Enabling Forest Products Company Transformations Through IPST

Strategic Directions and Capabilities

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Introduction

Three Messages:

- Welcome!
- Today’s IPST is evolving to meet the needs of our industry now and in the future
- IPST-GA Tech is uniquely suited to meet those needs
## Reflections on the IPST Transition

<table>
<thead>
<tr>
<th>THEN:</th>
<th>NOW:</th>
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</thead>
<tbody>
<tr>
<td>Focused on pulp and paper industry</td>
<td>Focused on forest biomaterials industries</td>
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<tr>
<td>Focused on improving traditional processes and products</td>
<td>Also focused on developing breakthrough processes and products</td>
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<td>Membership from pulp &amp; paper and suppliers</td>
<td>Also targeting new forest biomaterial users</td>
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<td>Independent thinking with some integration into GA Tech</td>
<td>Leveraging the intellectual horsepower of a world class research university</td>
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<td>Premium pricing; single membership format</td>
<td>Cost-effective; multiple options for participation</td>
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IPST Today

IPST is uniquely positioned to advance today’s companies—to:
– address strategic needs
– revitalize existing assets
– improve margins
– and win in the marketplace
– develop new, innovative product portfolios

IPST offers depth & breadth over time in the industry, now housed within the intellectual powerhouse of GT
Vision and Mission

Vision:
To be the premier research institute for the cost-competitive transformation of forest biomaterials into value-added products, including traditional and new forest products, renewable energy, chemicals, advanced materials and pharmaceuticals.

Mission:
Provide members solutions to their strategic, economic, and technical challenges by building a research collaborative that enables access to world-class research personnel at IPST, across Georgia Tech, and globally.
IPST Assets

• Experienced research and academic faculty familiar with industry challenges
• Integration within the capabilities of Georgia Tech – access; exposure
• Federal and State research grants that can be leveraged by members
• State budget support of IPST operations
• Facility and laboratory committed to service of our industry
• Opportunities for consortium research on innovative, breakthrough challenges
IPST Assets

- Scholarly awards supporting graduate students—future leaders
- Museum and historical literature
- Intellectual property available for licensing
Key Services At IPST

• Focused Research
  – Strategic Alliances for consortium research
  – Company-specific projects (directed research)

• Expert Technical Services
  – World-class pulp and paper industry consultants
  – Industry-specialized analytical services

• Education and leadership development through sponsored research

• Networking, via Georgia-Tech; global access
Testing Services at IPST

- Biomass pulping and fractionation
- Biomass characterization, gasification, and pyrolysis
- Pulp analysis
- Recovery process elements
- Chemical analysis
- Product physical analysis
- Paper contaminants/deposits
- Corrosion / failure analysis
- Microscopy (optical, SEM, TEM)
Georgia Tech: Recognized for Excellence


- No. 7 public university in the country
- No. 4 graduate engineering college
- No. 5 undergrad engineering college
- 7 undergraduate engineering programs ranked in the top 5
- 9 graduate engineering programs ranked in the top 10
- No. 1 industrial engineering program (19 consecutive years)
Paper Science & Engineering Program

- Fifty graduate students are funded by the IPST Foundation
  - Invest over $1.2 million in graduate students each year
- Twenty faculty from six departments supervise PS&E students and contribute to forest products industry related research
- 55% of recent graduates accepting industry assignments joined pulp & paper companies and related suppliers*

* 76 graduates from 2003-2010; percent does not include graduates electing academic affiliations
Paper Science & Engineering Research

Operational Excellence:
• Effect of chlorides on stress corrosion cracking in white liquor

Product Enhancement:
• Fiber modification via starch grafting for improved paper properties
• Robust and smart antimicrobial microcapsules for application in paper and packaging

Environment:
• Fate and degradation of sterols in pulp mill wastewater
Biorefining and Biofuels:
- Development of new gasification processes for biomass residuals
- Hydrodeoxygenation of pyrolysis oils

New Products:
- Understanding impact of nanofillers on composite modulus and toughness
Georgia Tech Research

Sponsored R&D at Georgia Tech

- FY2010 Research Awards of $558 MM
- FY2011 GIT Budget $1.2 B
  - 45% Research
- A “culture of commercialization with interdisciplinary focus”
Forest Products Research at Georgia Tech

Sponsored R&D at Georgia Tech:

- FY2010 Research Spending of $7.6 Million in Forest Biomaterials
- IPST member company-sponsored research in FY2010 of $1.1 Million
- The $7.6 Million research spending supported:
  - Manufacturing Excellence: $2.0 MM
  - Bioenergy: $3.9 MM
  - Biomaterials: $0.8 MM
  - Other: $0.9MM
Strategic Thrusts

• Operational Excellence

• Biorefining

• Biomaterials (New Product Development)

• Business and Policy

• Education
Operational Excellence at IPST is breakthrough manufacturing technology, manufacturing cost reduction, and technical & laboratory support

Objectives:

• Develop technology to reduce manufacturing costs
• Leverage core competence in pulp & paper
  • Expert consulting, forums
  • Manufacturing reliability, energy, materials, environment
• Engage a multi-institution collaborative
  • Create pathways to strengthen resources for industry
• Provide world-class, specialized testing services
Operational Excellence

Areas of Research:

- Reductions in carbon emissions and energy consumption
- Chemical & energy recovery in the kraft pulp mill
- Optimized fibers for pulp & paper products
- Filler technology to reduce energy and improve sheet properties
- Applied & exploratory paper chemistry
- Improved dewatering and reduced fresh water use in manufacturing
- Predicting impact of operational changes on corrosion, and failure analysis
Biorefining at IPST is supporting pulp & paper through developing technologies to enrich a manufacturing site’s portfolio of products, designing new biorefineries, and addressing the technical challenges of biofuel development.
Objectives:

- Leverage leadership in cellulose and lignin chemistry
  - Biorefinery design: “bolt-on” and green field challenges
  - Process chemistry expertise
  - University Manufacturing Research Center
- Resolve technical challenges for the cost-efficient production of biofuels
  - Capitalize on US DoE-funded research into lignocellulosic material conversion by thermal and biological processes
  - Leverage IPST’s fluidized bed reactor capability to understand and address technical issues
Biomaterials

Biomaterial development at IPST is discovering the fundamentals, identifying new materials, and designing manufacturing capability for innovative new products from forest-based resources

Objectives:
• Renewable, sustainable materials and improved composites
• New product development:
  • Biocomposites and biopolymers
  • Crystalline nanocellulose (CNC) and nanofibrillated cellulose (NFC)
• Technical capabilities in materials, engineering and chemistry
Center for Paper Business and Industry Studies (CPBIS)

The objective of CPBIS is to further the understanding of business, management, organizations, and social issues of vital importance to the pulp, paper, and forest products industry.

Research themes:
• Globalization
• Enterprise Effectiveness
• Workplace Transformation
• Innovation
• The Community
Summary

IPST-Georgia Tech enables:

- Access to world-renowned faculty, along with world-class expert technical and consulting services
- Benefit from consortium and directed research
- Leverage of State and Federally funded projects
- Participation in technical forums
- Access to highly cross-disciplinary students
Conclusion

IPST:

• Provides members solutions to their strategic, economic, and technical challenges

• Is evolving to meet the challenges and needs of today’s pulp and paper companies
Thank you for engaging with us!