Education:

High School: Fairfield School Systems, Fairfield, OH

College: General Motors Institute, Flint, MI (Kettering University) Bachelor of Mechanical Engineering

Xavier University, Cincinnati, OH Master of Business Administration
Personal History

• Math + Science = Engineering

• Love of Math

• Love of Science

• Challenges

• Problem Solving
Kaydon Corporation
A Global Leader Serving over 40 Industries

- Founded in 1907
- 48,000+ employees globally
- Headquarters located in Gothenburg Sweden
- US Headquarters in Lansdale, PA (LEED Certified)
- 140 Sites in 28 countries
- 16 Global technical centers
- SKF BeyondZero product portfolio focused on reducing the environmental impact during the products life cycle and customers operations
- Parent company of Kaydon Corporation

“SKF technology platforms: bearings and units, seals, mechatronics and lubrication systems.”
SKF 2014 net sales by market

- Cars & light trucks: 28%
- Aerospace: 14%
- Railway: 9%
- Off-highway: 6%
- Trucks: 6%
- 2-wheelers & electrical: 5%
- Industrial - general: 4%
- Ind.- heavy & special: 4%
- Energy: 5%
- Vehicle Aftermarket: 2%
- Industrial Distribution: 11%
SKF 2013 net sales by region

- Europe: 41%
- North America: 28%
- Latin America: 6%
- Asia/Pacific: 3%
- Middle East & Africa: 22%
Kaydon Mission Statement:

Committed to identify, engineer and deliver world class, friction control and motion velocity control solutions to solve our customers’ design challenges and needs.
History

A Global Leader in Friction & Velocity Control

- Established in 1941 by A. Harold Frauenthal
- Strategic Growth (organic and via acquisition) in targeted business sectors
- 12 business units serving a broad range of diverse markets
- Headquartered in Ann Arbor, Michigan U.S.
- 21 world-wide manufacturing locations
- 2,004 employees globally
- Originally started producing large precision bearings for naval gun mounts

Kaydon was publicly listed on NYSE (ticker: KDN), until being acquired by SKF in 2013

Kaydon’s auspicious beginning supplying the US Navy

A. Harold Frauenthal, Founder of Kaydon
Providing customers with problem-solving, application-specific, custom and standard thin section and slewing ring bearings

- Formed in 1941 and still operating in Muskegon, Michigan
- Invented thin section bearings in the 1950s
- 446,000 sq. ft. of combined manufacturing and operations
- Facilities in Muskegon, MI; Sumter, SC (2 facilities); Avon, Ohio; Monterrey, Mexico, and Cajamar, Brazil (Opening June, 2015)
Sumter Plant 12 Overview

Markets Served:
• Medical
• Semi-conductor
• Defense Industry
• Industrial Machinery
• Aerospace

293 workers in 2 manufacturing facilities

Non-union Workforce

275,000 Sq Ft of manufacturing space

49 acres of property, with 12 acres un-cleared
Employees Home Counties

Average Tenure = 11 years

<table>
<thead>
<tr>
<th>County</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sumter</td>
<td>250</td>
</tr>
<tr>
<td>Clarendon</td>
<td>24</td>
</tr>
<tr>
<td>Richland</td>
<td>5</td>
</tr>
<tr>
<td>Kershaw</td>
<td>5</td>
</tr>
<tr>
<td>Orangeburg</td>
<td>3</td>
</tr>
<tr>
<td>Williamsburg</td>
<td>2</td>
</tr>
<tr>
<td>Lee</td>
<td>4</td>
</tr>
</tbody>
</table>
The World Leader in Thin Section Bearings and the North American Leader in Slewing Ring Bearings

• Specializes in thin section bearing and slewing ring solutions
• Experts in solving demanding bearing design requirements
• Thinfinite® thin bearings saves space and weight
• Slewinfinite® bearings for optimal economy in a given envelope dimension
Reali-Slim® Thin Section Bearings Key Features

- For applications where precise positioning, space and weight limitations are crucial
- Kaydon Thinfinite® bearing solutions save weight, create space, reduce friction, increase design flexibility, and provide excellent running accuracy
- Ultra-Slim® made of stainless steel for corrosion resistance
- Bore sizes range from 1” to 40” ID
- Cross-sections from .187”x/187” to 1”x1” (4.75mm to 25mm)
- Cross-section remains constant as the bore diameter increases
- More dynamic capacity and longer life than standard bearings
- Available in 52100, stainless steel, hybrid ceramic materials

Common applications include: radar antennas, targeting pods, marine, aircraft, helicopters, ground vehicles, space applications, automotive, semiconductor, conveyors and industrial machinery.
Slewing Ring Bearings Key Features

- Used to transmit and rotate extremely heavy loads precisely
- Heavy-duty applications requiring significant load-carrying capacity; for designs where precise positioning is critical
- Available in diameters up to 20’ (6.1m)
- Configurations to suit almost any application
- Over 70 years of success in challenging applications

Slewing Ring Bearings Types:

4-Point Contact Bearings:
- Carry radial, axial and moment loads simultaneously

8-Point Contact Bearings:
- Provide up to 80% more load capacity than 4-point

Cross-Roller Bearings
- Offer exceptional stiffness with low rotational torque

3-Row Roller Bearings
- Share the thrust radial and moment loads between the rows

WireX Wire Race Roller Bearings
- Optimize space, weight and corrosion resistance with wire raceways

Key benefit of Slewing Ring Bearings is that it supports a heavy but slow turning, or slow oscillating load with great precision and reliability

Common applications include: radar antennas, targeting pods, marine, aircraft, helicopters, ground vehicles, space applications, automotive, semiconductor, conveyors and industrial machinery.
Superior Bearing Solutions for a Wide Range of Applications

Jib Cranes

Airline Passenger Bridge

Amusement Rides

Satellite & Radar

Port/Marine Cranes

Packaging Equipment
Machine / Industrial

- Rotary Indexing Table
- Positioning Tables
- Coilers
- Bottle Filling Machines
Military / Aerospace

- Targeting Pods/Sites
- Radars
- Cameras
- Gun Turrets
- Flight control applications
  - Flaps
  - Actuators
Semi-Conductor

- Atmospheric & Vacuum Robots
- Wafer spin driers
- Die bonders
- Lappers
- Flip chip die bonder
- Sputtering machine
- Wafer stepper
CT and Luggage Scanners

Analogic eXaminer XLB
Wire-X Defense

M1A2 Abrahams Tank

HIMARS

Bradley M2A3

LAV
Math, Science, and Bearings
Math, Science, and Bearings

da Vinci Bearing
Circa 1500
The resultant moment load (M) equation:

\[ M = (\pm T) (S_r) + (\pm R) (S_f) \]
Math, Science, and Bearings

Reali-Slim Type C
Figure 1-10

Outer Race
Ball
Snap-over Separator
Inner Race

Reali-Slim Type A
Figure 1-11

Contact Angle
Outer Race
Ball
Circular Pocket Separator
Inner Race

Reali-Slim Type X
Figure 1-12

Contact Angle
Outer Race
Ball
Snap-over Separator
Inner Race
Induction Heat Treated Paths in Housings

- Capable of full 360 degree induction heat treat without a soft spot
- Requires additional processing which drives cost
- Gauging is challenging
Math, Science, and Bearings

Capability to evaluate bearing cleanliness
Based on particle type, size, and count
Math, Science, and Bearings

- ISO Class 5 and 7 Clean Room (FED STD 209E Class 100 and 10,000)
- 965 Ft² (89.7 m²)
- Capability to duplex bearings
- Capability to torque test
Torque Evaluation

Graphs and Data Analysis
Questions?