### Pulley Shaft Calculation - AS1403

**Project**
- AS 1403 Example Calculation

**Designed By**
- P Burrow

**Design Date**
- 27 July 2007

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#### Pulley Shaft Details

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conveyor Number</td>
<td>CV 101</td>
</tr>
<tr>
<td>Pulley Description</td>
<td>As 1403 Example</td>
</tr>
<tr>
<td>Belt Speed</td>
<td>3 m/s</td>
</tr>
<tr>
<td>Pulley Diameter O/Steel</td>
<td>1046 mm</td>
</tr>
<tr>
<td>Pulley Lagging thickness</td>
<td>12 mm</td>
</tr>
<tr>
<td>Pulley Mass</td>
<td>5,286 kg</td>
</tr>
<tr>
<td>Shaft Bearing Centres</td>
<td>2,134 mm</td>
</tr>
<tr>
<td>Locking Element Centres</td>
<td>1,420 mm</td>
</tr>
<tr>
<td>Bearing Housing Type</td>
<td>SSN/SD</td>
</tr>
<tr>
<td>Shaft Material</td>
<td>CS1020</td>
</tr>
<tr>
<td>Shaft UTS</td>
<td>410 MPa</td>
</tr>
<tr>
<td>Shaft Endurance Limit</td>
<td>185 MPa</td>
</tr>
<tr>
<td>Shaft Modulus 'E'</td>
<td>207,000 MPa</td>
</tr>
<tr>
<td>Shaft Size factor, Ks fig.1</td>
<td>1.78</td>
</tr>
<tr>
<td>Corr.factor kstep AS1403 fig.4</td>
<td>1.37</td>
</tr>
</tbody>
</table>

#### Belt and Torque Details

- Belt Speed: 3 m/s
- Torque Reversals: Yes
- Design Factor of Safety: 1.2
- Belt Tension T1 Start: 516.25 kN
- Belt Tension T2 Start: 320.59 kN
- Belt Tension T1 Run: 300 kN
- Belt Tension T2 Run: 200 kN
- Belt Wrap Angle: 180 degrees
- Belt Contact Angle to T1: 0 degrees

#### Belt Tension and Mass

- Tension T1 Start: 516.25 kN
- Tension T2 Start: 320.59 kN
- Tension T1 Run: 300 kN
- Tension T2 Run: 200 kN
- Mass: 5,286 kg

#### Shaft and Bearing Details

- Shaft Material: CS1020
- Shaft UTS: 410 MPa
- Shaft Endurance Limit: 185 MPa
- Shaft Modulus 'E': 207,000 MPa
- Shaft Size factor, Ks fig.1: 1.78
- Corr.factor kstep AS1403 fig.4: 1.37
- Bearing Housing Type: SSN/SD
- Bearing Type: Designated

#### Gearbox and Locking Elements

- Gearbox assembly mass: 12500 kg
- Gearbox Drive: Dual
- Gearbox Thrust Orientation: Leading

#### Half Resultant Load

- Half Resultant Load, run: 250 kN
- Half Resultant Load, start: 418.42 kN

#### Torque and Bending Moment

- Torque on Shaft: 52,339.05 Nm
- Lock. Elem Torque Rating: 153,000 Nm
- Bending Moment at Bearing: 78.86 kNm
- Bending Moment at Shoulder: 128.63 kNm
- Bending Moment at Locking Element: 164.8 kNm

#### Bearing and Clearance

- Bearing Diameter Selected: 280 mm
- Shaft Shoulder Radius R1: 20 mm
- Selected Dia at Locking Element: 300 mm
- Shaft Dia at centre D6: 300 mm
- Shaft Linear Deflection: 0.038 % brg span

#### Angular and Linear Deflection

- Angular Deflection: 0.0008 radians
- Linear Deflection: 0.817 mm

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**Notes:**

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