Welcome to Valmet Karlstad
Anders Björn, VP, Tissue Mills BU
November 28, 2017
Valmet’s history in Karlstad

1860  Tidholm & Andersson Foundry established

1871  Operates under the name KMW

1871  Paper Laboratory established

1891  First paper machine delivery to Serlachius in Finland

1895  The Yankee dryer is developed and delivered to Göteborgs Pappersbruk

1916  First tissue machine delivery to Fiskeby

1936  First paper machine delivery to China

1972  Biggest paper machine in the world delivered to Weyerhauser, USA

1974  Valmet acquires KMW

1979  Valmet acquires Tidholm & Andersson

1999  Metso created through merger of Valmet and Rauma

2001  Tissue Technology Center inaugurated

2005  Advantage Tissue making concept developed

2013  Tissue machine No. 200 sold

2015  Valmet Pescia Rewinder business

2015  Metso Process Automation Systems to Valmet

End of 2013  Demerger to Valmet and Metso
PAPER PROVINCE

A world-class cluster for companies within the forest-based bioeconomy in mid Sweden.

- Appointed a "World Class Cluster"
- Approx. 7,000 employees in member companies
- 106 member companies
- SEK 14 million turnover in 2015
- Member companies' turnover SEK 23.5 billion in 2015
PRODUCTION FACILITIES IN PAPER PROVINCE

- Converters
- Service providers
- Chem pulp prod.
- Mech pulp prod.
- Pulp & Paper prod.
- Machine Supplier
- Raw material suppl.

Ball size indicates # of employees
Source: Vinnova Analys
Paper business line locations

- **Biddeford: HC 45**
  - TAD technology & air systems - Tissue

- **Karlstad: HC 570**
  - Tissue making technology

- **Gorizia: HC 80**
  - Yankee hoods & Ventilation

- **Pescia: HC 33**
  - Rewinders

- **Shanghai: HC 582**
  - Paper, board & Tissue machines, finishing machinery, stock preparation, components

**HC = headcount**
Advantage NTT has become a category of its own

Competitive option for production of premium products

6 in operation
FAPSA, Mexico
FPC, Chile
ADNPM, Abu Dhabi
Von Drehle, USA
Resolute, USA
Renova, Portugal

5 in the pipeline
Sofidel, Poland
Sofidel, USA
Sofidel, USA
Sofidel, Spain
Confidential
Three tissue machine technologies covering the whole product range

Advantage™ DCT® technology
Plain tissue

Advantage™ NTT™ technology
Plain and textured tissue

Advantage™ Thru-Air® technology
Structured tissue
Valmet Pescia, a new member of our family
Rewinders for Tissue and Nonwovens production
Increasing demand for large scope of supply
Project scope 40 new installations 2013-2017

- Tissue machine: 40
- Stock preparation: 40
- Automation system: 39
- Process Utility Systems: 17
- Field instruments: 17
- Mill Engineering: 17
- Electrical system: 9
- Piping and tanks: 7
New orders

2015-2017

Advantage DCT

New orders
• 8 x Lee & Man, China
• FAPSA TM7, Mexico
• Hayat Kimya TM7, Russia
• ICT B2, Spain
• Fine Hygienic Holding, Abu Dhabi
• Crown Paper, Abu Dhabi
• Crecia, Japan
• Confidential, NA
• Confidential, EMEA

Advantage NTT

New orders
• 2 x Sofidel, Circleville, USA
• Sofidel, Delitissue, Poland
• Sofidel, Ibertissue, Spain
• Resolute, USA
• Renova, Portugal
• Confidential
• Confidential

Advantage ThruAir

New orders
• First Quality Tissue, TM4, USA
• Irving Tissue, North America
New installations

2015-2017 Total added capacity to the market 1.2 Million annual tons

Advantage DCT

Start-ups
- Aktül Kagıt TM2, Turkey
- Hayat Kimya TM5, Turkey
- Hayat Kimya TM6, Egypt
- Hengan TM 19 & 20, China
- Lee & Man TM 4, 5,6,7,8, China
- PT Suparma, Indonesia
- Faderco, Algeria
- Grupo Corporativo, Mexico
- Tezol, Turkey
- ICT, Poland
- Confidential, EMEA

Advantage NTT

Start-ups
- von Drehle, USA
- Renova, Portugal
- Resolute, USA
- FPC, Chile
- ADNPM, Abu Dhabi
- Confidential

Advantage ThruAir

Start-ups
- First Quality Tissue TM3, USA
Tissue machine orders
2000-2017 (148)
(Totally 248)
Large demanding international projects
Experienced Project teams and a wide competence network
Way to operate
Partnership based on mutual trust and common targets

<table>
<thead>
<tr>
<th>No. of Customers</th>
<th>No. of orders</th>
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<tbody>
<tr>
<td>7</td>
<td>7 or more</td>
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<td>9</td>
<td>3 - 6</td>
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<tr>
<td>9</td>
<td>2</td>
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</table>
Way to operate
Continuous improvements and process oriented operations

Valmet Project Execution Model

• Sales & delivery process model
• Life cycle process model
• Internal project process model
Valmet Project Execution Model

From function-oriented to process-oriented sales and delivery process

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>G-2</td>
<td>Decision to quote to customer</td>
</tr>
<tr>
<td>G-1</td>
<td>Decision to negotiate and offer agreement to customer</td>
</tr>
<tr>
<td>G 0</td>
<td>Decision to start internal project establishment work</td>
</tr>
<tr>
<td>G 1</td>
<td>Project start: Decision to start basic engineering</td>
</tr>
<tr>
<td>G 2</td>
<td>Decision to start detailed engineering, purchasing and manufacturing</td>
</tr>
<tr>
<td>G 3</td>
<td>Decision to deliver foundation for installation purchase, by ourselves or by customer</td>
</tr>
<tr>
<td>G 4</td>
<td>Decision to start shipping</td>
</tr>
<tr>
<td>G 5</td>
<td>Decision to prepare for installation</td>
</tr>
<tr>
<td>G 6</td>
<td>Decision to prepare for check out</td>
</tr>
<tr>
<td>G 7</td>
<td>Decision to finalize site activities and reduce project organization</td>
</tr>
<tr>
<td>G 8</td>
<td>Project closing: Decision to close the project</td>
</tr>
</tbody>
</table>
Valmet Performance center
Data-driven reliability and performance services
Tissue market, challenges and opportunities

Investor site visit to Karlstad

November 28, 2017

Jan Erikson
Vice President, Sales
Tissue Mills Business Unit
Cellulose based paper products

Three main categories

Tissue & Towel
Caring

Communicating

Containing
Protecting
Tissue

Products and segments

- Bath
  - Standard
  - Premium
  - Ultra premium

- Facial
  - Standard
  - Premium
  - Ultra premium

- Towel
  - Standard
  - Premium
  - Ultra premium
Tissue paper

#1 non-food fast moving consumer good

• Hygiene is an important factor for development
• Faces few substitution threats
• Not very sensitive to cyclical changes in economy
• No mandatory product specifications
• Product development, image/brand and confidentiality – vital competitive tools
• Consumption drivers
  – Economic growth and growing middle class
  – Population growth and urbanization
  – Raising quality demand
**Tissue World Market**

**Market by segment**

- Away from Home: 25%
- Consumer products: 75%

**36 Mton**

**Consumer products**

- Toilet tissue: 63%
- Facial/hankies: 16%
- Towels: 17%
- Napkins: 4%

**Branded products**

- Kimberly-Clark
- Georgia Pacific
- SCA

**Private label**

- Carrefour
- Tesco
- Aldi
- Lidl

**Away from Home**

- Toilet tissue: 38%
- Towels: 38%
- Napkins: 15%
- Facial/hankies: 3%
- Other: 5%

**AFH**

- Restaurants
- Hotels
- Public
- Business
Drivers for tissue growth

- Expected future economic growth
  - Global GDP growth approx. 3%

- Population growth and other demographic changes
  - Global growth 1%
  - Urbanization

- Product penetration levels
  - Distribution and sales channels
  - Towel is growing
  - New products

- Developments in tissue quality and product specifications
  - Higher quality when basic needs are met
  - Step change at consumption 10 kg/person/year

- Substitution effects and AFH dispenser developments
  - Hot air dryers
  - Textile
How tissue is made

99.8% water

1.5 sec
120 km/h

Advantage DCT 200 – width 5.6 meter

95% dryness

2 m rolls/day

65,000 tons/year

3 m people/year

0.5 l water

0.15 kWh electricity

0.1 kg steam

0.15 kWh gas
One tissue machine for every need

**Advantage™ DCT® technology**
High quality tissue with high efficiency and reliability

**Advantage™ NTT ® technology**
Premium quality textured tissue with high bulk and softness

**Advantage™ Thru-Air ® technology**
Superior quality structured tissue with excellent absorbency and softness
Consumer trends and needs

**Consumer trends**

**Products**
- Bath, facial, towel
  - mainly brands

**Quality**
- TAD 30%, quality focused private label
- high quality, TAD & Hybrid technologies

**Trends**
- Economic growth, private labels are challenging brands

**Impact**
- Economic growth, private labels are challenging brands

**Consumer trends**

**Products**
- Bath, facial, towel
  - mainly brands

**Quality**
- high quality facial

**Trends**
- high quality MENA

**Impact**
- low purchasing power, low cost products, tourists trendsetters

**Consumer trends**

**Products**
- Bath, facial, towel
  - brands & private label

**Quality**
- multi-ply, softness, mixed conventional/premium

**Trends**
- growth of towel & bath
  - Hybrid technology growth

**Impact**
- raising quality demands, environmental concerns

**Consumer trends**

**Products**
- Bath, facial
  - mainly brands

**Quality**
- standard, hard rolls

**Trends**
- higher quality, towel

**Impact**
- urbanization, improved living standards

**Consumer trends**

**Products**
- Bath, towel
  - brands & private label

**Quality**
- from 1 ply to 2 ply

**Trends**
- Towards higher quality
  - high growth, mixed conventional/premium

**Impact**
- raising quality demands, environmental concerns
Producers’ trends and needs

**Trends**
- Major brands challenged by new players aiming for high quality products
- North and East Africa export to central Africa
- Low consolidation
- Preparing for higher quality products

**Impact**
- Few investments by “old” companies
- Low energy cost
- High technology in mills
- Challenging distribution, local production, recycled furnish
- Overcapacity, increasing export, energy concern, strong cost pressure
- High energy cost, strong supermarket purchasing power
- Local production, Distribution is a concern, competition from Chinese export
- Few investments by “old” companies
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“Amazon Linking with US Tissue Paper Suppliers to Speed Supply Chain”
Hundreds of brands and pack sizes
## Major global tissue producers 2016

<table>
<thead>
<tr>
<th>Pos</th>
<th>Major tissue producer</th>
<th>Eff. Capacity (Kton/a)</th>
<th>% of Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SCA</td>
<td>4582</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Kimberly-Clark</td>
<td>3751</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>APP</td>
<td>2818</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Georgia-Pacific</td>
<td>2585</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Procter &amp; Gamble</td>
<td>1355</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Sofidel</td>
<td>1058</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Hengan</td>
<td>1038</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>CMPC Tissue</td>
<td>844</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>WEPA</td>
<td>724</td>
<td>2</td>
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<tr>
<td>10</td>
<td>Kruger Tissue</td>
<td>657</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Cascades</td>
<td>647</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Metsä Tissue</td>
<td>641</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>ICT</td>
<td>527</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>C&amp;S Paper Group</td>
<td>466</td>
<td>1</td>
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<tr>
<td>15</td>
<td>Clearwater Paper</td>
<td>395</td>
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<td>16</td>
<td>Daio Paper</td>
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<td>Corelex</td>
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<tr>
<td>18</td>
<td>Hayat Kimya Group</td>
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</tr>
<tr>
<td>19</td>
<td>YFY</td>
<td>342</td>
<td>1</td>
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<tr>
<td>20</td>
<td>First Quality Tissue</td>
<td>327</td>
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</tr>
<tr>
<td></td>
<td>Others</td>
<td>20546</td>
<td>46</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>44300</strong></td>
<td></td>
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</tbody>
</table>

## Global tissue consumption 2016

- **Tissue consumption**: 36 MT/a
- **Installed capacity**: 44.3 MT
- **Tissue Machines**: >3,400
  - of which ~1,700 in China
- **Typical capacity**: 15,000 - 60,000 T/a
- **Largest capacity**: 100,000 T/a
Tissue Technology Center

Investor site visit to Karlstad

*November 28, 2017*

Karl-Johan Tolfsson
Manager, Tissue Technology Center
Leading technologies with high flexibility
developed by customer demand

Advantage NTT technology
• Plain and textured tissue production
• Premium Quality
• Low energy and fiber consumption
• High capacity

Advantage ViscoNip press
• Linear load flexibility
• Significantly reduced energy consumption
• Improved product quality – bulk and softness
• Improved runnability

Advantage ReTurne – energy recovery
• Recover > 50% of headbox jet power
• Return it as electricity to the tissue process
• Significant cost savings

Industrial Internet Services
• Remote Services
  • Monitor, control and maintain high efficiency
• Simulator training
  • Increase and maintain high operator competence
Reaching energy targets

Total Specific Energy Consumption

\( \text{kWh/ton} \)

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<tbody>
<tr>
<td>Average</td>
<td>3330 kWh/ton</td>
<td>3105</td>
<td>2850</td>
<td>2310</td>
<td>2150</td>
</tr>
<tr>
<td>five mills</td>
<td></td>
<td></td>
<td>Best practice</td>
<td></td>
<td></td>
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<tr>
<td>late 90ths</td>
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<td>2006</td>
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<td>State of the</td>
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<td>Delivered by</td>
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<td>Valmet BAT</td>
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<td>2000</td>
<td></td>
<td></td>
<td>2010</td>
<td></td>
<td></td>
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<tr>
<td>Best practice</td>
<td></td>
<td></td>
<td>Valmet BAT</td>
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<td>2006</td>
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<td>Delivered by</td>
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<td>Valmet BAT</td>
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<td>Valmet BAT</td>
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<td>2010</td>
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<td>2010</td>
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<td>Valmet BAT</td>
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<td>Valmet BAT</td>
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<td>Valmet BAT</td>
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</tbody>
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November 28, 2017
© Valmet
Pilot machine / mill
External customers

1/3

Internal trials

2/3
Industrial Internet – Dialogue with data

Investor site visit to Karlstad

November 28, 2017

Kent Nika, Sales Manager
Content

1. Industrial Internet – definition
2. Dialogue with data – how to use all data?
3. Case studies
4. Summary
The concept of Industrial Internet

- By industrial internet we mean the integration of physical machinery with networked sensors and software.
- This enables gathering and analyzing data from machines and processes, and utilizing it to adjust operations and plan predictive maintenance to positively affect the value chain.

The topic has many names:
- Industrial Internet
- Internet of Things
- Industry 4.0
- Internet of Services
- Big Data
Today, customers are extensively utilizing our Industrial Internet capabilities.

- **800** Valmet-supplied lines with Valmet DCS
- **420 81,000** 420 Condition Monitoring (CM) references with over 81,000 I/O tags
- **350** Advanced process control installations
- **540** Online connections with customers
- **90** Performance agreements with remote connections
- **Ongoing** Co-creation of advanced analytics with customers
Valmet Industrial Internet

Building blocks

- Ecosystem
- Applications and services
- Automation and IT platform
- Process technology

Offering

- Reliability services
  - Component reliability monitoring and diagnostics
  - Sub-process reliability improvement
  - Mill and plant reliability optimization

- Performance services
  - Process performance optimization
  - Mill and plant performance optimization
  - Fleet performance optimization

- Valmet Performance Center
  - On-demand expert support
  - Remote monitoring and optimization
  - Data discovery and analysis
Valmet Performance Centers
Your channel to all our data-driven reliability and performance services
Dialogue with Data

Data Analysis

Interpret results

Criteria

Applied knowledge

Recommendations

Analysis

System

Experts
Case 1
Performance services
Performance services - The process

- Continuous data collection and processing
- Data transfer to Valmet expert
- Review, action plan and actions on site
- Analyses and reporting
- Report delivery to Customer
Root cause analysis

Conclusion:
- Transmitter malfunction

Recommendation to customer:
- Replace transmitter

Saving at mill:
- 500 kg/hr
- 9 EUR/hr
- 75,000 EUR/year

- System analysis: deviation in the steam pressure value of a machine, system unable to correct
- Valmet engineers analyze and give recommendations to manually check the transmitter at the machine.
- Mill operators check and notice that the transmitter is broken.
- Transmitter is changed. Steam flow decreases to normal flow again.
Case 2
Troubleshooting with remote support
Tissue mill in South America
A real case example of troubleshooting with remote support

- Tissue mill in South America with shoe press technology
- Target: to change linear load profile on the shoe press
- Experienced problem: changing profile does not give the expected response

Comparison traditional problem solving vs. remote support
# Traditional vs Remote support

## Traditional analysis

### Analysis and conclusions
- Leakage in hydraulic cylinders assumed, largely based on earlier experiences
- Decision to replace cylinders with advisory services

### Actions and results
- Order new cylinders: 10,000 EUR
- Order external resources on site OEM: 10,000 EUR
- Unplanned shutdown: 24 hours
- Lost production: 150 tons

## Analysis using data

### Analysis and conclusions
- Analyze data from hydraulic system – 2 hours
- Conclusion: Incorrect valve mounted in the press. Change valve

### Actions and results
- New Valve: 15 EUR
- Order external resources on site OEM: 0 EUR
- Unplanned shutdown: 10 minutes
- Lost production: 1 ton

### Savings:
- Equipment: 10,000 EUR
- Services: 10,000 EUR
- Downtime: 23 hours 50 minutes
- Production: 149 tons of tissue
Dialogue with Data

- Data
- Analysis
- Interpret results
- Criteria
- Applied knowledge
- Recommendations
- Experts
- System Analysis
Summary
- Industrial Internet is proven and used in many Valmet deliveries
- Tools with models are available for Valmet tissue mills
- Dialogue with data works with reliable and safe connections
- Potential is very high in terms of performance, savings and quality

The question is not how much data we can collect.

The question is how to utilize the data!
It should be noted that certain statements herein which are not historical facts, including, without limitation, those regarding expectations for general economic development and the market situation, expectations for growth, profitability and investment willingness, expectations for company development, growth and profitability and the realization of synergy benefits and cost savings, and statements preceded by “anticipates”, “believes”, ”estimates”, “expects”, ”foresees” or similar expressions, are forward-looking statements. Since these statements are based on current decisions and plans, estimates and projections, they involve risks and uncertainties which may cause the actual results to materially differ from the results currently expressed. Such factors include, but are not limited to:

1) general economic conditions, including fluctuations in exchange rates and interest levels which influence the operating environment and profitability of customers of the company or economic growth in the company's principal geographic markets.

2) industry conditions, intensity of competition situation, especially potential introduction of significant technological solutions developed by competitors, financial condition of the customers and the competitors of the company,

3) the company’s own operating factors, such as the success of production, product development and project management and the efficiencies therein including continuous development and improvement

4) the success of pending and future acquisitions and restructuring.