POWER QUALITY IMPACT ON PRODUCTION

2016-06-14 | Bengt-Arne Walldén
PULP AND PAPER INDUSTRY

- 45 mills in Sweden
- Consuming about 18 Twh
- Self-sufficiency level various between the mills from 0 to 100 %
- A branch with a very exciting future
  - Intelligent paper
  - New areas
PULP AND PAPER INDUSTRY

- Can be divided in 3 areas:
  - Pulp production
  - Newsprint and magazine paper
  - Board and packaging paper
PULP AND PAPER IS A PROCESS INDUSTRY

- Running 24/7

- Through continuous optimization and production increases, equipment's are heavy loaded

- Start up time for a mill is 1-3 days

- If a critical section/equipment in the production line stops, the total downtime will be at least start up time
ELECTRICITY QUALITY PARAMETERS

- Interruptions
- Harmonic distortion
- Flicker
- Voltage variations
- Voltage transients
- Electric and magnetic fields
- Nonlinear loads
- Frequency variations
- Voltage dips
SENsitIVITY FOR disTURBANCE FROM POWER NETWORK

- Voltage dips is the parameter that gives us high costs
- Is there any technical possible solutions to get rid of the problems?
  - Yes, both inside and outside the mills
- Is it cost efficient to get rid of the disturbances?
  - Yes, but the investments have to be done in the right places
WHERE IS THE PROBLEM IN THE MILL?

- **Control/computer-systems**
  - Solved by UPS systems

- **Frequence converters**
  - Settings for undervoltage protection.
  - Ageing electrolyte capacitors in DC-link
Our mills can operate down to 65% of nominal voltage without any problem.

150 ms is the time that our process can run at 65% of nominal voltage.

This gives an immunity curve:
- All dips down to 65% in less than 150 ms can be handled by the mill, which in practice is the main part of all dips.
ECONOMICAL RESULTS

➢ To be able to follow the immunity curve, a maintenance program has to be set up:

➢ UPS-system for all critical control/computer systems
➢ Program for changing all electrolyte capacitors in frequency converters, according to life cycle dimensioning from manufacture (Normal lifetime 100,000 hours)
➢ After each disturbance, follow up and see what happened
EVOX RIFA

ESR

PEH200

PEH169

2xESR

Tid

7,5 år

10 år
ECONOMICAL RESULTS

- Experiences in pulp and paper industry shows that these two actions has decreased production losses according to voltage dips with 75 %

- Depending on type of mill, and where it is located, the amount of saving various from 0.1 up to 2.5 MEURO per year
ECONOMICAL CONSEQUENCES

- Production losses:
  - About 30 MEURO a year for Swedish Pulp and Paper industry
  - Indirect cost by broken equipment and bad good will and similar are not included

- Before action where taken 2005-2010, production losses about 50 MEURO
COSTS AND PAY-OFF FOR INVESTMENTS AT END-CUSTOMER
EXAMPLE FROM TWO MILLS

<table>
<thead>
<tr>
<th>Time</th>
<th>Investments: 2,5 MEURO</th>
<th>Pay back: 0,2 MEURO/year</th>
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<table>
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<tr>
<th>Time</th>
<th>Investments: 0,7 MEURO</th>
<th>Pay back: 2,5 MEURO/year</th>
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<table>
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<tr>
<th>Voltage</th>
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<tbody>
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<tr>
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<tr>
<td>50</td>
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<tr>
<td>25</td>
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Time
RESEARCH ON A SUBTRANSMISSION NETWORK

- A region with combination of heavy and light industry was chosen for a complete study

- Involved in the study were Fortum, (network operator), STRI AB and a number of pulp and paper industries

- Link to report
SUMMARY

- A responsibility sharing curve is needed
- EI:s Författningssamling EIFS 2011:2 gives the possibility for this
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