**Oxygen Delignification Process Chemistry for Acacia**

**PROJECT BACKGROUND**
- Strength loss on Acacia fiber at oxygen delignification stage is a lot more than others.
- Mill is currently operating the oxygen delignification stage at similar condition between Acacia and MBW.
- Acacia has a significant different in their morphology and chemistry.
- This research is to study the response of Acacia on different oxygen delignification conditions, including reaction time, temperature, soda addition and mechanical pretreatment.

**Current Mill Operating Conditions**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Acacia</th>
<th>MW</th>
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</thead>
<tbody>
<tr>
<td>Soda loss, kg per metric ton</td>
<td>130</td>
<td>150</td>
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<tr>
<td>Temperature, C</td>
<td>87-90</td>
<td>87-90</td>
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<tr>
<td>KOH charge, kg ADT</td>
<td>16.5</td>
<td>16-17</td>
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<tr>
<td>Pre O2</td>
<td>5</td>
<td>10</td>
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<tr>
<td>Reaction time, minutes</td>
<td>120</td>
<td>120</td>
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</tbody>
</table>

**EXPERIMENTAL O-DELIGNIFICATION CONDITIONS**
- The pre O2 Acacia kraft pulp was acquired from April’s pulp mill in Sumatra, Indonesia, and was fully characterized according to its hardwood chemistry and physical properties.
- The response of this pulp to oxygen delignification is under study employing a laboratory Parr reactor under constant oxygen pressure (150 psi) and consistency (12%).
- The reaction parameter under study includes:
  - Reaction time 60, 90 and 120 minutes
  - Reaction temperature 85, 90 and 95 C
  - Soda addition 16, 20 and 23.3 g/kg pulp
  - Quantum pretreatment mixing time 5, 10 and 15 seconds
- The pulp was characterized according to brightness, kappa#, viscosity, HexA, carbohydrate, FQA and physical properties.

**RESULTS**

- **Zero Span Strength Loss across Mill Fiberlines**

**CONCLUSIONS**
- Pulp brightness was obtained relatively better while viscosity could be maintained high and kappa# was low at reaction time 120 minutes.
- The dry and wet z-span tensile strengths were decreasing relatively small at the reaction time 60, 90 and 120 minutes.
- The total charge and DCM extractive were decreasing a lot at the reaction temperature 95 C.
- Pulp viscosity decreased a lot at pretreatment with Quantum mixer while brightness was not gained.

**PROJECT BENEFITS**
- Better understanding on what impacts most on strength loss and fiber chemistry changes during oxygen delignification process.
- Extend practical mill process improvement.

**PROJECT OBJECTIVE**
Determine the fundamental principles contributing to strength loss in kraft Acacia brownstock during oxygen delignification.

**RESEARCH OBJECTIVES**
- Determine fiber chemistry changes during oxygen delignification including cellulose crystallinity, hemicellulose composition, fiber charge and fiber structure.
- Model the physical strength parameters employ principal components analysis and partial least square regression analysis.

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