

JAMS

Student Perspectives on the AMTAS Experience

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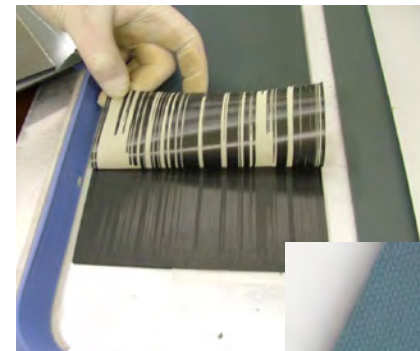
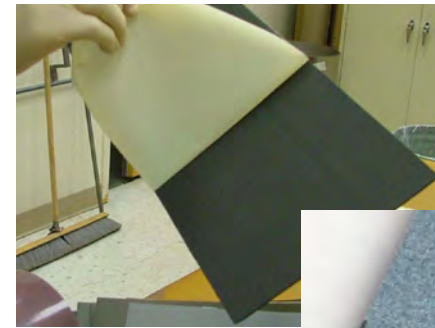


The Joint Advanced Materials and Structures Center of Excellence

Project Statement: Characteristics of Surfaces to be Adhesively Bonded

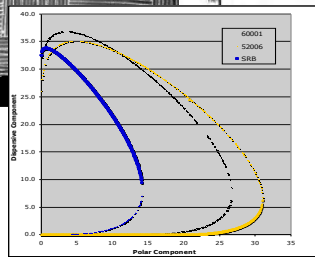
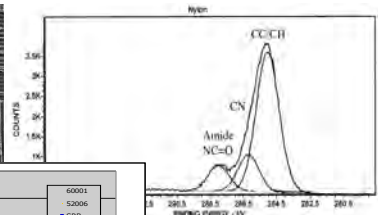
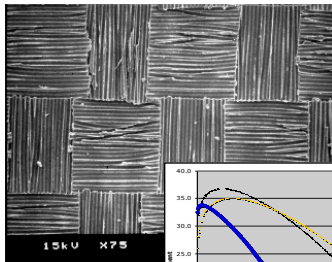
- Motivation and Key Issues
 - Peel ply surface preparation used for bonding primary structure on Boeing 777 and 787 and other commercial transport aircraft
 - Good bonds are produced but better fundamental understanding of surface characteristics that create strong bonds is needed
 - Lack of inspection methods for bond quality assurance

- Objective
 - Further understand the effect of peel ply surface preparation variables on the durability of primary structural composite bonds through surface analysis coupled with mechanical testing and fractography





- Composite processing
 - Layup, surface prep, and bonding
 - Vacuum bagging
 - Autoclave operation



- Characterization
 - XPS
 - SEM
 - Thermal analysis
 - AFM
 - Surface energy measurement



- Mechanical Testing
 - DCB
 - RAT
 - CDP

- Learning current industrial best practices
- Resources for expertise, training, materials, and equipment



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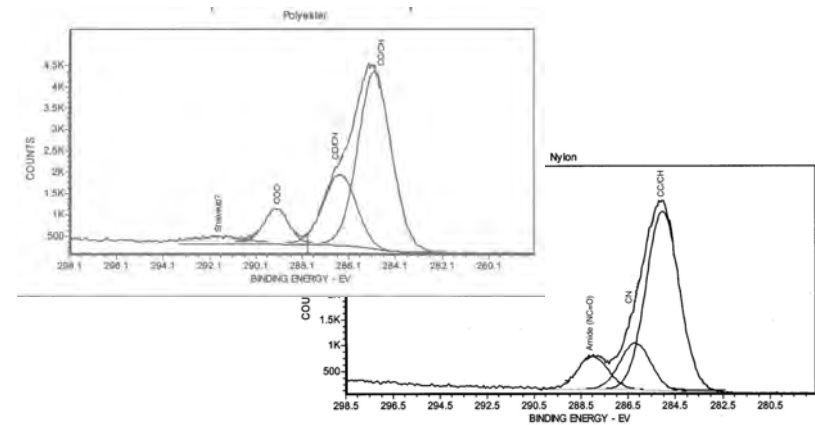
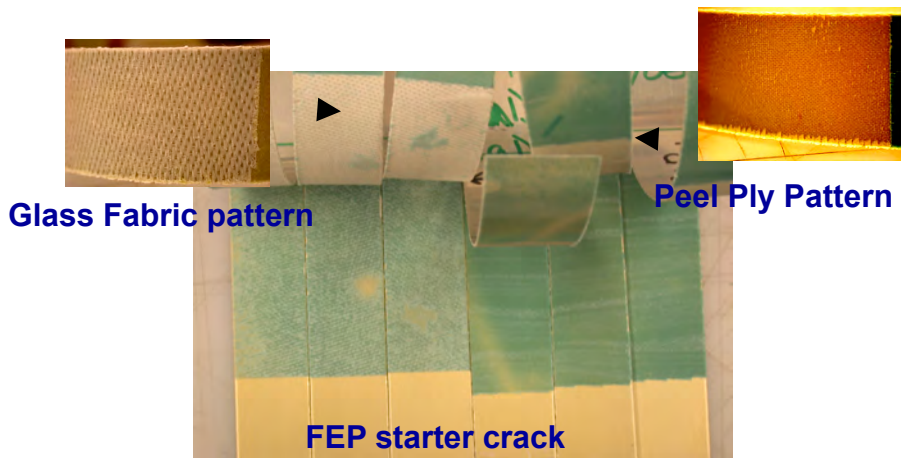
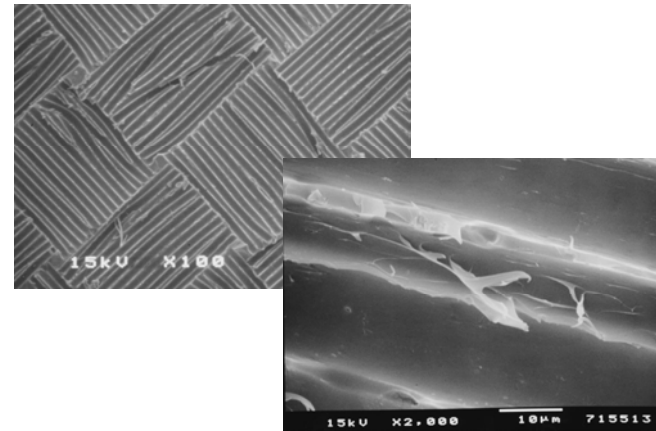
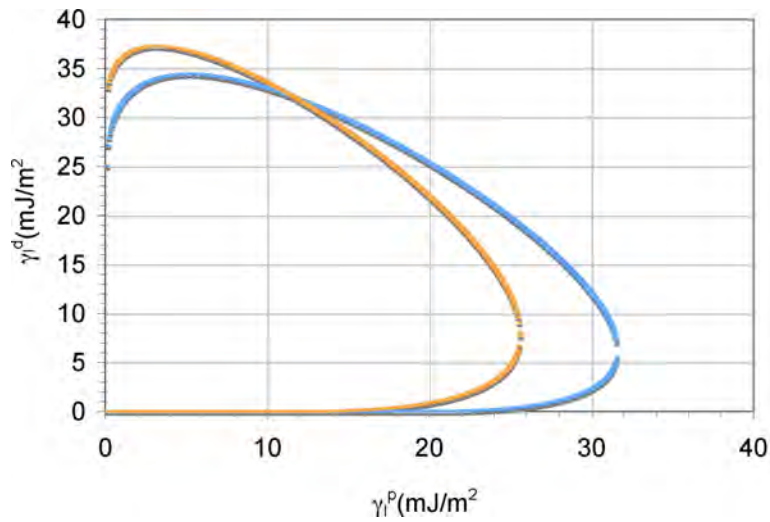


Fostering Professional Relationships

Working with subject matter experts from across the field

- Academia
 - Dr. Mark Tuttle, University of Washington
 - Dr. James Boerio, University of Cincinnati
 - Dr. Lloyd Smith, Washington State University
- Large Industry
 - Peter Van Voast, Will Grace, Gwen Gross and Dick Bossi, The Boeing Company
 - Wendy Williams, GE
- Vendors and Specialty Companies
 - Giles Dillingham, Brighton Technology Group
 - John Houston and Joe Holder, Precision Fabrics Group
 - Grant Pomering and Bob LaMantea, Intec
 - Shreeram Raj and John Montgomery, Cytec
- Regulatory Agencies
 - Larry Ilcewicz
 - Curt Davies
 - Peter Shyprykevich

Examples of Research Results



- Broader perspective (other projects)
- Making presentations
 - Preparing
 - Delivery
- Discussions/Breakout Sessions
- Questions
- Different focus from CECAM projects
- Student perspectives from different universities/centers
- Industry feedback

Additional Benefits of the JAMS Experience

- Working under a funding schedule
- Directed focus to relevant problems
- Writing focused proposals
- Preparing reports
- Participating in breakout sessions
- Future work on a short time scale
- Exposure to regulatory side of aircraft industry
- Experience of building a research center

- It can be difficult to combine "real" (industry related) problems/materials with academic requirements for a PhD
 - Working with commercial systems
 - Proprietary
 - Complex
 - MANY variables and unknowns
 - Limited control of material variables
 - Difficult to develop simple model systems to evaluate
- Conflicting priorities of academia, industry, and regulatory research
 - Time scale for application
 - Relevance to FAA mission - flight safety

- Unique opportunity and challenges, especially for those here from the beginning
- Funding supported my research and study of composites
- AMTAS/JAMS experience also taught me about building a research center, working with industrial goals, and expanding my network of experts
- Valuable insight to industry careers
 - Mentors with PhDs in roles outside of academia
 - Observations and experiences in industrial environment
 - Need to justify research goals in context of business plan
 - See how materials/research/product aspects come together
 - Relations between types of companies
 - Helped me to consolidate career goals
- Showed practical application of theory from classes

Thank you to everyone for all your support; funding, materials, instruction, and motivation.