Cubicity

Sandvik Rock Processing
Design of a Plant circuit

How do we get a cubical product from a Hydrocone crusher or a Merlin VSI?
Good shape fractions

- Rail-way Ballast 32-56(63) mm from secondary crusher
- Concrete fractions 8-16, 16-32 mm and sand
- Asphalt fractions 4(5)-8, 8-11, 11-16 and 16-22 mm.
- Most critical fraction to get cubical are the 4-8 or 5-8 mm and crushed concrete sand.
Test norms

Test methods for determining cubical shape

- Europe
  - Shape index (SI) where L/T > 3
  - Flakiness Index (FI) W/T where W/T > 0.6
- British Standard BS 812, Flake Index, the slot hole width is 3/5 of the median dimension of the fraction.
- ASTM – Superpave L/T > 5
- Others, Russia, China, India etc
Feed materials

Rule of thumbs

- Higher Impact Work Index (WI) gives in H/C larger CSS
- Materials with coarse crystalline structure usually give better shape than fine crystalline material.
  - Coarse crystalline is for example Granite, Gneiss.
  - Fine crystalline is for example Basalt, Diabase
- Sedimentary rocks can be difficult to shape up due to the laminar structure in the material
  - Laminar structure in for example Slate, Sandstone
- Long feed fractions normally gives better shape
  - Top feed size < 3/4 of intake opening
  - In Merlin VSI 0-fraction increase the cubicity
- Contaminations reduce the possibility of produce good shape
Important guidelines H/C

To get cubical products from the Hydrocone
- The crusher should always be choke fed
- Surge Bin with feeder and the Surge Bin equipped with max/min level indicators (min level indicator interlocked with the feeder).
- Max level indicator in the feed Hopper of the Hydrocone to be interlocked with the feeder.
- Long fraction (4-32 mm) gives high pressure in the crushing chamber and more interparticle crushing
- Max feed size ¾ of intake
- Preferable reduction ratio 3.
- Smaller crushers give better shape in fine fractions
- ASR
Important guidelines VSI

To get cubical products from the Merlin

- The crusher should always be even fed
  - Capacity, watch up for under feeding
  - Particle size distribution, well mixed
- 0 – fraction reduce impact crushing and increase abrasion breakage which increase cubicity
- Max feed size \( \frac{3}{4} \) of intake
- Preferable By-Flow\textsuperscript{TM} process.
- Can be used as fraction(s) upgrader
No cubicity Plant

Production 0 – 16 mm

Why?

Deck 2
Sep 16 mm
Upgraded cubicity Plant

Production 0 – 16 mm

Deck 1
Sep 16 mm

Deck 2
Sep 25 mm

Why?
Cubicity Plant

Production 0 – 16 mm

Why? Alternative?

Deck 1
Sep 16 mm

Deck 2
Sep 4 mm

NF

Quarry Academy 2005
### One example

<table>
<thead>
<tr>
<th>Feed (mm)</th>
<th>4 – 8 mm</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 – 32</td>
<td>15 %</td>
<td>MF, ecc 29 mm ASR</td>
</tr>
<tr>
<td>32 – 63</td>
<td>31 %</td>
<td>MF, ecc 29 mm ASR</td>
</tr>
<tr>
<td>4 – 63</td>
<td>22 %</td>
<td>MF, ecc 29 mm ASR</td>
</tr>
</tbody>
</table>