Integrating Forest / Wood / Products / Customers

Fiction or Reality?

(or, how much this issue depends just on us?)

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The real truth is that

"Pulp and paper mills do not run as Swiss watches, neither the wood is responsible for all problems in the pulp and paper production"

Value Chain...
or
Chain of Complains and Justifications...

Networking: Thinking globally and acting locally

Today:

$\Rightarrow$ **paper machines are faster, cleaner, bigger and very sensitive to changes**

$\Rightarrow$ **paper quality especifications are a lot more stringent**

<u>Today</u>:

⇒ **mill managers are squeezed to control costs, operational efficiencies, quality, environmental issues, performances and results**

⇒ **customers are more demanding and volatile**

⇒ **competition is huge and global**

Wood cost is requested to be minimum

Forest always deserves second class investments from top management

Facts and Realities

About 5 % of our trees grow to have wood and fibers discarded as garbage, pollution or residues

- 2% minimum stay in the forests

- 1 - 2% are discarded in the chip preparation (at least they may be used as biomass fuel)

- 1% are cooking rejects that are demanded to be recoooked, using digester capacity and reducing production

- In general up to 1% fibers are lost both in pulp and paper mills

Facts and Realities

The most frightening: PAPER BROKE

About 8 to 20 % of our paper come back again to the pulpers to be reprocessed, reducing machine capacity, paper production and machine productivity and raising costs (fixed and variable)

Energy:

Where to get biomass?

At forests and mills – but with sustainability
- Branches
- Decayed wood
- Small diameter logs
- Wood residues
- Bark
- Chip residues

Thirteen Rules to Wood & Fiber Management

Rule # 1: <u>Manage the wood supply chain from forest to users</u>

"from trees to pulpmakers, papermakers and paper end-users"

Rule # 2: <u>Manage to guarantee the supply of wood to mills</u>

" to keep production running..."

Rule # 3: <u>Manage the quantity of wood to feed the digesters</u>

" to be sure to be adding the required and stable weight of wood to the digesters"

Rule # 4: Manage the representativeness on sampling wood

"the challenge is not to make wrong decisions by poor sampling"

Rule # 4:   Manage the representativeness on sampling wood

Null hypothesis

Ho

Clone 1 = Clone 2

Rule # 4: <u>Manage the representativeness on sampling wood</u>

<u>Type I error</u>

The null hypothesis is rejected when it shoud not be.

This means that we unbderstand that clone 1 is different from clone 2 when it is not.

We accept that a clone is better when in reality it is not.

<u>Risky.</u>

<u>We need to increase sample size</u>

Rule # 4: Manage the representativeness on sampling wood

Type II error

We accept the null hypothesis when it should be rejected.
A better clone is discarded when it should be accepted.

In general due to insufficient sampling or high level of significance

Rule # 5: Management of variability

"the challenge is to tame variability to guarantee even production"

Rule # 5: <u>Management of variability</u>

- **good sampling and efficient laboratory control**

- **efficient control in the forest thanks to a good information system**

- **wood mix (from forest to chip yard, each mill has the own design)**
- **fiber blends at paper mills**

Rule # 5: Management of variability

- **two chipping lines to chip different wood qualities**

  - **two or more chip piles to allow efficient blends**

- **top management decison: blend or have different products (differentiation)**

Rule # 5: Management of variability

Wood quality:

- Species / age
- Moisture
- Wood density
- Bark content
- Extractive content
- Lignin content and S/G ratio
- Hemicellulose content
- Non process elements

Rule # 5:   Management of variability

Wood quality:

- Wood health and decay
- Pests and diseases
- Burnt wood
- Knots
- Reaction wood.
- Extractives – gum pockets, kino, etc.

Rule # 5: Management of variability

Wood quality:

Remember that:

"to engineer trees without lignin is like to develop cattle with no bones"

Rule # 5:   Management of variability

Another quality parameter on wood:

- **Certified wood – blends to be controlled**

Rule # 5:   Management of variability

Fiber quality

- Fiber population
- Coarseness
- Fine content
- Vessel elements
- Water Retention Value

Rule # 5:   Management of variability

Fiber quality

- **Fiber wall fraction**
- **Fibril angle**
- **Zero Span and fiber strength**
- **Fiber deformations**

Rule # 5:   Management of variability

Pulp quality

- **Viscosity**
- **Extractives & Pitch**
- **Hemicelluloses**
- **Fiber charge**
- **Non process elements**

Rule # 5: Management of variability

Pulp quality

- Refining
- Energy demands
- Fiber bonding
- Strength properties
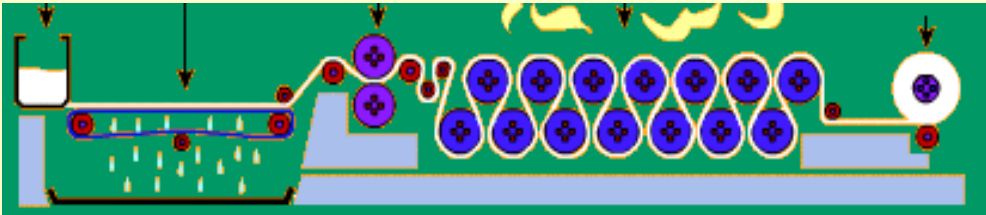- Swelling
- WRV

Rule # 6:   <u>Manage the chip preparation</u>

- **Bark content**

- **Chip dimensions**

- **Fines and overs**

- **Moisture**

- **Density**

- **Wood health**

- **Contaminants**

Rule # 7: Manage the pulp production

- Cooking
- Yield
- Rejects
- Bleachability
- Chemical consumption's
- Drying / Hysteresis
- Dry solids in black liquor

Rule # 8: <u>Manage the papermaking process</u>

- Refining
- Drainage
- Retention
- Chemicals
- Pressing
- Sizing
- Drying – steam needs
- Coating

Rule # 9: __Manage to minimize process residues__

- **Controls**
- **Measurements**
- **Monitoring**
- **Economic value**
- **Correction measures**

Rule # 10: **Manage process changes**

- **Planning**
- **Follow up**
- **Speed of changes**
- **Vital indicators**
- **Restrictions and constraints**

Rule # 11: <u>Manage the differentiation and oddities</u>

<u>Classify the wood supply according to the type of paper:</u>

- Tissue
- Printing
- Packaging
- Cartonboard
- Decor
- Photo
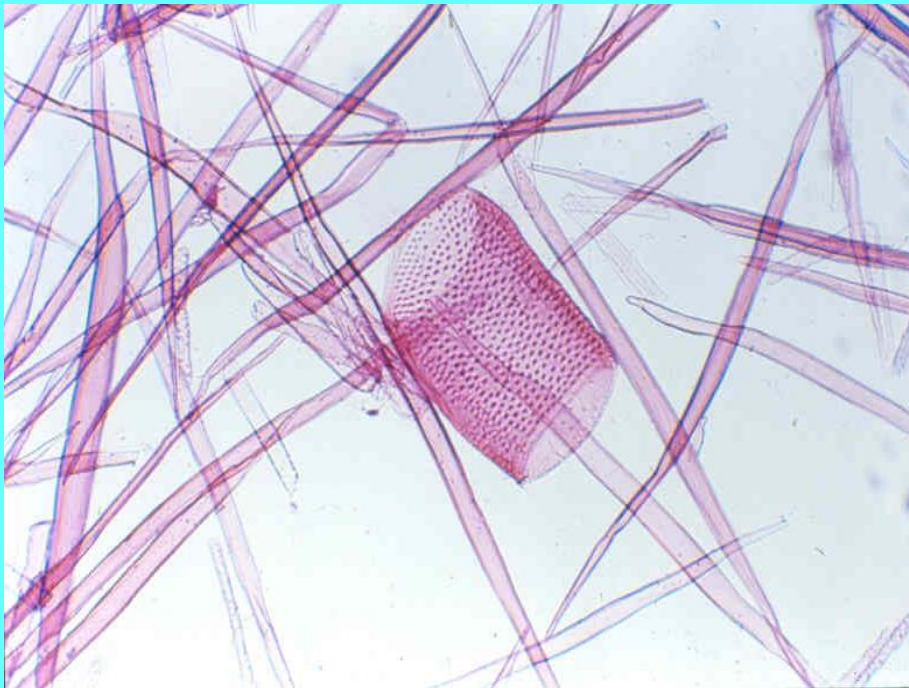
Rule # 11: **Manage the differentiation and oddities**

What to use as indicators?

- Fiber population
- Fiber wall thickness
- Wood density
- Hemicellulose
- Coarseness
- Fines
- WRV

Rule # 11: **Manage the differentiation and oddities**

What to use as indicators?

- **Porositty**
  - **Bulk**
- **Softness**
- **Strength**
- **Absorption**
  - **Opacity**
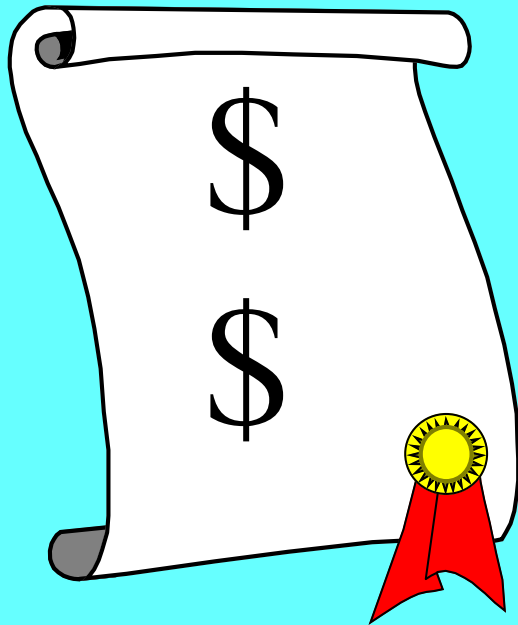
Rule # 11: <u>Manage the differentiation and oddities</u>

"**This management is very much affected by bottlenecks.**

Tecnology and good will are required"

Rule # 12: <u>Manage the economic value</u>

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"We need to value in terms of economics all the changes we want to make in the process.

How much we are able to gain or to lose, and where?"

Rule # 13: <u>Manage the human resources, mainly vanities</u>

"It depends on you all"

Everything is possible: