Introduction

- Chromium in the tanning process
- Why it is important to remove chromium from tannery waste water
- How chromium was recovered using molecularly imprinted polymers
- Potential to reuse recovered chromium
- Economic analysis
- Conclusions
Background Information
Recovering Chromium Using MIPs
MIP Coated Bead
Pilot Trial
Pilot Trial
Pilot Trial

Mass Percent Chrome vs Volume Processed

- Eluent
- Formic Acid
- Treated Tanning Liquor
Plant Design
Plant Design
# Quality of Hides Tanned with Recovered Chromium

<table>
<thead>
<tr>
<th></th>
<th>Acceptable Range</th>
<th>100% Virgin Chrome</th>
<th>80% Virgin Chrome 20% Rec. Chrome</th>
<th>100% Rec. Chrome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual Inspection</strong></td>
<td>NA</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>Acceptable</td>
</tr>
<tr>
<td><strong>Shrinkage Temperature (°C)</strong></td>
<td>≥ 100.00</td>
<td>106.00</td>
<td>105.75</td>
<td>93.50</td>
</tr>
<tr>
<td><strong>Full Thickness Chrome (% as Cr₂O₃)</strong></td>
<td>3.50 – 4.00</td>
<td>3.40</td>
<td>4.35</td>
<td>2.55</td>
</tr>
<tr>
<td><strong>Grease (% w/w)</strong></td>
<td>1.00 - 1.50</td>
<td>Not Tested</td>
<td>1.40</td>
<td>2.60</td>
</tr>
</tbody>
</table>
## Payback Period

<table>
<thead>
<tr>
<th>Chromium Recovery (kg/day)</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>400</th>
<th>500</th>
<th>600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payback with Disposal Cost Savings (years)</td>
<td>21.89</td>
<td>7.61</td>
<td>4.61</td>
<td>3.30</td>
<td>2.57</td>
<td>2.11</td>
</tr>
<tr>
<td>Payback without Disposal Cost Savings (years)</td>
<td>31.58</td>
<td>9.68</td>
<td>5.71</td>
<td>4.05</td>
<td>3.14</td>
<td>2.56</td>
</tr>
</tbody>
</table>
Payback Period
Conclusions and Recommendations

- Chromium can be recovered from tanning liquor using MIPs.
- Hides tanned with 100% recovered chromium were visually indistinguishable from hides tanned with virgin chromium. However analysis revealed shrinkage temperature, chromium content and grease content were below acceptable values.
- Hides tanned with 20% recovered chromium combined with 80% virgin chromium were within acceptable values.
- Application of a chromium recovery plant is not economically viable for small tanneries at the current chromium price. It is viable for medium to large tanneries. As the chromium price increases the chromium recovery plant will become more attractive.
- It would be worthwhile completing additional tanning trials with different ratios of recovered chromium to virgin chromium.
Thank You