Well; it’s already the third week of February, where did the first month of the year go?

I’d like to welcome two new members to the PUPID executive board; Pat Dixon has agreed to help Mike Waller, his former college professor at Miami of Ohio, with the PUPID endowment scholarship and Frank Wilson has agreed to be the wood products industry liaison with a regular column about wood products (if you read the division mission statement, you’ll note that we deal with pulp and paper AND forest products industries) in the Logger newsletter. Welcome to both of you!

Well, there’s less than a month until the 2007 PUPID scholarship deadline. Please, get the word out that we have two $1000 scholarships to give away. If you know of any deserving student, urge them to go to the PUPID website look at last years scholarship winners, fill out the application and email it to Mike Waller. Let’s not miss the chance to give away some of our scholarship endowment money. Spread the word!

PUPID membership is slowly dwindling, it is now at 478 members. How can we get back to the 1996 membership level of around 1900 members?

I want to challenge ALL OF YOU to send me a couple of paragraphs telling me what you are doing in your part of the world. You can send me either some good news about some new and fun project you’ve been working on lately OR simply vent your frustrations with the state of the world (I’ll make your quotes anonymous if you want!)

The 2007 Spring Symposium will be with the TAPPI Papermaking and Process Control, Electrical & Information Divisions (PCE&I) and PIMA and will be March 12 – 16 at the Hyatt Regency Jacksonville Riverfront Hotel in Jacksonville, Florida.. Mark it on your calendars.

Well, I’ll sign off now until next time; keep watching the PUPID website for upcoming attractions!
**Tuning Tip: Using Performance Monitoring Software**

Before a planned shutdown, prioritized lists (based on economic weight) are extracted:

- Transmitters with problems
- Sticky valves
- Loops to be tuned

Weekly reports

Management
- Area performance
- Trends

Production
- Sector performance
- Percentage of loops that are not working in normal mode
- 3 loops needing tuning
- 3 loops where set point changes are frequent

Engineering
- Prioritized lists of undersized valves
- Prioritized lists of loops that are not in control

Maintenance
- Prioritized lists of loops needing attention
- Non performing areas

Actual situation

Treemap showing hot spots. For example, the following graphic illustrates a 1 000 loop system where:
- Rectangle size represents the economic weight
- Color represents the oscillation index of loops where oscillation comes from the valve
- Hence, we are looking for large red rectangles!


**Calendar of Events**

Get a quick overview of the ISA PUPID events for 2006 by going to the Calendar at: [http://www.isa.org/~pupid/2007_PUPID_Calender.htm](http://www.isa.org/~pupid/2007_PUPID_Calender.htm)

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**Paperweek 2007 - ExFor 2007**
February 5 - 9, 2007
Palais Des Congrès
Montreal, QC Canada
[http://www.paptac.ca/english/am/paperweek.htm](http://www.paptac.ca/english/am/paperweek.htm)

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**PIMA/TAPPI Papermakers Conference 2007**
March 12 - 16, 2007
Hyatt Regency Jacksonville Riverfront Hotel
Jacksonville, Florida

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**61st Appita Annual Conference and Exhibition & International Paper Physics Conference**
co-sponsored by PAPTAC (Canada) and TAPPI (USA)
Gold Coast Convention & Exhibition Centre
Broadbeach Queensland
6 – 10 May, 2007
[http://www.APPITA.com](http://www.APPITA.com)

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**53rd Pulp & Paper Industry Conference 2007**
June 24 - 28, 2007
Williamsburg Lodge
Williamsburg, VA
[http://www.pulppaper.org](http://www.pulppaper.org)

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**The 3rd International Paper Industry Expo Guangzhou**
Guangzhou Jinhan Exhibition Center
Guangning People’s Government
July 25-27,2006

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**ISA President’s Fall Meeting**
*Houston, TX*
**September 29 - October 1, 2007**
Come meet your leaders & get involved!

**ISA Expo 2007**
*Reliant Center, Houston, TX*
**October 2 - 4, 2007**

**Upcoming ISA Conferences & Exhibitions**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event Date</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>October 2 – 4</td>
<td>Houston, Texas</td>
</tr>
<tr>
<td>2008</td>
<td>October 20 – 23</td>
<td>Houston, Texas</td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td>Chicago, Illinois</td>
</tr>
<tr>
<td>2010</td>
<td>October 11 – 14</td>
<td>New Orleans, Louisiana</td>
</tr>
</tbody>
</table>
You can see the online calendar at [http://www.isa.org/~pupid/2007_PUPID_Calendar.htm](http://www.isa.org/~pupid/2007_PUPID_Calendar.htm)
WELCOME TO THE 32 NEW ISA PULP & PAPER INDUSTRY DIVISION
MEMBERS SINCE NOVEMBER 2006
WELCOME TO NEW PUPID MEMBERS

Lane Arias  Hamid Kashefiipour  Kevin M. Pearson
John S. Cain  Michael Wayne Kiper  Ray Patrylak
Victor R. Christensen  Stephen M. Krchnavy  Malcolm Bryan Persac
Rutuja Anil Dhariya  Rex E. LaRowe  Laura J. Pongratz
Matthew Dorval  Mario Lopez  Ronaldo Ribeiro
Daniel J. Elsinger  Hank McNally  Eduardo Robles
Mario Freitas  Chris Muller  Raúl Rodríguez
Agustin Gutierrez  Vivek Nagarkar  Warun Santhatkarn
Patrick W. Hall  Kevin F. Nolan  Larry R. Tipton
Kevin Hanchett  Denis Ouellet  David Victor
Jim Huza  Ghazaleh Parvaneh

HERE'S A REMINDER TO THE 34 ISA PULP & PAPER INDUSTRY DIVISION
MEMBERS WHO NEED TO RENEW THEIR MEMBERSHIP

B Annand  Alok Basnantaram Kewat  Carlos R. Rodriguez
Farhaan Ajmal Ansari  Abrar Mohammed Khan  Robert C. Ross
Ersal S. Baydar  Peter M. Koza  Edward Santiago
John P. Bayles  John Kevin McKinley  Michael D. Scipioni
Aaron Byrd  Emilio Moralo  Daniel Lee Sherman
Ibrahim Colmenares  Dinesh Reddy Mullanji  Sandeep Prakash Singh
Ron Cornelius  Raja Ramya Nallamalli  Scottie D. Smith
John L. Davis  Anthony Joseph Ortolani  Mike Stephens
Christopher Demos  Michael Pegorari  Martin L. Timmons
Dwight Wayne Flinchum  Dan John Prugar  Andrew Weber
Yohann Gaudreault  James Martin Robbins  Robert Samuel Wingard
David R. Hadden

DON'T FORGET TO RENEW!
PRODUCT SHOWCASE: BARK GASIFICATION
By: Dave Mackie; Director of Sales, Pulp & Paper Solutions; Nexterra Energy; Vancouver, B.C.

Editor’s Note:
This paper was originally presented at the EXFOR Paperweek 2007 conference in Montreal this past February 6. Dave can be reached at either dmackie@nexterra.ca or www.nexterra.ca
Syngas from Hog Fuel: Displacing Fossil Fuels in Power Boilers and Lime Kilns

PAPTAC 2007 – Steam and Power

David Mackie, Director of Sales, Pulp and Paper Solutions

February 6, 2007
Contents

1. Introduction to Nexterra
2. Energy Challenges in Pulp and Paper
3. Introduction to Gasification
4. Nexterra’s Technology
5. Gasification Applications
6. Product Development
7. Conclusions
Nexterra - A Brief Introduction

- Develop & supply turnkey gasifier solutions for inside-the-fence industrial and institutional customers
- Gasifier technology converts wood fuels into a clean burning “syngas” substitute for natural gas
- Enables customers to substantially reduce energy costs by self-generating heat and/or power
- Targeting multi-billion dollar industrial & institutional fuel displacement & cogeneration markets in North America
- Customers & partners include:
The Problem – Higher and More Volatile Gas Prices

Source: Bloomberg, ARC Financial Research

- Oil price rise and maturing gas supply
- Momentary cold spell
- First and last storage deficit
- Hurricanes
- Storage Bloat

1990s baseline

Source: Bloomberg, ARC Financial Research
## Impact of High Fuel Costs

<table>
<thead>
<tr>
<th>Mill type</th>
<th>$/unit production</th>
<th>% of production cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulp mills</td>
<td>$20 – $40 / tonne</td>
<td>5 – 15%</td>
</tr>
<tr>
<td>Paper mills</td>
<td>$40 – $60 / tonne</td>
<td>10 – 20%</td>
</tr>
<tr>
<td>Sawmills</td>
<td>$10 – $14 / mfbm</td>
<td>10 – 15%</td>
</tr>
<tr>
<td>Plywood</td>
<td>$15 – $30 / msf</td>
<td>15 – 25%</td>
</tr>
</tbody>
</table>

Reducing Energy Costs is the #1 Way to Cut Production Costs
High Cost Producers Will Struggle to Survive

Production Costs

Production Cost for Kraft Mills

$ Can ADN

0 100 200 300 400 500 600 700
“The greatest threat to the successful operation of the wood products industry is the high cost and use of fossil fuels by the industry.”

Jim Buzzard, President of MeadWestvaco, 2006 Tappi Pulping Conference Keynote Address
1. Turnkey gasification systems (available today)
   - Thermal only - up to 100 MMBtu/hr (steam, hot water, flue gas)
   - Cogeneration – up to 10 MW electricity
   - Integrated fuel handling, gasifiers & heat recovery
   - Operate on wood fuels including bark up to 55% moisture

2. Direct-firing syngas system (available 2007/08)
   - Gasifier direct-firing syngas into existing steam boilers
   - Gasifier direct-firing into pulp mill kiln kilns
   - Integrated gasifier-reciprocating engine cogen system <5 MWe
   - Other biomass fuels
What is Gasification?

- Thermo-chemical process that converts any carbon containing solid fuel into syngas
- Syngas is low calorific, clean burning, combustible gas comprised of CO, H₂, CH₄, N₂, H₂O, CO₂
- Benefits – clean, low emissions, fuel flexible, syngas can be directly fired as a substitute for natural gas
Core Gasification Technology

Partial oxidation at 1500 – 1800 °F and fuel is converted into “syngas”

Ash migrates to base, removed by automatic ash grate

Primary Air (30% of stoichoimetric)

• Syngas exits at 500 – 700°F
• Syngas 100 – 300 btu/ft3
• Clean burning fuel comprised of CO, H₂, CH₄, N₂, H₂O, CO₂
• PM emissions less than 100 mg/dscm without cleanup

Hog fuel
3-inch minus
25 – 55% moisture

Kraft mill kiln burners are all under 120 MMBTU/hr
Syngas Composition Range *

<table>
<thead>
<tr>
<th>Component</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHV</td>
<td>100 – 300 btu/ft³</td>
</tr>
<tr>
<td>CO</td>
<td>15 – 42%</td>
</tr>
<tr>
<td>CH₄</td>
<td>2 – 8%</td>
</tr>
<tr>
<td>H₂</td>
<td>10 – 30%</td>
</tr>
<tr>
<td>CO₂</td>
<td>16 – 18%</td>
</tr>
<tr>
<td>O₂</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>N₂</td>
<td>As balance</td>
</tr>
</tbody>
</table>

*Syngas composition ranges, as shown in the table above, are dependent on type of gasification medium used in the process, such as recirculated flue gas + ambient air, steam + ambient air or pure oxygen + steam.
Nexterra Technology Advantages

1. Design Simplicity
2. Application Versatility
3. Low Capital, O&M Cost
4. Clean, Low Temperature Syngas
5. Low Particulate & NOx Emissions
6. Fully Automated Operation
7. High Turn Down Ratio (5:1)
8. Fuel Flexibility (up to 55% moisture)
## Gasification System Comparison

<table>
<thead>
<tr>
<th>Fuel Chamber</th>
<th>Fixed Bed</th>
<th>Fluidized Bed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fuel</strong></td>
<td>3 inch minus, 20-55% Moisture</td>
<td>Dried and pulverized</td>
</tr>
<tr>
<td><strong>Fuel Chamber</strong></td>
<td>Non-pressurized (atmospheric)</td>
<td>Pressurized chamber</td>
</tr>
<tr>
<td></td>
<td>Air blown</td>
<td>O2/Steam blown</td>
</tr>
<tr>
<td></td>
<td>Large fuel mass</td>
<td>Small fuel mass</td>
</tr>
<tr>
<td></td>
<td>Long fuel residence time</td>
<td>Short fuel residence time</td>
</tr>
<tr>
<td><strong>Syngas</strong></td>
<td>500°F Syngas</td>
<td>1200 – 1300°F Syngas</td>
</tr>
<tr>
<td><strong>Ash/char handling</strong></td>
<td>Quiescent bed</td>
<td>Moving media causes more carryover of ash &amp; char</td>
</tr>
<tr>
<td></td>
<td>Little particulate carryover</td>
<td>Media is recycled</td>
</tr>
<tr>
<td></td>
<td>Ash discharged through base</td>
<td>Significant char carryover</td>
</tr>
<tr>
<td></td>
<td>Char burnout close to 100%</td>
<td></td>
</tr>
<tr>
<td><strong>Operations</strong></td>
<td>Excellent turndown (4:1)</td>
<td>Poor turndown (2:1)</td>
</tr>
<tr>
<td></td>
<td>Low parasitic demand</td>
<td>High parasitic demand</td>
</tr>
<tr>
<td></td>
<td>Rapid response</td>
<td>Slow response time</td>
</tr>
<tr>
<td></td>
<td>Can temporarily freeze process</td>
<td></td>
</tr>
</tbody>
</table>
Thermal Gasification System
Tolko Heffley Plywood Plant
Turnkey 38 MMBtu/hr System
Hot Water & Dryer Heat

- Hot air stainless steel heat exchanger
- Oxidizer
- Control room
- To Veneer Dryer
- Variable speed drive fan
- Boiler
- Gasifiers
- Fuel bin
- Fuel conveyor system
Cogen System - Johnson Controls at University of South Carolina
72 MMBtu/hr Gasifier System
60,000 lbs/hr steam; 1.4 MWe

Gasifiers
Oxidizer
Combustion air fan
Steam boiler
Induced draft fan
Product Development Roadmap (Wood Fuels)

1. Indirect-Fired Heating or Cogen Plant
   - Output: Process heat, hot air, steam, hot water, thermal oil
   - Apps: Plywood/veneer dryers, sawmills, institutional boilers and cogen

2. Syngas Plant – (unprocessed syngas)
   - Output: Raw, unprocessed, pressurized syngas
   - Apps: Direct-fire syngas in large single users – boilers

3. Syngas Plant (cleaned syngas)
   - Output: Partially cleaned, pressurized syngas
   - Apps: Direct-fire syngas in lime kiln/boilers/dryers

4. Gasifier-Recip Engine
   - Output: Green power from biomass
   - Apps: On-site industrial & institutional

Customer Value
Standardization
Direct-Firing Syngas in Existing Steam Boiler

- Syngas pressurized and delivered directly into boiler via dual fuel burner nozzle
- Syngas is combusted, replacing natural gas
- Up to 35 GJ/hr natural gas displacement per gasifier
Direct-Firing Syngas in Pulp Mill Lime Kiln

- Syngas pressurized and delivered to dual fuel NG/syngas burner nozzle
- CFD modeling will define displacement %
- Syngas can be upgraded if required
### Direct-Firing Sample Economics

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N.G. Displacement Capacity</td>
<td>60 MMBtu/hr</td>
</tr>
<tr>
<td>Capital Cost</td>
<td>$8 M</td>
</tr>
<tr>
<td>Annual Gas Displacement</td>
<td>529,200 GJ/yr</td>
</tr>
<tr>
<td>Hog Fuel Requirement</td>
<td>33,000 BDAMT/yr</td>
</tr>
<tr>
<td>Net Operating Cost @ $20 / tonne</td>
<td>$910,000/yr</td>
</tr>
<tr>
<td>Net Annual Savings (NG @ $8/GJ)</td>
<td>$3.322 MM /yr</td>
</tr>
<tr>
<td>Simple Payback</td>
<td>2.4 yr</td>
</tr>
</tbody>
</table>

#### Payback Sensitivity

- $60 BDT Fuel
- $40 BDT Fuel
- $20 BDT Fuel

**Burner Tip Cost of Natural Gas ($/GJ)**

**Years**

- $8
- $10
- $12
Kiln CFD Modeling - PSL

Gas Temperature

100% Natural Gas Flame

50% Natural Gas Displacement with Syngas
Kiln CFD Modeling - PSL

NOx Distribution

100% Natural Gas

50% Natural Gas displacement with Syngas
Kiln Calcinations
Performance Prediction

Predicted Axial Profile in Kamloops Lime Kiln

100% Natural gas

50% Natural gas
Displacement with Syngas
Nexterra Product Development

- Commissioned Feb ‘04 in Kamloops, BC
- Capacity 8 MMBtu/hr net useable heat
- Site used for fuel testing and application development
- Fuel testing on unprocessed hog fuel from local mills
- Emissions consistently measured at <50 mg/dscm
- Rigorously monitored by Province of BC (MWALP)
Product Development Centre
Flame from Burner Side
Conclusions

➢ Higher and fluctuating energy costs are forcing pulp and paper mills to look for options that can maximize value of wood residuals.

➢ Nexterra has gasification solutions available today that can reduce energy costs.

➢ Nexterra is working with the industry to develop new applications that will maximize value of wood waste.
ThankYou!

For More Information Visit Our Website: www.nexterra.ca

Visit us at Exfor Booth #1304
Greetings,

This is the beginning of a new column for the PUPID newsletter. The column itself will be focusing on the Lumber Industry. Since ISA doesn’t have a division for the Lumber and Timber Industries (LTI) if you have to pick a division to belong to, the Pulp and Paper Division is the group that is closest to LTI. Unfortunately that is also the case with many other industrial publications and organizations. So due to the innovative spirit of Brad Carlberg the PUPID division newsletter is breaking new ground and opening up a venue to promote the advancement of the LTI.

Allow me to introduce myself. I believe my background is not all that different from my fellow professionals in the industry. One difference may be that I have been member of ISA for the last 15 years. Although the LTI has its own publications, associations, and conferences it is somewhat isolated from the mainstream of instrumentation, automation and controls. This is in part due to evolution of the LTI.

A brief summary of the history of LTI automation history may help to clarify the subject. For the better part of the last century the mainstream of the LTI processing controls went unchanged. The process of turning logs into lumber was primarily labor intensive. The natural resource (trees) was plentiful and the ability to harvest them went pretty much unchallenged, at least on the west coast, where I am from. The east coast solved the reforestation issues centuries ago when America was in its infancy. When our founding fathers came to the new world one of the main interests was timber. Europe had exhausted their resources, so with the discovery of a new continent full of trees and other resources, investment companies were formed to reap the benefit of those resources. However the reality of hauling trees back to Europe was less economical than trading them in the West Atlantic. In addition the trees were needed to develop the infrastructure of the new world itself. Consequently as the trees were cut down and used, the inhabitants simply headed up the river to the next place to settle and ultimately made their way to the west coast. In the case of the Pacific Northwest that expansion really began to take off after the Gold Rush of the mid 1800’s. Since there appeared to be an unlimited supply of timber and the emerging mechanization of saw mill equipment was still relatively simple, the primary means of harvesting logs and producing lumber was done with manual work and lots of it.

Up until the 1970’s the idea of automation within the LTI was mostly relays and limit switches. Part of the nature of sawing trees into lumber is that each tree is different in shape and structure. This is in contrast to other manufacturing processes where the products being produced are consistent in shape and design. Therefore the automation process of mainstream manufacturing developed at a much faster rate than the LTI. In the LTI there was a greater emphasis on strength and durability of equipment rather than high speed automation. Since the LTI had a different priority of focus than the rest of the processing industries they both went their own separate ways. That is a definite handicap presently to the LTI. Even though this gap is decreasing considerably, part of my focus for this column is to close the gap further and hopefully broaden the horizons of those involved in the development of LTI. At the same time it should be noted that LTI has brought innovations to certain technologies that should be recognized and could be utilized by other industries. As other industries become aware of these technologies the developers and integrators can share knowledge and everyone benefits. This may be a little idealistic but one has to remain positive.

One area of technology that the LTI focused on was variable speed control of motors. The processing of lumber required constant speed changes to maintain a consistent flow of lumber through the production line. This was due largely to the variable nature of lumber consistency. DC motors controlled by generator sets were a common way to convert available AC power to variable speed motion. The industry experimented with all kinds of ideas. Those technologies included eddy current drives, generator sets that changed the frequency of the AC power, and various types of slip ring innovations with adjustable brushes to name a few. With the advancement of solid state electronics and the Silicone Controlled Rectifier (SCR) coming of age, the industry was dominated by the SCR drive for variable speed control. This remained the standard with all of the maintenance issues associated with DC motors until the
perfection of the Variable Frequency Drive (VFD) in the 1990’s.

This is not to say that there have not been innovations in the LTI, but in most case they were very specialized equipment and very proprietary. One of the biggest areas of innovation is the development of scanning systems to optimize lumber and logs. The use of the Charge-Coupled Device (CCD) camera in conjunction with lasers was far ahead other industries. It is only recently that we see the CCD term used in advertisements as they are used in the video camera industry. The specialized scanning systems were expensive but the Return On Investment (ROI) was huge considering the rising cost of the timber resources and their decreasing supply. The ability to process lumber faster and the fact lumber does not grow on trees (excuse the pun) means that it must be processed from logs into lumber. Trees take time to grow and the harvesting of them is controversial with the growing environmental restrictions and regulations.

As technology has improved the ability to get more usable lumber from a decreasing resource the automaton world plays a large part of the daily operation and planning of modern sawmills. Over the past thirty years I have watched dozens of local mills shut down to be replaced by the modern “Super Mills” (more about these in future articles). One of these mills can easily produce 4 to 5 times as much lumber in a day as the older mills with less than half as many people.

Herein lies the need for organizations such as ISA to produce the highly skilled technicians, maintenance personnel, and designers of the equipment needed to compete in today’s new world.

In the future I hope to shed light on these technologies and attract the expertise of those professionals that possess the knowledge and skills to move this industry successfully into the 21st century.

I would like to thank ISA and Brad Carlberg for this opportunity to promote the advancements of the LTI through this newsletter. Please feel free to contact me with comments, suggestions, and feedback. I can be reached best by email at fwilson@palco.com.

Respectfully,
Frank R. Wilson
**WHO’S DOIN’ ANYTHING?:**

**Weyerhaeuser Announces Prospective Buyer For Its Cosmopolis Pulp Mill**

1/30/2007

Federal Way, WA - Weyerhaeuser Company recently announced that it intends to enter into preliminary/formal purchase discussions with Charleston Investments to sell the Cosmopolis Pulp Mill, located near Aberdeen, WA.

The Charleston Investments proposal offered the greatest value to Weyerhaeuser and the most viable long-term investment for the community. There is no timeline for completing the discussion.

In separate news, the company also announced its intent to sell a veneer manufacturing operation in Elma, Washington – – effective immediately.

“Weyerhaeuser made the difficult decision to put the plant up for sale after a strategic review of the company’s veneer business,” Slater said.

The company plans to continue its current operating posture while seeking a buyer for the mill. The affected associates will keep their positions while the company seeks a new owner.

“This is an exceptional workforce,” Slater said. “Our associates work diligently to make this mill productive and safe.”

Weyerhaeuser employs approximately 7,400 people in Washington in a variety of businesses and manages about approximately 1.1 million acres of timberland.

**SOURCE: Weyerhaeuser Company**

**International Paper To Cease Uncoated Paper Production At Pensacola In April/May**

1/30/2007

Pensacola, FL - International Paper recetly announced it will discontinue production of uncoated paper at its Pensacola, FL, Mill in April or May of this year to begin the conversion of its 350,000 ton-per-year uncoated paper machine to a 500,000 ton-per-year lightweight linerboard machine.

Originally, International Paper planned to cease uncoated paper production in July 2007 at the Pensacola mill, but the company moved up the date to provide adequate time to complete the conversion and provide for an on-schedule startup of lightweight linerboard production this fall.

“This timeline will enable our conversion teams to complete equipment changes and employee training while delivering the project on schedule at the lowest possible cost,” said International Paper Senior Vice President Wayne Brafford. “As we move forward, we are working closely with employees and customers to ensure a smooth transition of the mill into a globally competitive lightweight linerboard facility.”

The machine conversion at Pensacola is part of International Paper’s transformation plan to focus on its global uncoated papers and packaging businesses, as well as xpedx, its North American distribution business. The company is realigning its North American mill system to increase operational efficiencies and to redeploy capital to the most competitive, lowest-cost facilities.

**SOURCE: International Paper**
WHO’S DOIN’ ANYTHING?: (CONTINUED)

Cellulosic Ethanol Takes Off
1/31/2007

Atlanta, and Park Falls, WI - Flambeau River Biorefinery, LLC of Wisconsin has entered into a Memorandum of Understanding with American Process Inc. of Atlanta, Georgia to provide project management and engineering services for its cellulosic ethanol project at Park Falls, WI. The new biorefinery will be constructed adjacent to the Flambeau River Papers facility in Park Falls, WI.

Flambeau River Papers, LLC makes 400 tons per day of book printing and copy grades on three paper machines. The mill recently announced plans to replace its natural gas boilers with a biomass boiler or gasifier. This will make Flambeau River Papers the first energy independent integrated mill in North America.

The Flambeau River Biorefinery project will be the first modern U.S. based pulp mill biorefinery to produce cellulosic ethanol. It will be designed to produce 20M gallons of cellulosic ethanol per year from spent pulping liquor. The technology selected for this biorefinery is AVAP, a patent pending process technology of American Process Inc. This technology enables production of ethanol without putting additional pressure on the wood basket and without fossil fuel consumption.

The new biorefinery, as designed, will have a positive carbon impact of 140,000 tons per year. That is, it will displace carbon dioxide from the atmosphere. Once in operation, it will increase employment at the Park Falls area by approximately 100 people.

A feasibility study and preliminary engineering were completed in August 2006, when Flambeau River Biorefinery, LLC applied for the Integrated Commercial Biorefinery Demonstration grant from the Department Of Energy. The project has strong support from the City of Park Falls, the State of Wisconsin and Clean Tech Partners Inc., key partners in the project. Project engineering has commenced with a production of ethanol expected to begin as early as 2009.

SOURCE: Flambeau River Biorefinery, LLC and American Process Inc.

Abitibi-Consolidated And Bowater To combine In Merger Of Equals That Will Create Global Leader In Publication Papers
1/31/2007

Montreal, QC, and Greenville, SC - Abitibi-Consolidated Inc. and Bowater Incorporated recently announced a definitive agreement to combine in an all-stock merger of equals. The combination will create a new leader in publication papers - an operationally and financially stronger company better able to meet changing customer needs, compete more effectively in an increasingly global market, adapt to lower demand for newsprint in North America, and deliver increased value to shareholders.

The combined company, which will be called AbitibiBowater Inc., will have pro forma annual revenues of approximately US$7.9B (C$9.3B), making it the 3rd largest publicly traded paper and forest products company in North America and the 8th largest in the world. The current combined enterprise value of the two companies is in excess of US$8B (C$9.4B).

John W. Weaver, President and Chief Executive Officer of Abitibi-Consolidated, will be Executive Chairman of AbitibiBowater, and David J. Paterson, Chairman, President and Chief Executive Officer of Bowater, will be President and Chief Executive Officer of AbitibiBowater. The AbitibiBowater Board of Directors will consist of 14 directors, seven from each company.

AbitibiBowater's headquarters and executive office will be located in Montreal, QC, with a U.S. regional manufacturing and sales office in Greenville, South Carolina. The company, which will be incorporated in Delaware as the new parent company, will apply to list its shares on the New York and Toronto stock exchanges.

Under the terms of the transaction, each common share of Abitibi-Consolidated will be exchanged for 0.06261 common share of AbitibiBowater, and each Bowater common share will be exchanged for 0.52 common share of AbitibiBowater. The exchange ratio will result in 48% of AbitibiBowater being owned by former Abitibi-Consolidated shareholders and 52% of AbitibiBowater being owned by former Bowater shareholders.
WHO’S DOIN’ ANYTHING?: (CONTINUED)

The combination is expected to generate approximately US$250M (C$295M) of annualized cost synergies from improved efficiencies in such areas as production, selling, general and administrative (SG&A) costs, distribution and procurement. These synergies are in addition to cost saving initiatives already in process at both companies.

Mr. Weaver said, "The new AbitibiBowater will be a global leader headquartered in Canada with a brighter future than either company would have on its own. The combined company's ability to realize significant synergies will increase shareholder value, improve our financial flexibility and better position us to compete in today's increasingly competitive global marketplace. Combining our companies is also the best way to continue to contribute to the local and regional economies of the communities in which we operate."

Mr. Paterson said, "This is a logical strategic step to address the realities of today's marketplace. A more efficient manufacturing platform will enable us to bring our customers better product quality, new product innovation, and improved logistical flexibility. Both Abitibi-Consolidated and Bowater shareholders will benefit from the upside potential of a financially stronger company that is able to generate significant cost synergies, improve its balance sheet, and compete more effectively."

AbitibiBowater's product lines will include newsprint, uncoated and coated mechanical papers, market pulp, and wood products. The company will also be one of the world's leading consumers of recycled newspapers and magazines as it builds on the existing efforts of both companies to be leaders in environmentally sustainable production practices.

AbitibiBowater will own or operate 32 pulp and paper facilities and 35 wood product facilities located mainly in Eastern Canada and the Southeastern U.S. Pro forma combined paper production capacity is approximately 11.3 million tonnes per year and about 3.1 billion board feet of lumber.

SOURCE: Abitibi-Consolidated Inc.

Norampac project goes commercial

Trenton, ON

The black liquor gasification project shared by Norampac and ThermoChem Recovery International(TRI) has moved from commissioning to full commercial operation.

Norampac's facility in Trenton, ON also recently completed air emissions testing, and is the world's first commercial, low temperature black liquor gasification system.

"This is an important milestone for the technology and for the Trenton mill," said JJ Davis, general manager of the facility. "We continue to be committed to spent liquor gasification at Trenton and are working with TRI to gain even more steam production and energy savings."

The project at Trenton uses TRI's low temperature biomass gasification technology to recover chemicals and energy from the spent pulping liquor the mill produces in the manufacture of corrugating medium.

The project is able to meet all of the mill's spent liquor requirements, and supplies cooking liquor and process steam back to the mill to support pulp and papermaking processes
Real-time Performance Management in Pulp and Paper

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Real-time performance management, condition-based maintenance, real-time operations management, real-time energy management, enterprise software, pulp and paper.

ABSTRACT

Today the pulp and paper industry markets have become highly competitive with worldwide capacity outstripping demand, energy price advantage eroding for North American producers, and rapid modernization and capacity expansion in China/Asia (1). Traditional end of cycle planning and accounting are no longer sufficient for companies to compete, even to survive. Survival requires that these companies re-engineer their business models from the ground-up and emerge as real-time enterprises - agile and able to respond and react to business conditions that change not by the quarter or month, not by the week or day, but hour-by-hour and even minute-by-minute. This requires real-time visibility up and down the demand chain, crossing application, platform and organizational boundaries. It requires real-time business intelligence, the rapid collaboration between people, data and systems. It requires timely access to massive amounts of data generated from day-to-day operations, transforming it into right-time information that enables information workers throughout the enterprise to collaborate and take profitable action. Real-time performance management (RtPM) systems enable real-time business intelligence so that pulp and paper manufacturers can continuously improve their operations. Global production data can be monitored in real-time and correlated with enterprise information. Key Performance Indicators can be set up to monitor operations targets in real-time triggering immediate corrective actions when they go out of target range. Automated real-time events and alerts can be distributed to operators, asset managers, supervisors and management, quality assurance and other key personnel that are in position to take intelligent corrective action. Maintenance costs can be reduced by implementing condition-based maintenance to trigger needed repairs on process equipment before failures occur. Users are better able to anticipate and avert unplanned plant downtime and to more easily collaborate on the rescheduling of production orders to minimize the impact of planned downtime.

INTRODUCTION

Pulp and paper mills are incredibly complex manufacturing environments. The real-time data and events needed to effectively optimize mill operations are typically locked up in a wide variety of automated systems - quality control systems, distributed control systems, programmable logic controllers, lab automation systems, product tracking systems, enterprise resource planning systems, information technology (IT) infrastructures, control system historians and others. A modern RtPM system is an events-driven platform that provides the capability to gather and analyze real-time data and events from disparate sources across multiple operations, transform the data into specific relevant information and deliver unified, role-based portal views of the information across the enterprise. Key elements of an RtPM system include automated data and events collectors, networked data storage, hierarchical data modeling, business analytics, data distribution and data visualization. The RtPM system provides the technical capabilities; however the corporation must reengineer business processes to gain the maximum value from the technology. This paper will describe the key elements of an RtPM system and will present actual case examples of RtPM being utilized to optimize energy usage, enable real-time operations and implement condition-based asset management.
Real-time Performance Management in Pulp and Paper (continued)

KEY ELEMENTS OF AN RtPM SYSTEM

AUTOMATED DATA AND EVENTS CONNECTORS

Events and data are generated from a widely diverse set of components. The RtPM platform provides the many proprietary interfaces required to collect and aggregate the data into a common platform. Moreover, bi-directional gateways correlate information stored in corporate enterprise systems and, in return, supply aggregated real-time data to these systems using technologies such as ODBC, OLEDB, XML connectors, and Web Services.

NETWORKED DATA STORAGE

A large integrated pulp and paper company may need to store 1-2 million separate data streams recording thousands of data points per second, at a large number of different and geographically disparate locations, all at their original resolution, and to maintain the data on-line for 3-5 years or longer. The high performance data storage infrastructure in the RtPM system is able to store the data locally (e.g. at a mill site) and corporately while providing high speed corporate wide access to all of the archived data. Reliable data storage and simplified availability of that data across the corporation enables more accurate and informed decision-making and accountability.

HIERARCHICAL DATA MODELING

The hidden value in the vast numbers of data can be unlocked by using the hierarchical data modeling in the RtPM system to organize the data into groups for use in programs and displays and into real world models easily understandable by the users. For maximum effectiveness, a contextual modeler organizes data in modules that allow users to define properties, aliases, headings, and layers. A typical example is a "family tree" structure used in the management of event-driven and batch processes. Equipment, operations, and phases can be grouped in a unified hierarchy and data streams identified by referencing actual pieces of equipment and manufacturing processes. The modeler accommodates links to information related to each process unit or piece of equipment such as MSDS information, operating procedure data, equipment drawings, or maintenance records. The modeler also maintains “versions” of the hierarchies so that users can review historical data via aliases in the context of the hierarchy that existed at that designated time segment. For example; this allows a user to accurately search historical records related to a customer order even though the equipment configuration was different than the current configuration.

BUSINESS ANALYTICS

Analytic tools are required to reduce and transform the data into actionable information. Key components in the RtPM analytics toolbox include an advanced calculation engine, batch analysis, event analysis, process templates, wizard-based Visual Studio.NET integration, and integration with Microsoft’s .NET XML Web Services. An advanced computing engine allows users to carry out complex calculations (with minimal programming) for asset efficiency analysis, cost accounting, and batch summaries, among other functions. Ideally, these programs may be written once for a particular service, then run simultaneously over multiple, similar tools or processes such as batch analysis. The wizards make these processes easier to program reducing the need for costly high-level programmers and keeping operations costs down.

DATA DISTRIBUTION

Actionable information needs to be rapidly delivered—both locally in the mills and globally across the entire corporation—to the right people who need it to collaborate in real-time on business issues. RtPM provides power users in the mills with easy-to-use tools for transforming real-time information into PC-based dynamic displays and analytics (spreadsheets). Web-based displays and analytical tools are provided for role based distribution of information across the corporation. All displays or analytics available locally are also directly accessible via web tools avoiding the need to produce the same information twice.

DATA VISUALIZATION

Easily configurable RtPM data visualization tools transform actionable information into pictures, graphics and trends that deliver the information in a form appropriate to the individual - trends for operators, radar and bar charts for financial issues, active maps for field personnel, and KPIs for managers and executives. These tools have the capability to produce widely available “standard locked down”
Real-time Performance Management in Pulp and Paper (continued)

displays and analyses as well as “ad hoc” individual versions for on the spot trouble shooting. Also, these tools provide a common referential basis, so that decisions can be collaborated on, reviewed and later used as training tools.

REENGINEERING BUSINESS PROCESSES

RtPM provides excellent returns on the investment in substantially increased efficiency, higher revenues, cost reductions and better customer retention from superior service. However corporations need to reengineer business processes to take maximum advantage of the new capabilities gained from implementing RtPM. Good corporate-wide planning of the implementation, strong involvement from operations and on-going support from engineering and information technology groups are essential to the success of the reengineering process. Using an integrated RtPM platform based on company-wide accepted standards goes a long way toward getting various departments on board, providing support for a successful reengineering effort with minimal disruption and immediate results.

CASE STUDY: REAL-TIME ENERGY MANAGEMENT

Efficiently managing the purchase and usage of energy is increasingly critical to profitability in the pulp and paper business. Over the past few years deregulation and other factors have doubled, and in some cases tripled, the cost of energy required to power the various operating units. Companies can be overwhelmed trying to gather and analyze the data needed to manage energy costs and remain profitable. In 2001, with deregulation looming in the Ontario Canada electric power market, executives of a large newsprint producer decided to implement an RtPM energy application to automate the data gathering process and centralize the information from and between the various mills and operating units. Their objective was to give operations and executive management a comprehensive real-time view of energy usage patterns across the company and the opportunity to take corrective actions before they had a negative impact on the bottom line. Historically their five Ontario mills purchased more than $100 million CDN (Canadian) of electric power annually, making this Canadian-based company the largest single user of electrical power in the province. With anticipated wide pricing swings in electric power they realized that poorly managed power purchasing could potentially cost the company hundreds of thousands of dollars. They needed an enterprise-wide energy management system to enable the mills to track electric power consumption in real time and to place this information in the context of the energy market pricing, so that they could make smart power-purchasing decisions. The company was able to develop its own energy management system at a fraction of the CDN$3 million price tag of an off-the-shelf system by using RtPM systems already in place at four of their five mills and by tapping the programming talent of key staff members. The RtPM systems, already used for managing production at the four mills, would be tapped to collect the data from the various mill systems required for the energy management project. The project would need to be completed ahead of the May 2002 deadline, only six months away. The company added an RtPM system at their fifth Ontario mill, and then implemented a second system at corporate headquarters to serve as the control center for the entire power management application. Data links and interfaces were set up between the remote servers in each mill and the corporate system. The next step was to link the system to electricity market information and other pertinent data that was available on the Internet. A HyperText Markup Language (HTML) interface was installed to connect the RtPM systems to a Web site operated by the Independent Electricity Market Operator (IMO), a not-for-profit organization that was formed as part of the restructuring of Ontario’s electric power industry. The IMO site provides real-time spot market electric energy pricing, as well as hourly pricing and next-day pricing forecasts. A link was also set up to the Environment Canada Web site to collect real-time weather information that could impact electric power pricing. Connections to other Web sites provided data on natural gas and crude oil futures markets. Work began on the project in October 2001 using programmers and specialists temporarily assigned from various company locations. The energy management system was completed in less than six months, in time to meet the deadline, and with a total budget of just CDN$77,000. The system has proved to be an invaluable cost saving tool for the mills, enabling them to see and react to fluctuating energy market conditions swiftly and effectively. For example, during the first year of the system’s operation, when IMO pricing reached a peak price of about $800 per MWH (compared to $43 per MWH prior to deregulation) one Ontario mill reacted quickly to alter its production operations to reduce power consumption. For mill personnel, the heart of energy management system is the Control Center screen, which allows operators and managers to look at any of the five Ontario mills to make comparisons between their planned demand and their actual load consumption. Staff can also monitor current and projected electric energy prices, aggregate demand for the whole Ontario power grid, prevailing weather conditions and forecasts, and energy futures data. Weather information drawn from the Environment Canada Web site is an important planning tool since forecasts for very cold or very hot weather in Toronto can drive up demand and subsequently the price of electricity. One important system component is the load-planning module. This module covers all heavy equipment for each mill, such as thermo-mechanical pulp systems, refiners, paper machines and winders. The base load is configured for every piece of equipment according to how many megawatts of power each machine consumes when it is running at full speed.

Real-time Performance Management in Pulp and Paper (continued)
Real-time Performance Management in Pulp and Paper (continued)

The load plan screen allows users to call up the data and see at what percentage utilization different pieces of equipment are scheduled to run, and for what period of time—down to 15-minute intervals. Managers can then adjust production schedules for differing strategies to match power pricing and forecasts by re-configuration the percent utilization and operation schedule for each piece of equipment.

Three of the five Ontario mills have their own hydroelectric generating capacity. Typically, they reduce their power purchases by producing their own electricity during the day when prices are higher. During the off-peak periods, such as night time, they keep the water and buy electricity. These mills can also choose to shut down parts or all of the mill equipment in favor of making and pushing power to the grid at current market price if the market is very high, for example at $200 per MWH. Management may also switch paper orders from one mill to another based on electricity cost considerations. The energy management system does not replace mill management involvement in the decisionmaking process but simply and effectively equips them with additional information for better decisionmaking. The company credits the system with enabling energy savings at the five Ontario mills estimated at CDN$1 million per year.

CASE STUDY: REAL-TIME OPERATIONS MANAGEMENT

Optimizing within a pulp and paper mill site is complex; attempting to optimize operations across multiple geographically dispersed mill sites is even more complex. However the consequences of poorly optimized enterprise operations are well known – increased production costs, lost revenue from the inability to meet customer requirements, etc. Management, both in the mill and at corporate locations, need a common view of operations to effectively respond to dynamic changes in the market, make production adjustments and improve product quality. A global producer of packaging, coated and specialty papers installed RtPM systems at 15 major manufacturing sites collecting over 650,000 data streams and deploying over 2000 user licenses (3). The systems are used to integrate their unique operations environments from the various processes and mill sites into a common platform for enterprise-wide communication to information workers, product tracking systems and ERP systems. Interfaces to distributed control systems, programmable logic controllers, quality systems, lab systems, etc. collect production and process data into the system for storage, analysis and distribution across the entire enterprise. A hierarchical view of the mills was set up by process areas such as the pulp mill and paper mill. For example, a module for the pulping area was configured to contain sub modules for hardwood and softwood. Each of these modules was set up to contain sub modules for flow, consistency and other properties of the different types of pulp. Other hierarchical views could easily be constructed such as a view by equipment for maintenance engineering purposes. Analytics tools were used to build complex calculations that prepared product quality data into a format suitable for use by the company’s production management system. The calculations were configured as a module in the hierarchical data model relating the calculations to specific process areas. The calculations were set to trigger on an event or on a timed basis depending on the usage. The reusable hierarchical module structures and complex quality calculations were easily deployed as common implementations across several of the corporation’s mill sites. In addition, all data was available for viewing on corporate servers at the company’s headquarters. This allowed the company’s geographically diverse business units to share a common view of production recording metrics while, at the same time, presenting the data locally for production optimization and process improvements. Some of the operational benefits included: • Close monitoring of bleach plant performance to minimize excess emissions and avoid cluster rule violations • Annual cost savings of $250,000 from closely monitoring chemical variability and usage • Minimizing downtime by immediately alerting supervisors via email when a sheet break occurs on a paper machine or a piece of equipment fails (e.g. the pumps that supply water from the river) • Tracing quality problems to equipment by analyzing downstream quality data - for example, mapping historical caliper profile data in two dimensions to detect the gradual degradation in the calendar stack rolls and determine when they need to be changed • Capital cost avoidance by providing corporate research with the ability to centrally analyze the utilization of equipment processes and determine the actual need for additional process equipment.

CASE STUDY: CONDITION-BASED ASSET MANAGEMENT

Calendar-centric maintenance has been accepted practice in the pulp & paper industry for decades. However, in today’s very competitive environment, optimizing existing equipment assets and delaying costly capital equipment expenditures are absolutely essential to compete. The inefficiencies of calendar- based equipment maintenance are too substantial, making it critical to implement a condition-based asset management system that gives engineering and operations the ability to track equipment performance in real-time. A Canadian newsprint and specialty papers mill initiated a recent project to expand the use of their RtPM system to do condition-based asset management (4). A basic care package and a work management system had been in place since the early 90s however, most routine mill maintenance was calendar-based (filter change, lubrication etc.). Most process maintenance was reactive/corrective maintenance, driven by the “squeaky wheel” philosophy (lab complaint, customer complaint).
Real-time Performance Management in Pulp and Paper (continued)

Custom RtPM interfaces were installed to over 10 mill automation systems to collect the required realtime data. Rules for condition monitoring were established in the RtPM system and events triggered by these rules became action items that were integrated and tracked via the mill maintenance module in the company’s enterprise resource planning system. Metrics were set up for measuring performance success in the combined operations maintenance system. Today, using condition-based asset management, over 1000 process variables and over 500 motor/pumps are being monitored for performance and, through integration with the mill maintenance system, automatic work orders issued where equipment is performing below par or process variability is too high. A well-tuned regulatory control and properly functioning instrumentation layer is a must for sustained benefits from advanced control. Maintenance of the mill process equipment (physical assets) was well documented, but maintenance of the mill’s process control loops, which has more benefits, was typically not done. A comprehensive system to proactively identify poorly performing control loops and better utilize instrument maintenance personnel was implemented as part of the condition-based asset management program. Over 900 control loops are now being monitored for performance and automatic work orders are issued for poorly performing loops. Benefits to date from the condition-based asset management initiative include: • Fewer emergency work orders as equipment is monitored for early indication of failure • More planned work orders that are expected to decrease in the long term as more problem control and process loops are identified and corrected • Fewer overtime hours from less unplanned work • Decreased spare parts inventory as early warning of failures has lessened the need to carry extra spares • Decreased chemical consumption (bleach per ton of paper) from running the process closer to limits and from better control loop tuning • Increased overall equipment effectiveness from better planning and scheduling as a result of longer equipment runtimes Work is in progress to further expand the RtPM system including more integration with the corporation’s enterprise resource planning system, implementing a batch control system and deploying a web-based real-time portal. Expanded integration to other systems such as production data management and shop floor inventory are also planned.

CASE EXAMPLES: REAL-TIME PERFORMANCE MANAGEMENT

As RtPM becomes accepted best practice in the pulp & paper industry, more applications are being developed to reduce maintenance and material costs, increase productivity, improve quality, increase energy efficiency, etc. Some further examples of the use of Real-time Performance Management in the pulp and paper industry include: • A coated paper manufacturer uses batch analytic tools to achieve a 40% reduction in cycle time in the coating kitchen manufacturing process. • An RtPM application monitors downtime on a paper machine by generating events from sheet break detectors and allows operators to log the reason for downtime and add comments. • A paper mill established a maintenance lockout procedure for the control system and process equipment that required operating personnel to sign off in an RtPM template that the equipment was safe to start before it could be restarted. • A paper mill monitors felt drying capacities with three dimensional RtPM displays to determine if the felt cleaning sprays are working properly and when to change the felts, which are expensive to replace. • A linerboard mill uses RtPM to analyze the periodic behavior of variations in the paper machine process to evaluate the lost opportunity, i.e. the ability to reduce the basis weight target and/or increase the moisture target while maintaining quality specifications. Both wet end process variables and dry end quality measurements are monitored and used in the calculations. • An integrated pulp and paper mill uses RtPM to track and optimize steam usage across the mill and to report daily usage to operations and monthly totals to accounting. • A paper company has developed an RtPM pulp tracking module that automatically tracks the production of Forest Stewardship Council (FSC) certified pulp through its entire pulping process. The company has received recognition for progress in environmental sustainability allowing them to sell the FSC certified pulp at a higher price.

THE BOTTOM LINE

Today in the paper industry, complex and competitive business environments demand that companies accomplish more with less. To survive and win, companies must reengineer their businesses to drive towards operational excellence. This can only be achieved through a process that is incremental and evolutionary, a process that empowers individuals toward continuous improvement in their role. Implementing a comprehensive RtPM system is the best recipe for continuous improvement on all fronts.

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Editor’s Note:
This paper was originally presented at the ISA Expo 2004 in Houston
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