

A Personal Success Story

SBX Radar – Onboard Pump System & Controls

- Name: Adarsh Iyengar
- Date: July 28th, 2022



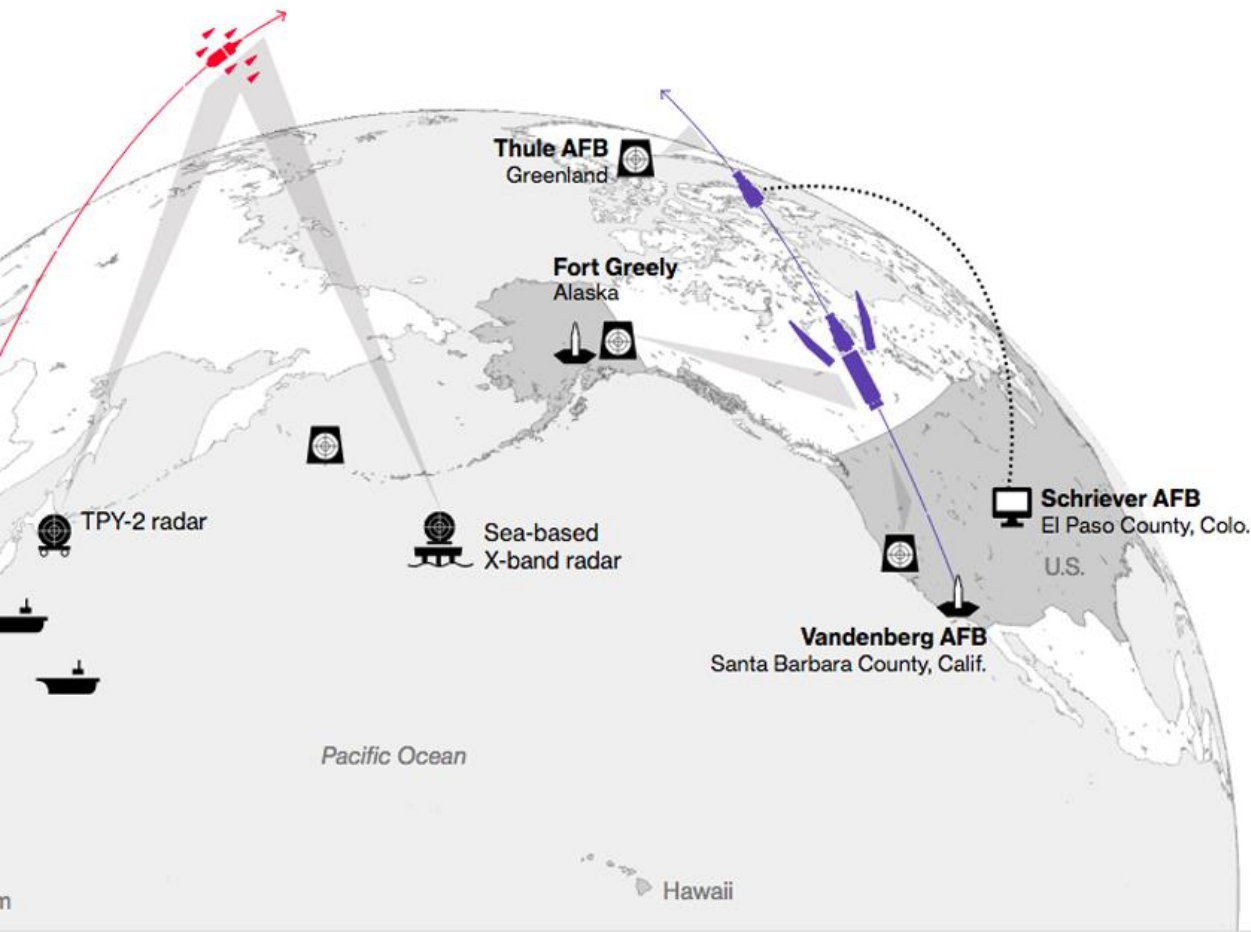


Agenda

- Background
- My Project Deliverables
- Pump Fundamentals
- Players Involved
- Project Execution
- Results, Recognition & Lessons Learned

Background

- Enhance the U.S. Ballistic Missile Defense System (BMDS)
- Detect and establish precise tracking information on ballistic missiles, discriminate missile warheads from decoys and debris.
- Provide data for updating ground-based interceptors in flight and assess the results of intercept attempts.





Project Deliverables



Provide a high-pressure cooling water pump system for the SBX Radar platform



Improve the reliability of the existing pumps



Meet an incredibly challenging timeline of delivering equipment in 6-8 weeks



Successful dry run of the entire system and controls 3 months from project start date

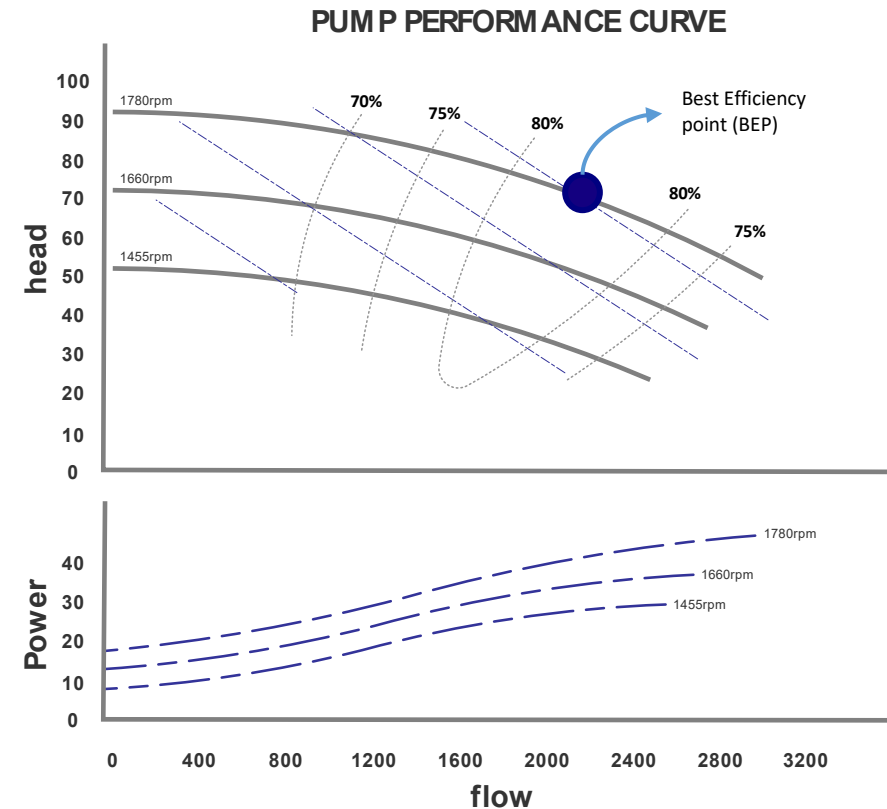
Pump System Fundamentals

A pump curve provides details on the performance related to flow, pressure, speed, power & efficiency

Operating at BEP will result in maximum reliability. Operation away from BEP will result in mechanical damage, excess vibration & temperature and could be catastrophic

Speed of a motor can be controlled / changed using a variable frequency drive

Variable speed drives generate electrical noise (pollution) that cannot be eliminated and negatively impact equipment on the electrical network

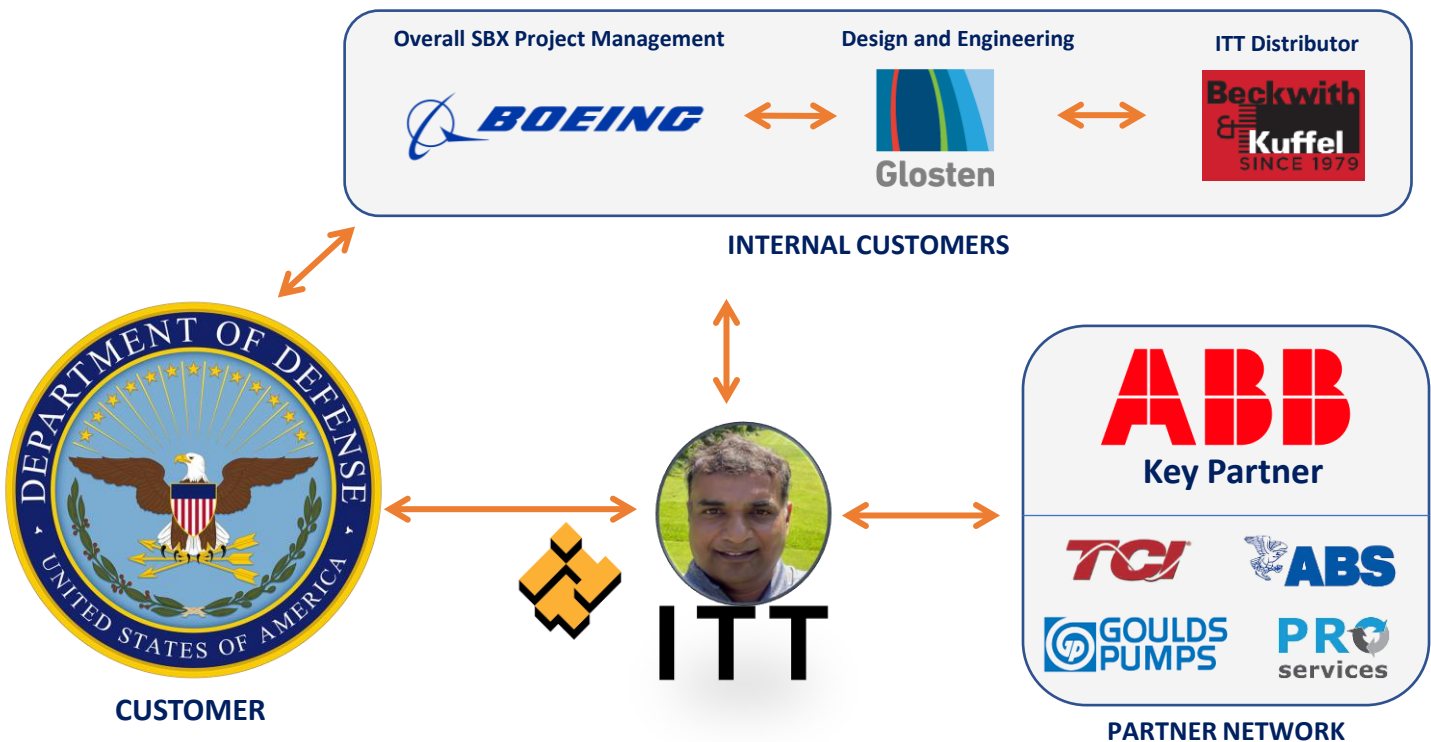


Pump & Electric Motor



Variable Speed Drive

The team



Team Player	Role
Department of Defense	Customer
Boeing	Entire Project Execution responsibility
Glosten	Design and Engineering of Ship controls and Pump Systems
Beckwith & Kuffell	Supplier of pumps and valves
ABB	Manufacturer of Motors and Variable Speed Drives
TCI	Manufacturer of Electrical Noise / filtering equipment
ABS	Marine certification agency
ITT	Pump Systems and service provider

“From a project management perspective, this was an extremely complex project. Multiple customers (Boeing, Glosten Associates, and Beckwith & Kuffell), one certifying agency (ABS), one third party control group (Kongsberg), two vendors (ABB and TCI), and the government lurking in the background made this a logistical nightmare” – ITT General Manager

Project Execution

Technical Solution Development

- Pump control solution
- Electrical Network Compatibility

Product Integration

- Pump controls integration with Ship controls system

Manufacturing

- New design utilized that was not tested on a marine application.
- Product Certification

Product Availability & Logistics

- Drives and motors manufactured in Finland
- Lead time & manufacturing concerns due to labor unavailability in Europe in July



Customer Success

Project delivered and commissioned on time to meet DOD dry run test dates

Calls every 6 months from the Chief Engineer on SBX-1 providing updates on the system

Energy Consumption reduced by 50% compared to the prior system

Pump system reliability improved from 4-6 weeks to over 2 years

Repair, Maintenance, inventory and downtime costs reduced by over \$500K annually

Efforts recognized by DOD, Boeing and Glosten Engineering

Recognition at the highest level within ITT with a nomination for the President's award



Cc: Iyengar, Adarsh - IBG; Kernan, Dan - IBG
Subject: Boeing - SBX Platform

Ken,

Adarsh has finished the commissioning of the PumpSmart drives for Boeing and is on his way home. All that remains is to complete our invoicing, and the job will be complete and closed.

It goes without saying that this job has been extremely difficult, and I believe that Adarsh should be recognized for his outstanding efforts to meet the demands of this job. You may not have been aware of all the problems...and the way Adarsh exceeded expectations.

- From a project management perspective, this has been an extremely complex order. Three customers (Boeing, Glosten Associates, and Beckwith & Kuffell), one certifying agency (ABS), one third party control group (Kongsberg), two vendors (ABB and TCI), and the government lurking in the background made this a logistical nightmare. He handled himself with professionalism and efficiency to help meet the July 15th delivery date. The primary project manager on the overall (Kevin Reynolds) relied heavily on his technical knowledge and advice to advance the project.

- From a commissioning standpoint, Adarsh has spent the last two weeks onsite...seven days a week, most often 15-18 hours a day...the equivalent of 5 working weeks to ensure the customers needs were met...most often on problems not related to PumpSmart. For example, the controls manufacturer (Kongsberg) created significant delays in the project from their inability to commission their DCS system. Adarsh assisted them throughout much of this time helping their novice programmer try to understand how the system should work. **He also served as a technical liaison for the Glosten Associates Project Manager when dealing with Kongsberg.**

- We experienced a significant 11th hour problem with the drive system; inductive noise on the electrical bus was causing a malfunction on their primary generator sets. With guidance from ABB, **Adarsh was able to isolate the problem and install EMI filters to eliminate the problem.** It was difficult to pinpoint whether it was a drive issue or an engine PLC was overly susceptible to the noise...nonetheless we fixed it.

We are fortunate to have Adarsh working with PumpSmart. He is an intrinsic component of the PumpSmart value proposition.

-Nick

Nicolas W. Ganzon, PE
General Manager PumpSmart Control Solutions

Iyengar, Adarsh - IR
From:
Sent:
To:
Cc:
Subject:

Gan
Monday, August 29, 2005 8:43 AM
Kernan, Dan - IBG
Iyengar, Adarsh - IBG
RE: DOD- Boeing project

Dan / Adarsh,

Although there was a delay during commissioning of the PumpSmart units because of the pump 1 failure, I would make the point that **Adarsh was onsite an contributing beneficially to other parts of the project.** In other words, Adarsh could have simply gone back to the hotel and waited for the pump to be repaired and then come back onsite, however instead he remained on the vessel to assist with Kongsberg and the DCS.

-Nick

Pluses & Deltas



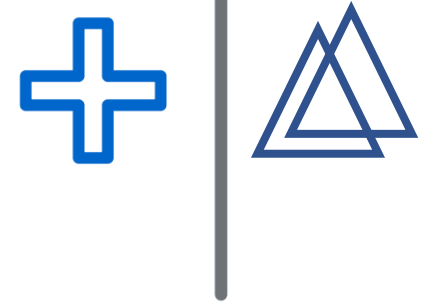
Project delivered and commissioned on time to meet DOD dry run test dates

ITT gained significant expertise with Low Harmonic drives, marine installations and electromagnetic interference

Created a new Pump control solution utilizing Ultra Low Harmonic Drives (S/N 1,2,3,4..)

Displaced competition and became a standard for future SBX platforms

Generated over \$5MM in new business with B&K and Glosten Engineering in the following year (Olmstead Dam Project)



Conduct better due diligence during the quotation process on such projects to mitigate risk

Gain better understanding of customer environments in design phase.



Thank You

References

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- www.boeing.com
- <https://www.studentnewsdaily.com/daily-news-article/u-s-deploys-radar-to-monitor-n-korean-missile/>
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- www.glostten.com