Find out more:

- SIPAPER – tailor-made solutions for higher efficiency and productivity in the fiber industry
  [www.siemens.com/fiber-industry](http://www.siemens.com/fiber-industry)
- Siemens light industrial and aero-derivative gas turbines up to 66 MW
  [www.siemens.com/gasturbines](http://www.siemens.com/gasturbines)
- Siemens steam turbines for efficient generation of power and heat
  [www.siemens.com/steamturbines](http://www.siemens.com/steamturbines)
The pulp and paper industry is preparing for the future. It is not only showing positive growth rates, it is already taken a leading role in the closed-cycle economy by making optimal use of resources, integrating waste products into processes, optimizing energy requirements, transforming into a self-sufficient energy cycle, and using digitalization tools.

The fiber industry of tomorrow

The shift to a closed-cycle economy and the optimization of process set-up helps reduce and even prevent pollution. With the help of our products and solutions, you can significantly reduce your carbon footprint.

- Decrease carbon emissions by 15 to 40 percent with CHP (compared with the separate provision of heat and electricity)
- Substantially boost your plant’s energy efficiency and improve energy consumption with our wide range of innovative SIPAPER automation and drives technologies

Siemens partnered with Propapier PM2 in Germany and delivered SIPAPER solutions and power generation equipment.
Turn challenges into opportunities

Pulping, tissue manufacturing, or producing board and other fiber applications – your challenges and requirements are as different as your products and business objectives. New, low-cost, highly efficient, and reliable approaches are key in your daily business. Or perhaps you are moving toward a closed cycle in your material flow?

Are you looking for low costs and high operational effectiveness for your plant?

To ensure your competitiveness, you need to reduce your costs while also boosting your productivity. To accomplish this, you need a high level of process understanding. Based on our years of experience, we offer you tailor-made solutions with high-efficiency components and services:

- Reduce your costs and optimize your operation thanks to intelligent process automation
- Our turbines perfectly match your flexible production processes
- Thanks to optimized lifecycle costs, you’ll benefit from the highest returns

Is reliability your top priority?

Maximum process reliability is required in order to achieve the lowest cost per ton of produced paper – which means that process interruptions are a major issue.

- Our products, systems, and solutions are designed with maximum reliability and availability, low wear, and long maintenance intervals to minimize or prevent these interruptions
- Process stability at a low cost is ensured by our state-of-the-art turbine technology, drive and automation technology, and optimal process integration
- Targeted steam management within the process and intelligent energy management are provided by our power supply solutions

Would you like to boost the efficiency of your power supply?

Developing a separate system for power generation that allows you to operate independent of the public grid will pay off quickly.

- Special service concepts and optimized solutions with standardized turbine modules feature short installation time, long service life, and reduced maintenance intervals and lifecycle costs

Are you ready for new approaches?

The by-products of pulp production like electricity, biogas, and turpentine as well as the surplus energy from your own power generation system are valuable commodities.

- Sell energy back to the grid or use it to supply neighboring districts with central heating
- Increase the yield by implementing processes for innovative biochemicals
Effectiveness and flexibility call for digitalization

Siemens digitalization solutions get you ready for the future with process transparency, data analytics, and predictive services to ensure your competitiveness. As our partner you will profit from our expertise in electrification, automation, and digitalization.

Our SIPAPER digitalization portfolio covers all lifecycle steps from integrated engineering to integrated operation

**Process automation: Enhanced efficiency**
- Integrated system for service and root-cause analytics
- Faster ramp-up of production thanks to flexible and reliable simulation of the software in advance
- Simple testing of later modifications and changes in the production, as well as off-site training and simulation for operators
- Continuous optimization of production resources and energy consumption via remote analytic systems in an open IoT system

**Steam management and power generation: Extended lifecycles**
- Condition-based maintenance and service through remote monitoring control
- Advanced power diagnostics center: operators are able to efficiently control processes in the power generation plant
- Pioneering, customized digital services that enable new maintenance models

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**Horizontal integration with SIPAPER Drives**

Integrated drive portfolio: All frequency converters, motors, couplings, and gear units from a single source. Perfectly integrated, seamless in interaction. For all performance classes. As a standard or totally customized solution.

You can boost the availability of your application or plant – by up to 100%

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**Integration with SIPAPER DCS APL**

Integrated in the automation technology: from the field level to the controller level, to the MES, thanks to PCS 7. For every application.

With PCS 7, you can cut your engineering time – by up to 30%

Substantial savings on engineering costs

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**Lifecycle integration**

Integrated software and services throughout the entire lifecycle. For higher performance and maximum investment security.

Thanks to Integrated Drive Systems, you can cut your maintenance costs – by up to 15%

Increases your profitability

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**Power generation integration with SIPAPER Power**

Integrated state-of-the-art power generation equipment: earn extra revenue with Siemens steam and gas turbines.

Siemens steam and gas turbines deliver efficiency gains (compared with older units) – of up to 20%
Comprehensive solutions for all disciplines along the process chain

Boost your productivity: Whether you want to increase availability and minimize downtime or improve the quality of your products and optimize your energy requirements – with our automation, electrification, and power solutions for the fiber industry, you and your plant will be ideally equipped to handle any task.

<table>
<thead>
<tr>
<th>Power generation</th>
<th>Process control system</th>
<th>Integrated Engineering</th>
<th>Integrated Service</th>
<th>Data analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Plant</td>
<td>Pulp Production and Stock Preparation</td>
<td>Headbox</td>
<td>Paper Machining</td>
<td>(Industrial Ethernet)</td>
</tr>
<tr>
<td>Fuel</td>
<td>Wood</td>
<td>Bleach</td>
<td>Reel/Sheet</td>
<td>Holocell 2 Portal</td>
</tr>
<tr>
<td>Gasoline</td>
<td>Hollinger</td>
<td>Reel/Cutter</td>
<td>Sheet Curing</td>
<td></td>
</tr>
</tbody>
</table>
The right product for any challenge

Our unique portfolio covers drive technology and automation as well as power generation, transmission, and distribution – with proven components and advanced technology for optimal efficiency, maximum plant availability, and long-term security for your investment. The precisely aligned solutions can be individually modified to fit your processes and are based on our in-depth knowledge, comprehensive R&D, and more than 100 years of experience as a partner to the fiber industry.

Steam turbines from 10 kW to 250 MW

Our steam turbines span the power range from 10 kW to 250 MW and will meet all steam system requirements in the fiber industry. Of course, they comply with API standards as well as all customer specifications.

Integrated SiPAPER APL solutions

* IDS = Integrated Drive Systems
Managing the water-steam cycle

As market leader in steam turbines for the fiber industry, we know the importance of a flexible turbine design and customization.

That’s why we provide steam turbines with various uncontrolled and controlled extraction options adapted to the steam flow in your process. We can offer the precise number of extractions indicated by your process requirements.

Typical combined heat and power cycle in pulp and integrated mills

implementation of a gas turbine in tissue drying process

The Yankee drying process is the most common drying method. Small gas turbines are desirable for use in the Yankee process because the demand for hot air is lower compared with the Through Air Dryer (TAD) process. TAD uses heat to dewater the product instead of the conventional mechanical pressing. This produces a much softer paper and reduces the demand for raw material from 8% to 30%, but dramatically increases the drying load. The high demand of hot air means that the implementation of gas turbines up to 10 MW is profitable for the TAD process.
Virgin fiber for the production of liquid packaging
Stora Enso Beihai Mill, Guanxi Integrated Project and Operations (GIPO),
State of Guangxi, China

Benefits
• Predictive maintenance solutions
• High efficiency and availability thanks to harmonized Simotics low- and medium-voltage motors and Sinamics frequency converters
• A reliable, productive machine with optimized components and a well-matched drive train
• Custom-made steam turbine with center admission designed precisely for the customer's needs
• Fully standardized, factory-wide automation system spanning all drive systems, energy switching and monitoring (ESM), and the steam turbine

Scope of supply
• Power distribution (PD): 220-kV GIS SWG, power transformers, 35-kV GIS SWG, 10-kV AIS SWG, distribution transformers, harmonic filters, DC systems, emergency power supply, SCADA system ESM/LMS, cable tray and cable routing, engineering and services
• Process electrification (PE): sectional drives including SIPAPER drive APL and SIPAPER winder APL, refiner motor (21 MW), MCCs, MV/LV VSDs, MV/LV motors, VD panel and UPS, cable tray and cable routing, engineering and services
• Process automation: latest generation 8.1 of the PCS7 process control system
• Steam turbine generator set SST 800: turbine SST 800 (EHNK 71/2.5 ax), generator SGen5-100A-2P, condenser SRC 27/32-21SS ax power: 59 MW; speed: 3,000 rpm
• Service: implementation of additional remote diagnostic systems for the 21-MW refiner motor and steam turbine

Stora Enso is the world’s leading producer of liquid packaging board, which is one of the most demanding and high value-added products in this industry. The Stora Enso Beihai mill has an annual capacity of 450,000 tons of liquid packaging board and other high-grade paperboard products. Stora Enso’s operations in the Guangxi region also consist of tree plantations with roughly 85,000 hectares of land leased since 2012. The plantations have been certified to the standards of the Forest Stewardship Council (FSC®) and the China Forest Certification Council (CFCC), and they will continue to provide a sustainable, cost-competitive, and self-sufficient fiber base for the mill.

The project began at a greenfield site. In addition to the board machine, the scope included a full site with infrastructure, power plant, water and effluent treatment capacities, and a bleached chemo-thermomechanical pulp mill (BCTMP) with an annual capacity of 220,000 tons. Siemens was contracted as the sole supplier of electrification and automation, from power generated by a steam turbine to integrated automation to predictive maintenance service. An integrated drive system from Siemens with over 160 drives is installed in the packaging board machine, which is over 300 meters long. The predictive maintenance service provides state-of-the-art maintenance solutions that operate on an entirely new level.
Innovations for sustainable and future-proof processes

To stay competitive and increase the sustainability of its processes, the fiber industry can take advantage of a variety of innovations: for example, generating bio-based basic materials for the chemical industry. The fiber industry can also contribute to stabilizing the grid by supplying electrolyzers like Silyzer in the secondary control loop.

Power to gas (hydrogen)
In general, electrolyzers generate H₂ and O₂ at 35 bar pressure and low-temperature heat (60° Celsius). In the form of hydrogen peroxide H₂O₂, H₂ and O₂ can be used as bleaching agents. In contrast to chlorine-based bleaching, the disposal issue that comes with chlorine compounds has been eliminated. While H₂O₂ can be produced locally, chlorine most likely cannot due to its toxicity.

The byproduct O₂ can also be used to enhance combustion processes. And in conjunction with renewable energy systems, H₂ can be used in energy storage technologies. This is essential in autonomous energy systems as a back-up system if the main system fails (for example, hydro power), or to provide peak-load coverage.

### Silyzer 200 electrolyzer basic system

<table>
<thead>
<tr>
<th>Electrolysis type/principle</th>
<th>Proton Exchange Membrane (PEM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated stack power</td>
<td>1.250 kW</td>
</tr>
<tr>
<td>Dimension skid</td>
<td>6.30 m x 3.10 m x 3.00 m</td>
</tr>
<tr>
<td>Cold (black) start time</td>
<td>10 min</td>
</tr>
<tr>
<td>Start-up time (from standby)</td>
<td>&lt; 10 sec</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>60° C – 70° C</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>+2° C – +40° C</td>
</tr>
<tr>
<td>Output pressure</td>
<td>Up to 35 bar</td>
</tr>
<tr>
<td>Purity H₂</td>
<td>99.5% – 99.9%, 99.999%*</td>
</tr>
<tr>
<td>Rated H₂ production</td>
<td>21 kg/h, 225 Nm³/h</td>
</tr>
<tr>
<td>Weight per skid</td>
<td>17 t</td>
</tr>
<tr>
<td>Noise</td>
<td>≤ 65 dB (aAudio)</td>
</tr>
<tr>
<td>CE conformity</td>
<td>yes</td>
</tr>
<tr>
<td>Water consumption</td>
<td>1.5 l/Nm³ H₂</td>
</tr>
</tbody>
</table>

*Depends on load; option
References from around the world

Our customers can rely on proven solutions with an extensive installed base. More than 170 Siemens turbines and over 1,000 SIPAPER solutions are in operation in all corners of the world.