Varkaus – in the middle of the lake district
Paper industry cluster in Varkaus

- StoraEnso: Paper, board and timber
- Sahala Group: Mechanical maintenance
- Metso: Sampling and automated analysis
- Andritz: Chemical recovery systems
- Honeywell: Sensing and control systems
- Foster Wheeler: Industrial power plants
- Sanoma Oy: Printing house
- Aft: Pulp screen components
Stora Enso Fine Paper

Integrated sulphate pulp mill
- ECF 225 000 t/a

One paper machine
- Envelope paper, Business Forms (Preprint) & Offset paper
  - Production 315 000 t/a (2009)
  - Main raw materials bleached pine and birch pulp
- 98 % exported
- Main markets: EU
Wood Handling Plant

• Start-up September 2007

• Investment of 46.7 M€

• Supplying fibre raw material both to Fine paper and Publication paper mills

• Production capacity 2,1 million solid meter (sob)

• Modern two-line wood handling
  – improved quality of chips
  – better yield in pulping
  – better bleachability
  – higher pulp strength
  – decreased energy consumption
  – less environmental loading
Wood Handling Plant

• Main technical scope
  – Power feed conveyor / deicing
  – Debarking drum
  – Horizontally fed chipper
  – Thickness screen
  – Oversize chips cutter
Technical Scope of Varkaus PM3

Asset development
- Investment 54.8 M€
- Production increase + 95 000 t/a
- Capacity 315 000 t/a

Technical main scope
- Former and press-section rebuild
- New winder and rewinder
- Fully automatic reel handling

Timing
- Offset paper reels, LumiSet, started in December 2007
- Berga Classic Preprint production started in January 2008
- Berga Mail+ production started in February 2008
# Rebuilt of PM3 – Main Changes

<table>
<thead>
<tr>
<th>Where?</th>
<th>What’s new?</th>
<th>Improves…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire section</td>
<td>Modernized wire section with new dewatering elements and vacuum shoe technology</td>
<td>Paper formation</td>
</tr>
<tr>
<td>Press section</td>
<td>Shoe press in third nip for higher dryness</td>
<td>Paper machine runnability</td>
</tr>
<tr>
<td>Drying section</td>
<td>Ropeless tail threading, new blow boxes and new guiding and stretcher rolls</td>
<td>Paper machine runnability, total efficiency</td>
</tr>
<tr>
<td>Sizing and after drying</td>
<td>Profiling infrared equipment</td>
<td>Moisture profile</td>
</tr>
<tr>
<td>Finishing</td>
<td>New cutter and rewinder</td>
<td>Quality of customer reels</td>
</tr>
</tbody>
</table>
Automatic functions of PM3

- Automatic parent reel transfer
- Automatic reel spool transfer
- Automatic butt-joint splicer
- Automatic positioning of slitters and core chucks
- Automatic core feeding and set change
- Automatic web threading
- Automatic core gluing
- Automatic end gluing
- Continuous winding software

Continuous winding software
Winding and Rewinding – Main Changes

New cutter and rewinder

New customer reel handling
Winding and Rewinding – Main Changes

- State-of-the-art winding technology
- Web separating device — no married reels
- Tail gluing and ink jet marking of customer reels
- Light plastic band of multi reel packages (no inner cores needed)
Benefits for our customers

Envelope paper, Berga Mail +

- Main product of Varkaus PM3
- Less capacity restraints
- More efficient slitting/rewinding – no bottle-neck
- Improved whiteness, from 160 CIE to 163 CIE
- Possibility to label every single reel, not just the package
- Preprint and envelope papers with the same shade – better house styling possibilities
# Products and benefits

<table>
<thead>
<tr>
<th>Product</th>
<th>Benefits</th>
<th>Reel</th>
<th>Sheet</th>
<th>Standard range g/m²</th>
</tr>
</thead>
</table>
| Berga Superior | • Paper for the highest quality envelopes  
• Provides the best printing results with the highest efficiency  
• Very high whiteness giving superior appearance  
• High opacity and excellent formation ensuring low print-through |      |       | 80, 90, 100, 120    |
| Berga Mail+  | • Europe’s most popular envelope paper  
• High whiteness  
• Low print-through  
• Excellent runability in all envelope and inserting machines |      |       | 70, 75, 80, 90, 100, 120 |
| MultiMail    | • Scandinavia’s first choice  
• Smooth surface and high whiteness  
• High bulk and stiffness  
• Totally chlorine free |      |       | 80, 90, 100         |
Benefits for our customers

*Preprint, Berga Classic Preprint*

- Full needed range of reel widths
- Improved formation
- Possibility to grow
- Preprint and envelope papers with the same shade – better house styling possibilities
## Products and benefits

<table>
<thead>
<tr>
<th>Product</th>
<th>Benefits</th>
<th>Conversion</th>
<th>Laser</th>
<th>Inkjet</th>
<th>Range g/m²</th>
</tr>
</thead>
</table>
| Berga Superior Preprint | • Top quality preprint paper with high whiteness for high image forms  
• Top performance with full colour applications | Reel to A4 Reel-to-reel Reel-to-fanfold | ✔     | ✔      | 80-120     |
| Berga Classic Preprint     | • Good multifunctional preprint paper  
• Good runnability in converting, laser, inkjet and plotters  
• Good printability with ¾ colours | Reel to A4 Reel-to-reel Reel-to-fanfold | ✔     | ✔      | 70-115     |
| Multiform Preprint        | • Good TCF multifunctional preprint paper  
• Good runnability in high speed lasers  
• Good printability with ¾ colours | Reel to A4 Reel-to-reel Reel-to-fanfold | ✔     | ✔      | 70-100     |
# Products and benefits

<table>
<thead>
<tr>
<th>Product</th>
<th>Benefits</th>
<th>Conversion</th>
<th>Laser</th>
<th>Inkjet</th>
<th>Range g/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berga Form Laser</td>
<td>• Laser quaranteed constat paper with excellent runnability in high speed laser production&lt;br&gt;• Consistent quality ensuring precise perforations and folds</td>
<td>Reel-to-reel&lt;br&gt;Reel-to-fanfold</td>
<td></td>
<td></td>
<td>70-90</td>
</tr>
<tr>
<td>Berga Form*</td>
<td>• Economic listing paper with excellent runnability&lt;br&gt;• Consistent quality ensuring precise perforations and folds</td>
<td>Reel-to-fanfold</td>
<td></td>
<td></td>
<td>60</td>
</tr>
</tbody>
</table>

*) Limited availability
# Berga Mail+ Reel Specifications

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basis weight</strong></td>
<td>Standard: 75, 80, 90, 100 and 120 Special: 70, 85, 95 and 110 gsm</td>
</tr>
<tr>
<td><strong>Trim width</strong></td>
<td>765 cm for 70 gsm 768 cm for 75 gsm and up</td>
</tr>
<tr>
<td><strong>Reel diameter</strong></td>
<td>120 cm, 140 cm and 150 cm</td>
</tr>
<tr>
<td><strong>Reel width</strong></td>
<td>Min 156 mm, max 2600 mm Only even millimeters in reel widths accepted</td>
</tr>
<tr>
<td><strong>Reel weight</strong></td>
<td>Max 3000 kg</td>
</tr>
<tr>
<td><strong>Core</strong></td>
<td>151 mm</td>
</tr>
<tr>
<td><strong>Packing</strong></td>
<td>156 – 178 mm 5 reels/package 180 – 228 mm 4 reels/package 230 – 308 mm 3 reels/package</td>
</tr>
<tr>
<td></td>
<td>310 – 514 mm 2 reels/package 516 mm and over 1 reel/package</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>Plastic band for multiple reels + kraft wrapper Inkjet marking on each reel belly + multiple id-cards Number of splices marked on the reel label</td>
</tr>
</tbody>
</table>
## Berga Classic Preprint Reel Specifications

<table>
<thead>
<tr>
<th><strong>Basis weight</strong></th>
<th>70, 75, 80, 90, 100 and 115 gsm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trim width</strong></td>
<td>765 cm for 70 gsm</td>
</tr>
<tr>
<td></td>
<td>768 cm for 75 gsm and up</td>
</tr>
<tr>
<td><strong>Reel diameter</strong></td>
<td>100 cm (only for Europe) and 120 cm</td>
</tr>
<tr>
<td><strong>Reel width</strong></td>
<td>Min 210 mm, max 2600 mm</td>
</tr>
<tr>
<td><strong>Reel weight</strong></td>
<td>Max 3000 kg</td>
</tr>
<tr>
<td><strong>Core</strong></td>
<td>70 and 76 mm</td>
</tr>
<tr>
<td></td>
<td>151 mm only with diameter 120 cm</td>
</tr>
<tr>
<td><strong>Packing</strong></td>
<td>210 – 255 mm 4 reels/package</td>
</tr>
<tr>
<td></td>
<td>256 – 345 mm 3 reels/package</td>
</tr>
<tr>
<td></td>
<td>346 – 500 mm 2 reels/package</td>
</tr>
<tr>
<td></td>
<td>501 mm and over 1 reel/package</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>Plastic band for multiple reels + kraft wrapper</td>
</tr>
<tr>
<td></td>
<td>Inkjet marking on each reel belly + multiple id-cards</td>
</tr>
<tr>
<td></td>
<td>Number of splices marked on the reel label</td>
</tr>
</tbody>
</table>
# LumiSet Premium Reel Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basis weight</td>
<td>70, 80, 90 and 100 gsm</td>
</tr>
<tr>
<td>Trim width</td>
<td>765 cm for 70 gsm&lt;br&gt;768 cm for 80 gsm and up</td>
</tr>
<tr>
<td>Reel diameter</td>
<td>100 cm (only for Europe) and 120 cm</td>
</tr>
<tr>
<td>Reel width</td>
<td>Min 420 mm, max 2600 mm</td>
</tr>
<tr>
<td>Reel weight</td>
<td>Max 3000 kg</td>
</tr>
<tr>
<td>Core</td>
<td>70 and 76 mm</td>
</tr>
<tr>
<td>Packing</td>
<td>420 – 500 mm 2 reels/package&lt;br&gt;501 mm and over 1 reel/package</td>
</tr>
<tr>
<td>Other</td>
<td>Plastic band for multiple reels + kraft wrapper&lt;br&gt;Inkjet marking on each reel belly + multiple id-cards&lt;br&gt;Number of splices marked on the reel label</td>
</tr>
</tbody>
</table>
Production cycles

Envelope Papers (Berga Mail+)
• 80 and 90 gsm every week
• 75 and 85 gsm twice a month
• 70, 95 and 100 gsm once a month
• 110 and 120 gsm every second month

Business Forms (Berga Classic Preprint)
• 80 gsm every week
• 90 gsm three times a month
• 70, 75 and 100 gsm once a month
• 115 gsm every second month
Main Transport Methods

In Gothenburg the Finnish and Swedish cargo flows are combined for transshipment to Zeebrugge, Tilbury and Immingham.

Main European ports:
- Zeebrugge 55 Kton
- Tilbury & Immingham 40 Kton
- Lübeck 30 Kton
- 10 % of deliveries to customers by truck and 90 % by vessel
- 20 % of paper from mill to Finnish export ports by truck and 80 % by train
SECU is a huge “container” or “cassette with walls and roof”

<table>
<thead>
<tr>
<th></th>
<th>outside</th>
<th>inside</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length /m</td>
<td>13,800</td>
<td>13,575</td>
</tr>
<tr>
<td>Breadth/m</td>
<td>3,600</td>
<td>3,430</td>
</tr>
<tr>
<td>Height</td>
<td>4,375</td>
<td>3,430</td>
</tr>
<tr>
<td>Grossweight max</td>
<td></td>
<td>93 000 kg</td>
</tr>
<tr>
<td>Tara standard units</td>
<td>13 500 kg</td>
<td></td>
</tr>
<tr>
<td>automatic load</td>
<td></td>
<td>14 560 kg</td>
</tr>
<tr>
<td>Max payload in trains</td>
<td>68 100 kg</td>
<td></td>
</tr>
<tr>
<td>in port/ship</td>
<td></td>
<td>79 500 kg</td>
</tr>
</tbody>
</table>
Quality Control

Raw material control
- Wood raw material (inc. traceability)
- Pulp
- Fillers
- Additives
- Regular audits with main suppliers

On-line paper machine control
- Measurements in machine and cross machine direction by continuous scanning of paper web
  - grammage, caliper, moisture content profile, filler content, optical properties, air permeability, formation
- Control of fiber orientation
- Paper web fault detector for holes, spots, impurities
- Visual check of full paper web

Paper measurements after paper machine
- Paper tests important from end use point of view
- Visual check of full paper web
- Laboratory scale printing tests
- Print through mottle measurements

Customer feedback and quality benchmarking
Certificates

- **Environmental**
  - ISO 14001
  - EMAS
  - Nordic Swan Label
  - PEFC: CoC (Chain of Custody)
  - FSC: CoC (Chain of Custody)
  - PEFC labelled paper from April 2008 onwards

- **Quality**
  - ISO 9001
Latest Investments

• Modernization of PM3 headbox and installation of new soft calander 2005

• Rebuild of wood handling plant 2007

• Rebuild of PM3 former and press-section, new winder and rewinder, fully automatic reel handling 2007
Appendix

March 2009
### Sulphate Pulp Mill

**Start:** 1980  
**Cooking:** Continuous cooking  
**O₂-stage:** 2-stage oxygen delignification  
**Bleaching:** D₀-EOP-D₁  
**Total Capacity:** 225 000 tons  
**Products:** Bleached hardwood pulp (ECF), bleached softwood pulp (ECF), tall oil and turpentine  
**Wood raw materials:** Birch, pine and spruce
Machines

PM 3

Built: 1961
Manufacturer: Voith/Valmet/Metso
Type of machine: Twin-wire / film press
Capacity: 315 000 tons/a
Products: Envelope paper, business forms (preprint), offset paper
Furnish: Hardwood pulp, Softwood pulp, PCC
Speed: 1200 m/min