CitecCTO - Crude Tall Oil
Why CitecCTO plants?

- Robust and reliable batch process for highest yield on market
- Main equipment and layout optimized for high availability and performance
- Proven technology with satisfied customers
- Continuous development
- Short payback with highest yield
Robust and reliable batch process for highest yield on market

- Batch process: ~7-9 h (filling-reaction-settling-emptying-cleaning)
- Reactor heated with steam, reactor temperature 90...98 °C
- Tall oil yield > 95 %
- High acid number
- Short automatic cleaning sequence at end of each batch
- Fully automatic process started by operator
- High quality with low variation
Main equipment and layout optimized for high availability and performance

- Reactor
- Acid water tank
- Tall oil tank (optional)
- Scrubber (optional)
  - White liquor cooler
- Dryer
  - Condenser+vacuum pump
- Pumps
  - Soap
  - Acid
  - Tall oil
  - Acid water
Main equipment and layout optimized for high availability and performance

- Layout adjustable and designed according to available space
References

Proven technology with satisfied customers

Billerud Korsnäs Frövi Bruk

Location: Sweden
Capacity: 2.5 t/h
Year: 2008
Citec scope: Complete delivery of tall oil production plant

Södra Cell Tofte

Location: Norway
Capacity: 2.5...3 t/h
Year: 2013
Citec scope: Complete delivery of tall oil production plant
Continuous development

- **Reactor design**
  - CFD simulation

- **Process optimization**
  - Less automation and I/O’s
  - Reduced service
  - Simple and reliable operation

- **Pilot scale testing**
  - Consider soap variations for high quality tall oil and high yield
  - Cooperation with Åbo Akademi University
Tall oil quality

- **Temperature**
  - Good temperature control ensures high acid number
  - Reaction time decreases with higher temperature

- **Sulfuric acid**
  - Optimized sulfuric acid content increases the yield and assures high acid number

- **Time**
  - Batch settling time ensures full separation of any soap at any quality and yield
  - Batch process is not depending on the content of tall oil in wood
Saving potential

Short payback with highest yield

**Calculation example**

- Average crude tall oil production capacity 5 t/h (per reactor)
- Tall oil yield increased by 7%
- Annual crude tall oil increase (assuming about 8000 h/a):
  - \( 5 \text{ t/h} \times 0.07 \times 8000 \text{ h/a} = 2800 \text{ t/a} \)
- Crude tall oil price estimated to 310 €/ton
- Annual additional sales:
  - \( 2800 \text{ t/a} \times 310 \text{ €/t} = 868000 \text{ €/a} \)
- In addition lower maintenance costs and lower energy consumption with the batch process

**Process** | **Average production loss**
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Centrifugal | 15%
HDS | 27%
Batch | 11%

**Case example:**

- Scandinavian pulp mill with HDS-reactor, capacity 4-5 t/h
- Actual tall oil yield 88,7%
- With our batch process >95 % reached

*Source: Optimerad Talloljeproduktion I*
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