assist rapid insertion of advanced composites
- Develop broad-based applications for advanced composites
- Encourage "invent here, build here" in the United States to improve U.S. competitiveness and sell advanced composite products globally

How CAIIAC Differs

- **Technology maturation** - concurrent maturation of TRL, MRL, business cases and an ecosystem to accelerate innovation and insertion as well as to ensure that the new technology is "invent here, build here in the US"
- **Full value chain engagement** - involving small- and medium-sized enterprises that support OEMs in a wide range of sectors
- **Innovative technology** – a fully integrated experimental and computational approach to dramatically reducing the "time to full readiness" of, e.g., novel nanomaterials, out-of-autoclave processes, rapid certification and recycling of composites

Product "Tech Transfer" Successfully Occurs Only When Technology and Business Factors Are Ready

Some readiness level metrics are well known – others are not:

- **TRL** from NASA and **MRL** from the DoD
  - Extensive use in aerospace - less in commercial activities
- Business cycle may not be in step with technology
  - Expected funding is slow to come or never does
  - Technology projects die In "The Missing Middle"
  - Markets are slow to develop
- Metric needed for Business Case (**BcRL**) and Regional Manufacturing Infrastructure Readiness, or Eco-system Readiness (**EcRL**)

xRL Is a Top Tier Metric that Defines Technology Transition Readiness to Industry

xRL consists of four distinct readiness level metrics to support CAIIAC mission:

- **TRL:** used by public-private sector technologists to communicate readiness level for technology use
- **MRL:** used primarily by defense community to assess readiness risk of the industrial base
- **BcRL:** used by Georgia Tech to engage industry and government customers to assess market opportunities, impact and risks of technology/manufacturing maturation and product development
- **EcRL:** used by Georgia Tech and regional manufacturing clusters to identify "build here" capabilities for job and business creation and retention

CAIIAC Technology Maturation Approach

Business Case Readiness Level

Phase	BcRL	Readiness Level Definitions
Phase 3: Reaching the "Tipping Point" and on to Full Scale Market Insertion	9	Full Rate Production into National Markets – Future Product Improvements Planned
	8	Full Rate Production into Local Market – Confirmation of Financial Metrics Estimate
	7	Product Insertion into one Target Market – Positive Market Focus Group Response
Phase 2: Bridging the "Missing Middle"	6	Market Ready Research Prototype Vetted to Outside Entity and Key Customers
	5	Financial Issues Defined – ROI Required, Margin, Funding Source (Internal, External, or Both)
	4	Research Concept /Target Markets Presented to Industrial Partners – Fit to Strategic Plan Goals
Phase 1: Technology/ Manufacturing for Market Readiness	3	Research Concept Vetted to Outside Entity (ADTC, Incubator Board, etc.) for Review
	2	University Team Review and Validation of Potential Research Concept Market Insertion
	1	Research Concept Proven in Laboratory – IP Defines Usage of Potential Market Value

xRL Readiness Maturity with Time

Exploratory Investigation Using Meta-Roadmapping

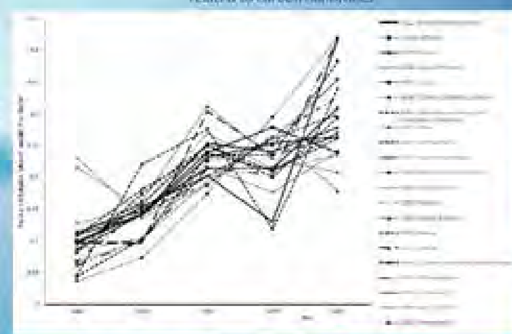
- Meta-Roadmapping involves a combined analysis of existing roadmaps, scientific publications and patents to derive useful information about the emerging technologies. Based on the result of this analysis, a meta-roadmap is developed in conjunction with experts' opinions
- This approach differs from traditional roadmapping process in that it can provide an idea about the technology under study from different perspectives in a single meta-roadmap

Four Phases of Meta-Roadmapping

Phase 1: Roadmaps Analysis
Phase 2: Publications Analysis
Phase 3: Patents Analysis
Phase 4: Triangulation

In Phase 4, results from Phases 1-3 are combined to define a list of emerging technologies to become a starting point for the development of meta-roadmap by subject experts.

Patents analysis for emerging technologies related to carbon nanotubes



CAIIAC Membership Activities

1. Identified Key Potential Partners in the Composites Industry – Many are Here Today
2. Established Database of Potential Partners
    1. Highlights Composite Expertise
    2. Identifies Market Segment Represented
    3. Covers Technologists to Business Specialists
3. Contact via F2F, Phone, Text and/or E-mail
4. Gratis Membership During Planning Grant Duration

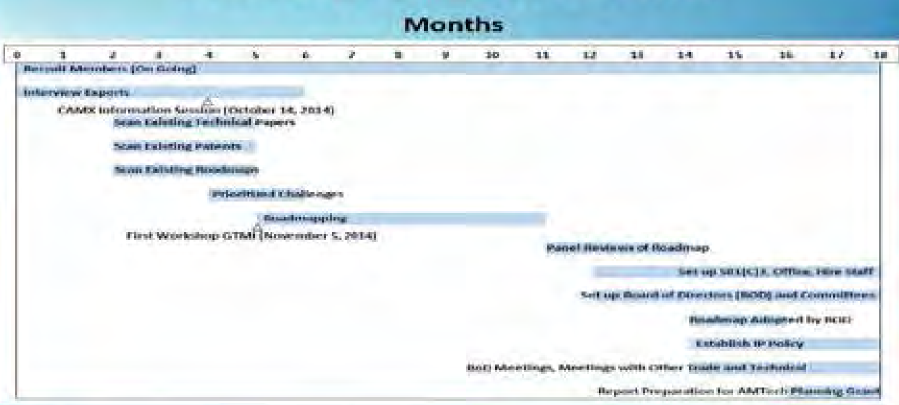
1st CAIIAC Workshop
8:30AM – 3:30PM
November 5, 2014
Georgia Tech
Agenda & travel information forthcoming

Governance and Business Challenges

1. Consortium organization model
2. Membership structure
3. Funding sources and long-sustainability
4. Project definition and selection
5. Intellectual property
6. Value proposition

Note: In addition to technical topics, these items Will be Discussed at Our November 5, 2014 Workshop at Georgia Tech

Schedule and Milestones



Appendix IV: Agenda for November 5, 2014, CAIIAC workshop

November 5, 2014

Workshop Venue: Georgia Tech Manufacturing Institute
813 Ferst Dr., NW
Atlanta, Georgia 30332

8:30 AM	Welcome	Ben Wang/GTMI
8:40 AM	Introduction of Participants (60 Seconds Self-Introduction Each at Podium)	All
9:10 AM	Workshop Agenda Overview	Les Kramer/AMPS
9:15 AM	Feature Talks on Challenges and Unmet Needs	
	• Scalabillity	Ben Wang
	• Standardized Design	speaker TBD
	• Composite Repairs	speaker TBD
	• ICME	Chuck Ward
10:20 AM	CAIIAC Vision, Goals, Mission and Deliverables	Ben Wang/GTMI
10:45 AM	Break	
11:00 AM	Breakout Sessions - I	TBD/GTMI
	• Grand Challenges, Technical Gaps and Readiness - I • Grand Challenges, Technical Gaps and Readiness - II • Consortium Organization/Governance,Tech Transfer and Shared Facilities Note: Three concurrent sessions	
11:45 AM	Working Lunch	
1:00 PM	Breakout Sessions - II	TBD/GTMI
	• Grand Challenges, Technical Gaps and Readiness - I • Grand Challenges, Technical Gaps and Readiness - II • Consortium Organization/Governance,Tech Transfer and Shared Facilities Note: Three concurrent sessions	
1:45 PM	Breakout Sessions - III	TBD/GTMI
	• Grand Challenges, Technical Gaps and Readiness - I • Grand Challenges, Technical Gaps and Readiness - II • Consortium Organization/Governance,Tech Transfer and Shared Facilities Note: Three concurrent sessions	
2:30 PM	Breakout Report Back Session	Moderators/AMPS
3:15 PM	Where Do We Go from Here?	Chuck Zhang/GTMI
3:25 PM	Adjourn	Ben Wang/GTMI
3:30 PM	Unstructured Networking Opportunities	