Northrop Grumman Internship 2009
Brian DeKock, Mechanical Engineering Concentration

About Northrop Grumman

Northrop Grumman Corporation is a leading global security company whose 120,000 employees provide innovative systems, products, and solutions in aerospace, electronics, information systems, shipbuilding and technical services to government and commercial customers worldwide.

The Electronic Systems Sector

Northrop Grumman is a leader in:
- airborne radar
- navigation systems

Key products include:
- F-16, F-22 and F-35
- active electronically scanned array sensor systems
- airborne early warning and control radar systems
- electronic countermeasures
- precision weapons
- digital electronic warfare systems
- aircraft missile defense systems
- air defense systems
- integrated bridge systems
- situational awareness
- fiber-optic gyro-based navigation systems

Inertial Systems Functional Basics

- Gimbaled System
  - Precision mechanical/electrical design
  - Low computational demand
- Strapdown System
  - High Dynamic Environments
  - High computational demands

A fiber optic gyroscope (FOG) is a gyroscope that uses the interference of light to detect mechanical rotation. The sensor is a coil of as much as 5 km of optical fiber. Two light beams travel along the fiber in opposite directions. The beam traveling against the rotation experiences a slightly longer path than the other beam. The resulting phase shift affects how the beams interfere with each other when they are combined. The intensity of the combined beam then depends on the rotation rate of the device.

Ring Laser Gyro Technology

E-2D Advanced Hawkeye

B-2 Spirit

LX Offers New Training Program

Northrop Grumman “went live” a year and a half ago with Learning Exchange (LX), a training program that employees use to obtain certification in technical areas. The intent was to make their overall training experience more productive, while cultivating the company’s talent. Employees will find that LX has regular updates to keep them current with the latest training modules. LX was implemented to replace the outdated previous program called PeopleSoft. The training team expects learners to benefit from a new friendlier version once the LX system is upgraded in the upcoming year.

Family of Northrop Gyroscopes

<table>
<thead>
<tr>
<th>Gyro Type</th>
<th>Accuracy</th>
<th>Random Drift</th>
<th>Cost</th>
<th>Production Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-2000 DTG</td>
<td>Medium</td>
<td>1 - 0.3</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>G-2000 DTG 3X</td>
<td>Medium - High</td>
<td>0.3 - 0.05</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>FIBER OPTIC GYRO</td>
<td>Medium - High</td>
<td>1 - 0.004</td>
<td>Medium - High</td>
<td>High</td>
</tr>
<tr>
<td>LASER GYRO</td>
<td>Medium - High</td>
<td>0.01 - 0.001</td>
<td>Medium - High</td>
<td>High</td>
</tr>
<tr>
<td>HEMS (Hemispherical Responder)</td>
<td>High</td>
<td>0.01 - 0.0001</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>HEMS GYRO (HESG)</td>
<td>Low - Medium</td>
<td>100 - 5</td>
<td>Low</td>
<td>?</td>
</tr>
</tbody>
</table>

Conclusions

Over the course of the summer I learned valuable lessons and gained many different skills. Not only did I become a better engineer from a technical perspective, but I also learned many important things about the business that goes on alongside engineering. My summer at Northrop Grumman was a good experience that I will not soon forget.