Welcome to Clevedon
Agenda

09:30  Registration & refreshments
10:00  Opening comments – Simon Young WEAF
10:10  SKF Aerospace Outline & Update – Andy Gunningham
10:40  Engagement with our customers – Andy Gunningham
10:50  Any questions
11:00  Factory Tour
12:30  Networking Lunch
13:15  Presentation from AgustaWestland – Colin Auger
13:45  SKF R&D & product development – Mike Colton
14:15  Questions & Answers
14:45  Close
Clevedon Operational Position Within SKF

AB SKF

- Industrial Market
  - Aerospace
    - Sales & Apps
    - Bearings Units
    - Seals
    - Fly-by-wire
  - Linear Systems
  - Kaydon Group
  - Second Brands
    - Composites
    - R&D

- Automotive Market

- Specialty Market

Locations:
- US x 3
- Italy x 1
- France x 2
- Stonehouse
- Clevedon
SKF Clevedon Site

Area: 5000sqm  
Site Employees: 215  
Approvals:  
  • AS9100 issC  
  • EASA21(g)  
  • ISO14001  
  • OHSAS18001  
  • NADCAP  
  • Critical Part Manuf.  
Channels: 4  
Part no: 5000  
Avg. Batch size: 70 (1 – 125)  
Live W/O: 900  
2014: 230’000  
2014 Part no: 822
Overview of Clevedon Products
Clevedon Product Portfolio

Channel 21/25 - Spherical plain bearings

Channel 22 - Rod ends

Channel 23 - Bushes

Channel 24 - Special Products

- Manufacture 3 liners
- 4 coatings used
- Plating, anodising & Surface Treatments
Wear Comparison

**X1**
Qualified to aerospace standard SAE AS81820

**XL & XLHP**
Exceed aerospace standards by a considerable margin

**XLNT**
Further extends bearing life and improves reliability

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**Graph Details:**
- **Loaded radial backlash change [mm]**
- **Radial liner wear/loaded surface [mm]**
- **Cycles × 10^6**
- **Frequency**: 6 Hz
- **Radial load**: ± 240 daN sinusoidal
- **Sliding velocity**: 0.046 m/sec
- **Radial projected stress**: 14.8 Mpa
- **Motion**: ± 11° oscillation
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<th>Helicopter programmes – sample</th>
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<td><strong>Swash plate</strong></td>
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<td><strong>Scissor control bearings</strong></td>
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<td><strong>MR Actuator bearings</strong></td>
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High number of EASA defined critical parts.
Applications: Fixed Wing

- Flap attachment bearings
- Aileron Hinges
- Airbrakes
- Slat mechanism
- Flight Control links
- Actuators ends
- Landing Gear Bushes
- Engine fittings
Fixed wing programmes - sample

A320 - Landing gear bushes
Aileron hinge bearing

A330 - Wing pylon bearings
Droop nose bearing
Wing slat bearings

A380 - Wing slat bearings (Fwd & Aft)
Droop nose bearings
Aileron hinge bearing

A350 - Droop nose bearings
Applications: Rail

- Intercoach dampers
- Anti-roll bar mechanism
- Steering linkages
- Automatic coupling support
- Brake stabilising links
- Actuators
Rail Applications - sample

Alstom Pendolino – Anti roll bar

Thunderbird Japan – Anti roll bar

Long Island M7 – Anti roll bar
Clevedon Customers & Markets
SKF Clevedon Markets

2014 Actual Sales Volume

- Train: 8%
- Formula One: 1%
- F-18: 5%
- Airplane: 22%
- Helicopter: 18%
- Other: 42%
SKF Clevedon Volume Development

- +287% growth in rotary business since 2001
- High level of spares within rotary business - business cycle un-predictable.
Engagement with our customers
Customer Engagement

1 Global face to customer for all product segments
- Aeroengine mainshaft / gearbox bearings
- Airframe products
- Composites
- Fly-by-wire
- Seals

WHY?
Customer Engagement

Global company with local resource:

• Local engineering attuned to the requirements of the local companies.

• Can call upon specialised engineers to help with a particular customer application.

• Can call upon global SKF R&D & testing resources.
SKF interacts throughout the aerospace supply chain from OEM to the aftermarket.

- Help support tier 1, 2 with improvements in designs for the OEM.
- Will act as a subcontractor for our key competences of bonding.
- Aftermarket: Sales through OEM/Tier 1
Customer Engagement

Customer problems are opportunities to get closer to your customer.