Latest Developments in Fiberline Technology

AFCP
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Agenda

- Valmet in South America and Capabilities
- Valmet’s Services Business Line
- Capital Projects – Turn key Installations
- Valmet Technology
- Rebuilds and Improvements
- Success cases of rebuilds
Valmet in South America
Valmet in South America

Local Operations

- Supports the South American pulp, paper and energy industry
- Approximately 460 employees
- Production plants, sales and service offices in five locations
- In 2013, South America was Valmet's second biggest area in terms of orders received and net sales.
Valmet in Brazil
Araucária workshop: Manufacturing and repairs

- Chipper Disc
- Liquor Filter
- High Pressure feeder
- Press Rolls
- Smelt spouts
- Boiler parts
Services Business Line Overview
Empowered to serve the pulp, paper, and energy industries

Full offering: Mill and plant improvements, roll and workshop services, spare parts, consumables, fabrics, and lifecycle services

Stable and growing: Business line sales growth 2010-2013: 5.4% p.a.

Market Position #1-2
3,800 pulp and paper mills worldwide, of which over 50% purchase services from Valmet
400 customers outside the paper industry

Net sales 2013: EUR 1.03 bn
Net sales of Group total: 39%

Employees 5,295
Employees of Group total: 46%
Global Service Network
Close to you – over 70 service centers* in 20 countries
Valmet offers a full range of services regardless of the original supplier of the equipment.

As a result of acquisitions and mergers, Valmet has a wide technology base to provide and develop OEM services further.
Services for Pulp, Paper and Energy
Based on process and technology know-how

- Long-term solutions
  - Consumables contracts
  - Service contracts
  - Maintenance outsourcing

- Improvement projects
  - Production development
  - Maintenance development
  - Upgrades

- Maintenance services
  - OEM spare parts
  - On-site and workshop services
  - Shutdown services
  - Roll maintenance

- Production services
  - Production support services
  - Paper machine clothing, filter fabrics
  - Roll covers
  - Process parts

Reliability, cost-efficiency, capacity, quality
Energy efficiency, water and material efficiency, emissions management, safety and usability

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Capital Projects
Turn key Installations
Full scope offering for the pulp and paper industry

1. Wood Handling
2. Heat and Power Production
3. Chemical Pulping
4. Chemical Recovery
5. Pulp Drying
6. Recycled Fiber
7. Mechanical Fiber
8. Stock Preparation
10. Tissue Making

Services
- Mill and plant improvements
- Spare and wear parts
- Paper machine clothing and filter fabrics
- Roll services
- Services for evaporation plants, power and recovery boilers
- Services for environmental equipment
Thousands of technology projects for our customers

**Pulp**
- 200 wood handling systems
- 470 cooking systems
- 300 complete fiber lines
- 400 evaporation systems
- 350 recovery islands

**Paper**
- 900 paper machines
- 700 board machines
- 200 tissue machines
- 200 mechanical pulping lines

**Energy**
- 270 fluidized bed boilers
- 120 BioGrate boilers
- 400 environmental protection systems

**Biotechnologies**
- Gasification
- Pyrolysis
- LignoBoost
- Prehydrolysis of biomass
One of the world's largest pulp mills supplied by Valmet successfully started up in Brazil

- Suzano Papel e Celulose is one of the largest vertically integrated producers of pulp and paper in Latin America.

- The new pulp mill has the capacity to produce 1.5 million tons of bleached eucalyptus market pulp per year.

- The mill is the first complete pulp mill supplied by Valmet to South America.
Technology
Wood Handling
Wood handling

Wood handling solutions

Storing
Conveying
Chip handling
Bark handling
Automation and special measurements
Fuel storing
Cleaning
Debarking
Log receiving
Chip receiving
Chipping
Wood handling solutions

Valmet
Valmet wood handling technology

Disc chippers

- **Camura GS chipper**
  - Up to 3900 mm chipper disc
  - Up to 7.20 m with gravity feed (Klabin)
  - QuickLock (Klabin, Fibria Três Lagoas, Veracel, Celbi)

- Carthage chipper

- 130”, 138”, common for tree length plants, horizontal feed
Wood saver

- Bark and other material from debarking process
- Bark to power plant
- Recovered wood to process
- Stones and other heavy debris
Valmet wood handling technology

Gentle Store
Valmet wood handling technology

Gentle Store – development and capacities

Eucatex-Salto
22,000m³

Klabin/Kerinci
43,000m³

Veracel 85,000m³

Rizhao 5x190,000m³
Valmet wood handling technology

Gentle Store – development and capacities

2013: Oji Nantong  3 x 250,000 m³

2013: Suzano Maranhão  145,000 m³

Valmet wood handling technology
Cooking and Fiberline
Compact Cooking™

Cooking focus on:

• End product
• Cost reduction (investment and operational costs)
Compact Cooking G2

Typical G2 Installation

MP steam

DNCG

To evaporation

White liquor

Wash liquor

Pulp

Valmet
Compact Cooking™ G2

- Few equipment / rotating machines;
- Only one pressure vessel;
- Compact Feed™ G2 allows longer High Pressure Feeder lifetime;
- System is low sand sensitive, since the machines in contact with chips work at low speed;
IMPBIN™ – Not only a Impregnation vessel

Chip buffer & steaming + Flashing + Impregnation = Chip buffer & steaming

Impregnation
Why is long time impregnation at low temperatures important

To reach:
• High yield
• Enables cooking to high kappa
• Low reject rate
• Less sensitive for uneven chip quality
• Enables large range of wood species mixtures
• Lower energy consumption (lower H factor)
• Uniform pulp quality
• Good bleachability
TwinRoll™ system

Low inlet pressure demand

- No scraper at top of the tower
- No mobile crane needed for maintenance
- Lower installed power
- Easier operation
- Internal buffer inside the tower

✓ Saving of Energy
✓ Decrease Opex
TwinRoll™ development

CONTINUOUS IMPROVEMENTS

G1
1954
MPC/VPC

1978
FPB/DPA

1993
DPB

2000
TRPA
TRPB
TRPW

2009
TRPE

G5
G4
G3
G2
G1
TwinRoll™ Evolution

Main features

- 30% Higher capacity*
- Optimized operation
- Tower feed consistency
- Minimized operational and maintenance cost

*/Compared to G4
Pulp Drying
Dryer
Pulp Drying

- Record capacity of 5395 ADt/day
- Record of 2.847 ADt/day in a single machine (13% above guaranteed capacity)
- Running very stable with high capacity and low consumption parameters
  - < 820 kg of steam/ADt
  - < 100 kW/ADt
Key benefits for Valmet Robobaling technology

Robust and proven technology
Valmet has delivered bale finishing lines for over 50 years, with proven and robust technology.

High capacity and availability
Units in the Robobaling product series deliver high capacity, up to 300 bales/h.

Short time for installation and start-up
The baling line is built as independent units with all functions included. Machines and control systems go through a comprehensive testing program before delivery, which secures short time for installation- and start-up.
Recovery Boilers
Recovery Boiler Capacity Evolution

<table>
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<tr>
<th>Date</th>
<th>Capacity</th>
<th>Surface</th>
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<tbody>
<tr>
<td>2004</td>
<td>5500 tds/d</td>
<td>268 m²</td>
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<tr>
<td>2010</td>
<td>7000 tds/d</td>
<td>293 m²</td>
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<tr>
<td>2013</td>
<td>7000 tds/d</td>
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<tr>
<td>201?</td>
<td>&gt;8000 tds/d</td>
<td>4?? m²</td>
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"Magnum" Size RB
Fuels of recovery boilers in "early times"

[Diagram showing a recovery boiler with labeled fuels: Black liquor and Oil]
Today’s Recovery Boiler is a Multi-fuel boiler

- Black liquor
- Oil
- Natural gas
- CNCG
- DNCG
- Vents (dissolving and mixing tank)
- Biosludge
- Soap
- Turpentine
- Methanol
High power features in Recovery Boilers

- **High Steam Parameters**
- **High Dry Solids Firing**
- **High Combustion Air Temperature**
- **Heat Recovery After Precipitator**
- **Optimized Feedwater Temperature**
- **Low Pressure Sootblowing or Steam from Turbine Extraction**
Two stage AshLeach – Duo without acid

Bleed

Ash

Water

Recycled ash
Why ash leaching?

• Control of chlorine and potassium levels in the pulp mill chemical cycle
• Less corrosion and plugging
• Longer runs between water washes
• Savings in make-up chemicals
• Environmental concerns
Rebuilds and Improvements
Mill and Plant Improvements
Optimized production line performance throughout its life cycle

- Process improvement services
- Production support services and process development cooperation
- Maintenance services
- Maintenance outsourcing
- Relocation services for equipment and production lines
- Shutdown services

Facts
- 5000 on-site projects annually
- 40 on-site service agreements
- Maintenance outsourcing agreements for 11 production lines

Results
- More uptime
- Lower operating costs
- Energy savings
- Improved paper quality
- Improved efficiency through well-organized maintenance
Success Cases of Rebuilds
The agreement includes:

- Recruitment of all maintenance personnel prior to start-up
- Establishment of Total Productive Maintenance (TPM) and condition-based maintenance procedures
- Full responsibility for mill maintenance operations for all production facilities
- Focus on improving reliability and maximizing availability
- Several additional long-term service agreements covering e.g. roll service and paper machine clothing
Digester Rebuild

The project includes:

- Energy optimization pack with new heat exchangers
- New Radial Wash Duo system
- Digester screen area increase

Project Target:

- Reduce steam consumption (~30%)
- Reduce COD
- Reduce ClO2 consumption
Boiler Rebuild

**The project includes:**
- Conversion to Single-Drum
- Partial superheater replacement
- Flue gas air heater replacement

**Project Target:**
- Reduce maintenance costs
- Reduce operational risks
- Reduce shutdown time for drum replacement