The Talloil Industry: 100 years of Innovation
Michel Baumassay, Forchem Oy
The Rosin industry: 100 years of Evolution

• The earliest production of rosin was gum rosin obtained by tree tapping.

• Late 19th century: Discovery that black liquors contain fatty acid and rosin acid soaps.

• 1899: Production of Crude Talloil starts in Sweden.

• Early 20th century: Development of wood rosin in USA.

• 1913: First CTO distillation plant in Finland.

• Continuous growth of the Talloil industry and Talloil rosin production, while wood rosin has almost disappeared, and production of gum rosin is stable/declining.
Wood Rosin Extraction, Mid 20th Century
Wood Rosin Production in USA

Production figures in MT
What Has Happened In The USA?

- US Gum rosin production in 1900: 400,000 T... 200,000 T in 1950...none left today

- Wood rosin production started in the early 20th century, to reach 300,000 T in 1950 then declined to 10,000/15,000 T nowadays.

- Talloil distillation started in the 1930’s and Talloil rosin production increased rapidly from 1950s...to reach over 200,000 T at the beginning of the 21st century

- The total rosin production in USA is only half that produced a century ago

- Development of Gum and Talloil rosin in other regions (China, Europe...)

- Global rosin production already 700,000 T in the 1930’s...reaching almost 1 Million T in the 1960’s and 1.2 Million T today.
Tree Tapping, Early 20th Century…
Tree Tapping Early 21st Century
Gum Rosin Production Challenges

- Tree tapping: Still a difficult manual job
- Increasing cost of manpower
  Difficulty to hire workers
- Urban development
- Pine trees replaced by faster growing Eucalyptus
- Natural forest: 1000/1500 trees / worker.
  2 Kg of crude gum / tree
- Planted forest with tree selection: 3000 trees / worker.
  3 Kg of crude gum / tree
- Sustainable planted forests to be developed
First CTO distillation plant in Finland, 1913
Pitch Fuel

Pitch Fuel (Including pitch and Heads) is a relatively low value product and the yield is typically 40%. It is sold into the renewable fuel market and can be swapped for CTO.

Tall Oil Rosin (TOR) yield is appx. 25-35% and main end markets (or upgraded products) are ink resins, tackifiers for adhesives, SBR and paper size. TOR is an alternative to Gum rosin.

CTO from the Pulp Industry. CTO was traditionally burned as an alternative to Heavy Fuel Oil and is now a raw material for biodiesel. Price trend of CTO follows Heavy Fuel Oil.

Maximum CTO feed rate with strong balanced sales of TOFA and TOR.

TOFA & DTO

TOFA and DTO combined yield is around 35-25%. Major end markets are coatings, Lubricants, Soaps and Surfactants.
Wood Pulp and CTO Trends

- The Sulphate Kraft process dominates the global pulp market with appx. 120 Million T. Crude taloil is obtained from softwood Kraft pulp of which there is over 40 Million T. 40-50 Kg CTO / T softwood Kraft pulp.
- Actions to improve CTO recovery
- Demand for softwood kraft pulp is forecast to increase by min 1-2% pa in coming years. Growing end use segments such as packaging board and tissues
- New projects should boost production: 2.5 Billions $ planned investments in Finland and Sweden by 2017.

Global Virgin Wood Pulp Production: 160 Million T
Global CTO Production And Fractionation Forecast (MT)

2013

2018

CTO Trends

Available
Fractionated
Total
TOFA Production Trend

Global TOFA Production Forecast (MT)

2013

2018
TOFA demand / market segment

• TOFA demand expected to grow by 3% pa driven by fuel additives, biodiesel and oilfield chemicals.

• Alkyd resins: Tofa demand growth limited to 1% pa while Paint and Coating demand increasing 4% pa. Risk of substitution towards soybean oil to save costs but TOFA based alkyds offer lower carbon solutions for coatings.

• Oilfields: Growth of 4% pa driven by USA, Asia Pacific and Latin America (In Europe growth limited by bans and regulations due to environmental concerns)

• Fuel additives: Growth of 3% pa driven by reduced sulphur content in fuels in emerging countries (slower growth in Europe and North America as mature markets).

• Biodiesel: Expected growth of almost 10% pa in Europe. CTO, TOFA and Talloil Pitch can be used to produce biodiesel but are expected to play a marginal role in overall biodiesel production. Vegetable oils, cooking oils and animal fats available in larger volume.
2014 Global Tall Oil Rosin (TOR) Production

Forecast Total TOR production: 380,000 T

- USA: 49%
- Finland: 16%
- Sweden: 10%
- Russia: 7%
- China: 2%
- Others: 3%
- Japan: 4%
- Austria: 3%
- Brazil: 3%
Talloil Rosin Production Trend

Global TOR Production Forecast (MT)

2013

2018
2014 Global Rosin Production

Forecast Total Rosin Production: 1,300,000 T

- Gum Rosin: 70%
- Tall Oil Rosin: 29%
- Wood Rosin: 1%
2014 Global Resin Production

Forecast Total Resin Production: 2 400 000 T

- Rosin, 54%
- Hydrocarbon Resins, 43%
- Terpene Resins, 3%
Terpene Resins Production Trend

- Competition with flavour and fragrance industry to source raw material (gum turpentine, CST or citrus limonene).
- 100 000 / 120 000 T Gum turpentine
- 130 000 T Crude Sulphate Turpentine
- CST fractionation more complex (Desulfurization unit needed, Delta 3 carene in some feedstocks....)
- New CST fractionation capacities being added in coming years
- Development of polyterpene resins limited to high performance applications (tires, adhesives...)
Hydrocarbon Resins Production Trend

- Volume of feedstock still declining in USA and Europe with crackers changing from Naptha to Gas
- Asia main producing region with 45% (USA:30%, Europe:25%)
- Hydrocarbon resin global production flat around 1 Million T or slightly growing by max 1% (C5 Aliphatic resins -1/0%, C9 Aromatic resins -2/-1%, Hydrogenated Waterwhite resins +3/5%)
- Supply and demand in balance due to lower economic conditions
- New production capacities of Waterwhite resins last year in USA
European Hydrocarbon resins (290K MT) 
Key Segments & Trends

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European Hydrocarbon resins Market Segments
European Gum Rosin + TOR Market (310K MT)

Key Segments & Trends

European Rosin Market Segments

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Global Resin Market trends

- Lower economic conditions in Europe than in North America and emerging countries.

- Global adhesive market growth 3% pa driven by Disposables and PSA. Fast development of Polyolefins/HCR formulations in Packaging HMA requiring less tackifiers. Sustainability and green chemistry promoting the use of natural resins.

- Global ink market growing 2% pa driven by emerging countries but declining in developed economies.

- Global rubber market growing 3 to 4% pa driven by the tire industry (55% of all synthetic rubber demand).

- Paper sizing market declining 1% pa (growing in China). ASA/AKD competing with Rosin market share of which is eroding.
Biodiesel From CTO- The Reality

• CTO can be used to produce Biodiesel but the long term viability is questionable.
• Diverting CTO to Biofuel does not reduce greenhouses gases.
• CTO is a sustainable raw material to produce Pine Chemicals.
• Biodiesel from biomass is more viable.
• Biodiesel from CTO does not comply with the best practice principle of ‘cascading’.
• Talloil Pitch classified as a waste qualifying for multiple counting under RED.
Summary And Prospects

• With a long and proud history, our industry is now uniquely positioned at the forefront of the growing bio-based economy and at the centre of the forest-products value chain.

• CTO, TOFA and Talloil Pitch are expected to play only a marginal role in the overall biodiesel production.

• The business is consistently profitable and looks set to maintain high production rates based on good CTO availability and strong demand for locally produced TOR and TOFA.

• TOR and TOFA are among the most sustainable raw materials and do not conflict with food or indirect land use.
WE HAVE A SOLUTION FOR A GREENER TOMORROW
THANK YOU