



Thrusters

How to Utilize Thruster Current Measurements to Improve Safety and Optimize DP Control Systems

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Kongsberg Maritime, Norway

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..about me

ØYVIND LØKLING

**Manager Product & Development - DP & Navigation
in Kongsberg Maritime AS**

Working with Dynamic Positioning since 1988

10 years working

- 10 years - traveled “the 7 Seas”, working with Dynamic Positioning System – Hardware & Software.

9 years managing

- 5 years managing DP SW Application Department
- 2 years startup new office in New Orleans, LA
- 2 years managed product & development

Why current measurement on each thruster?

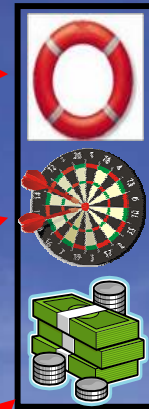
Safety



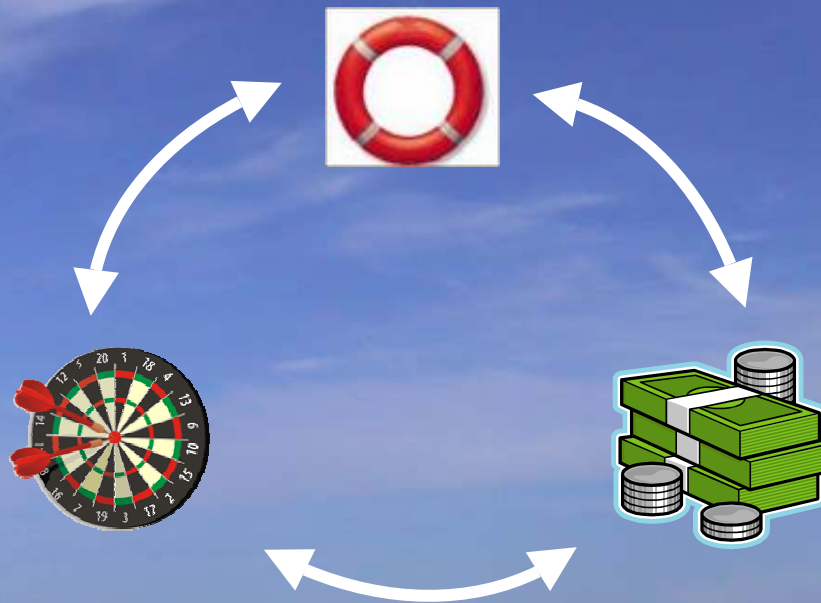
Performance



Economy



Is **Wear & Tear** issues Economy, is it Safety or is it Performance?

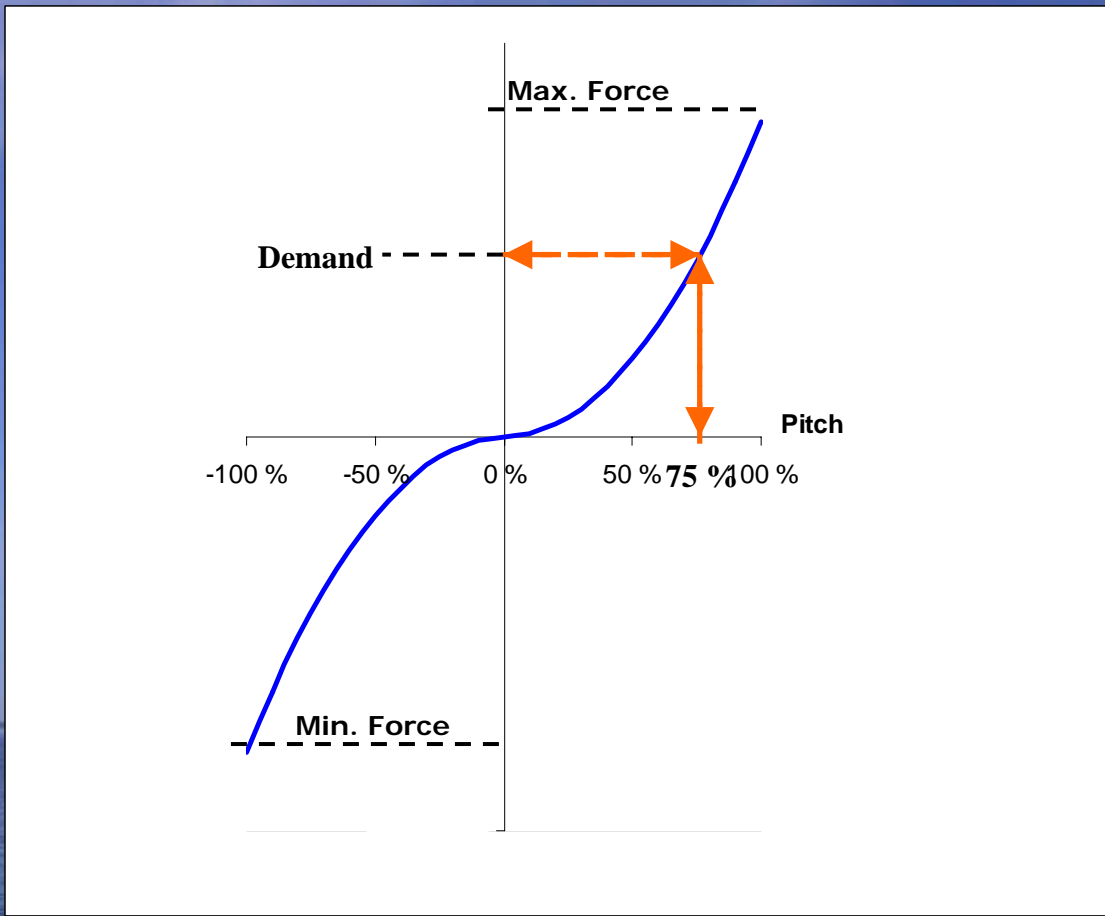
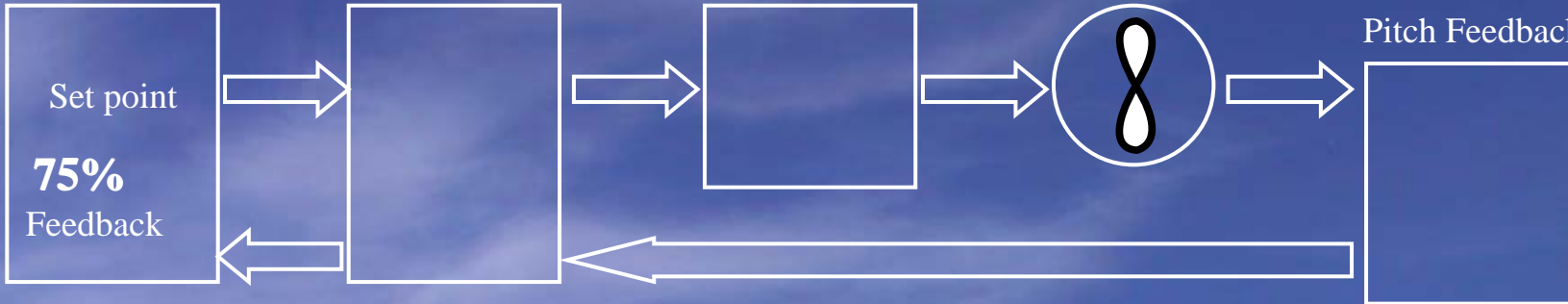


DP Controller

I/O card

Local Thruster Control

Pitch Feedback

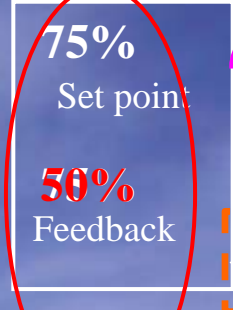


DP Controller

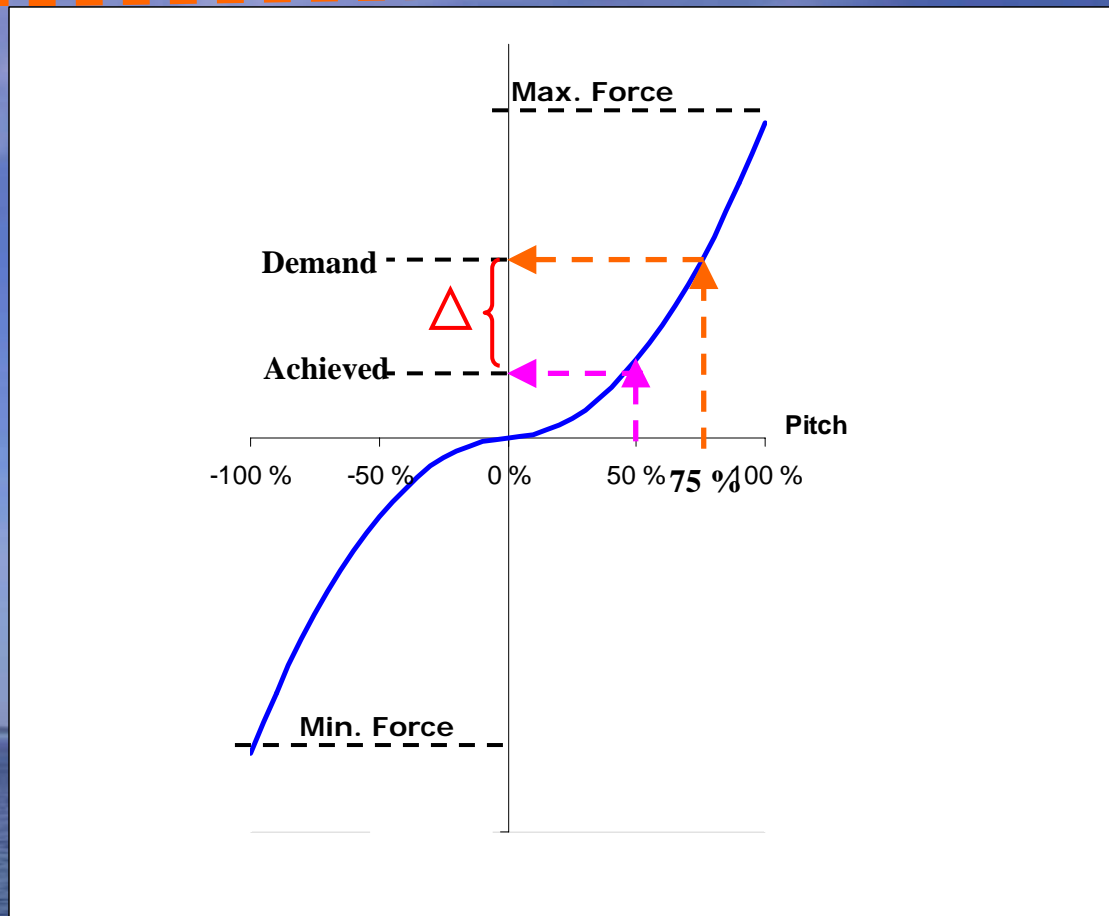
I/O card

Local Thruster Control

Pitch Feedback



Difference alarm!



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DP Controller

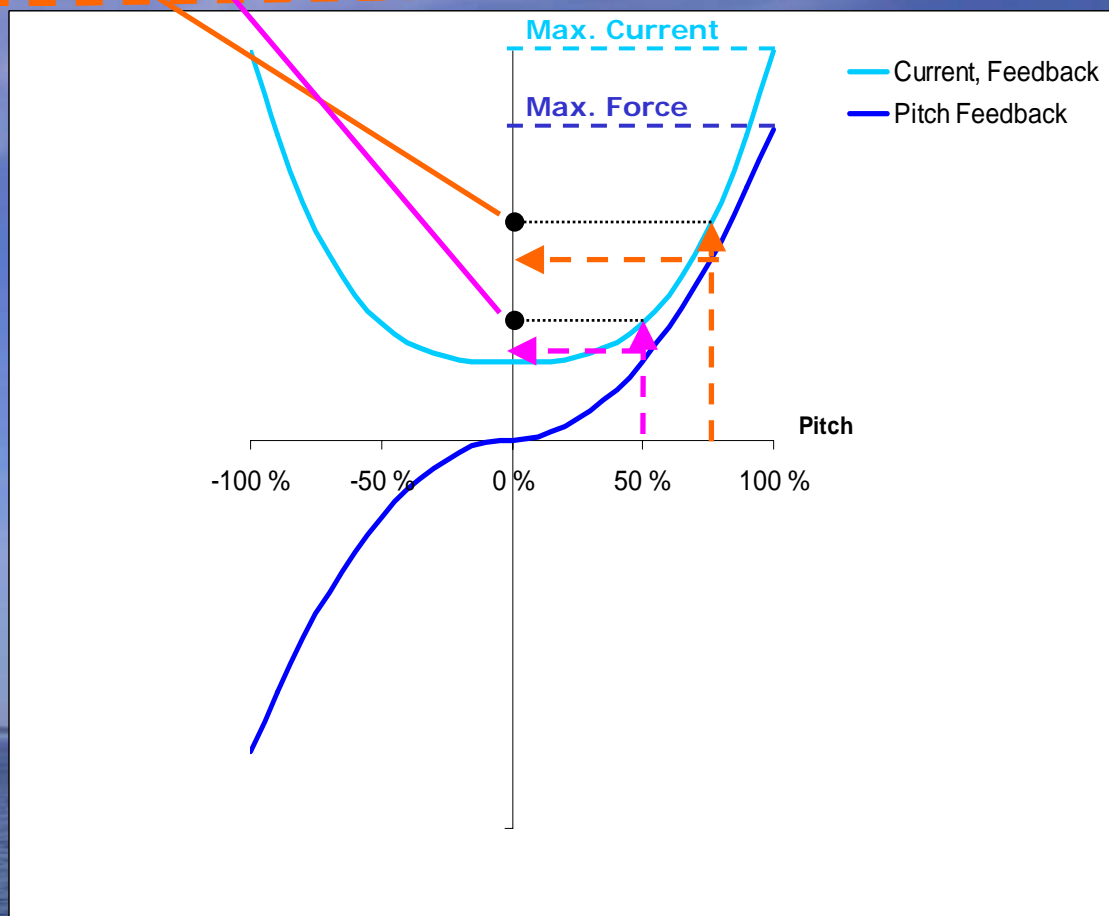
I/O card

Local Thruster Control

Pitch Feedback

75% Set point
50% Feedback

Difference alarm!



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12:54:21 05/09/07 Alarm High **setpoint error** 60.0 0.0

We know it's a difference between setpoint and feedback
Availability of current/load measurement on a thruster,
gives the DP System possibility to determine;
...if it's dealing with it **Setpoint failure**, or
dealing with a **Feedback failure**.



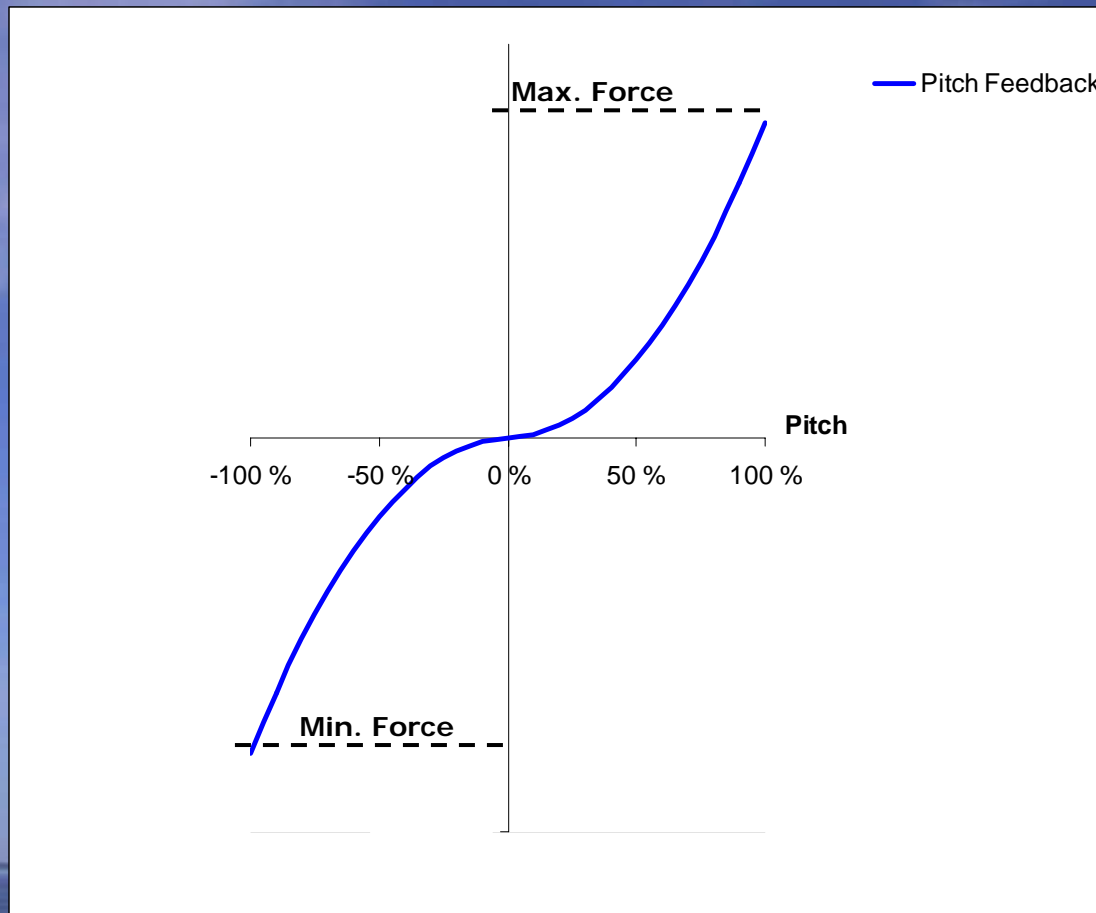
If we **KNOW** we have a **feedback** problem, the DP could switch to “estimated feedback” and continued to use the actual thruster, until the problem is solved.



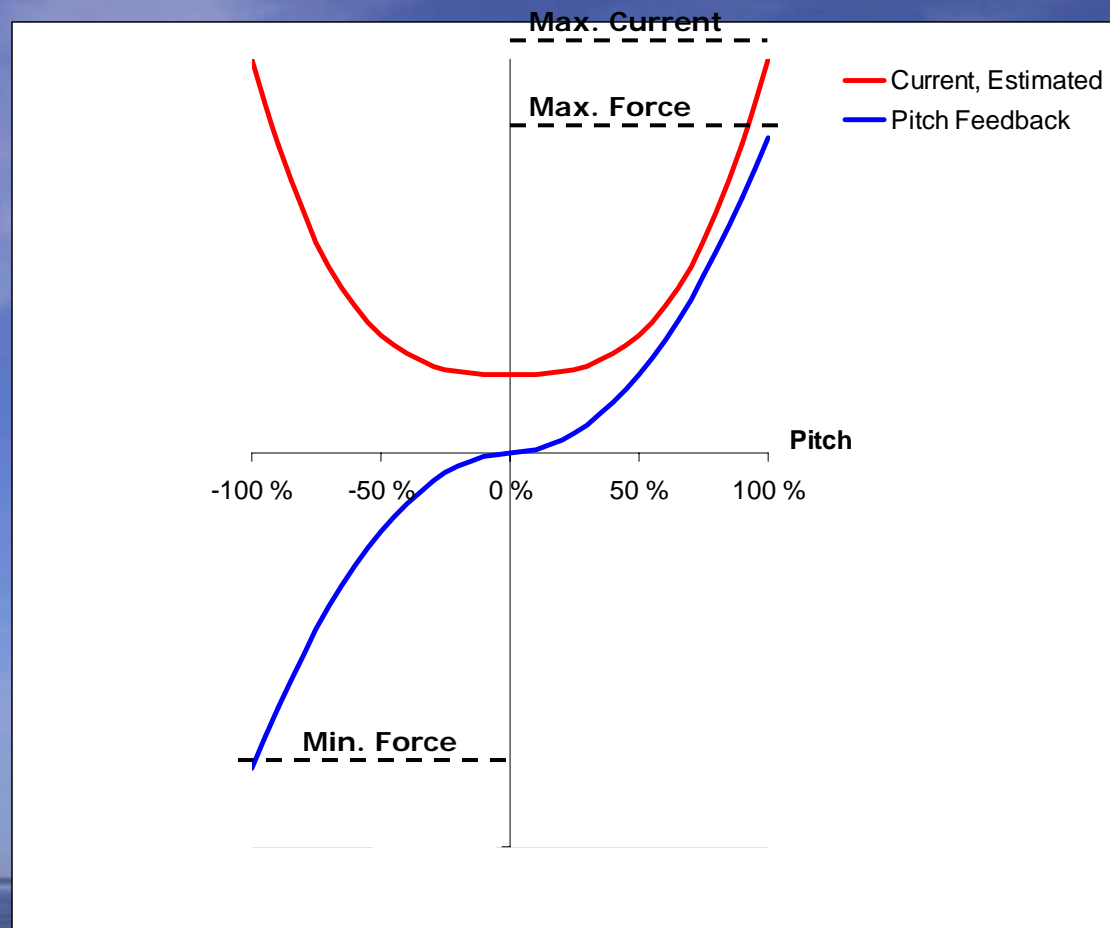
If we **KNOW** we have a **setpoint** problem, the DP could Give a clear alarm saying; **STOP THE THRUSTER!!**



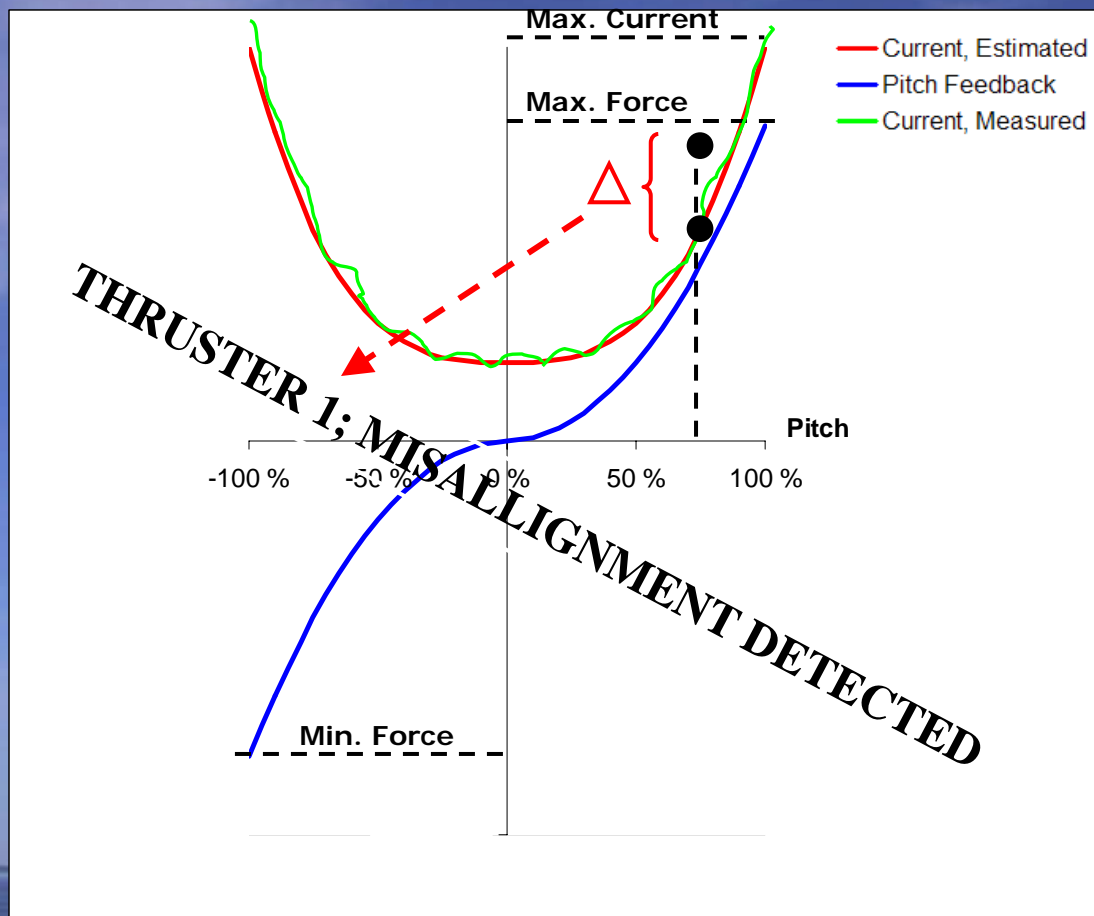
“Potmeter Out of zero” detection



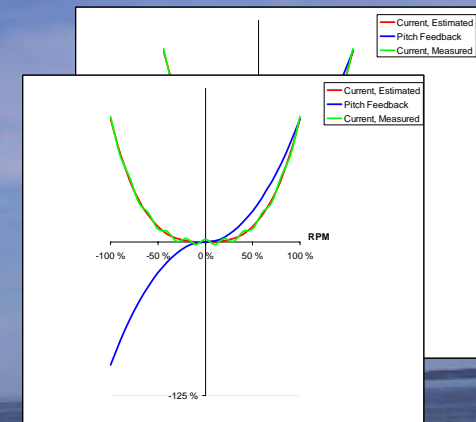
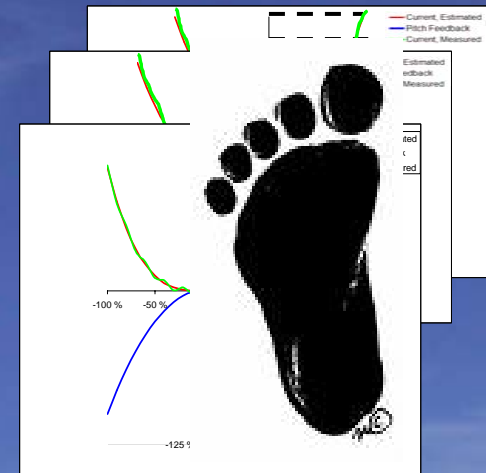
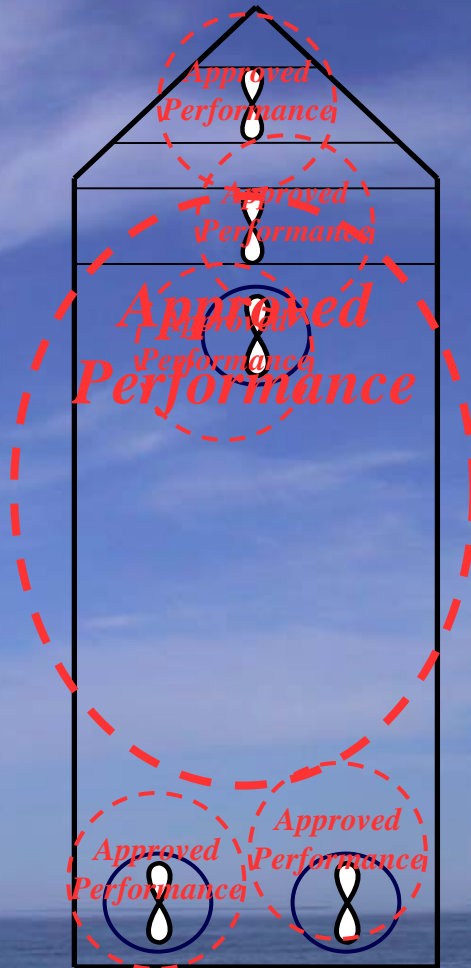
“Potmeter Out of zero” detection



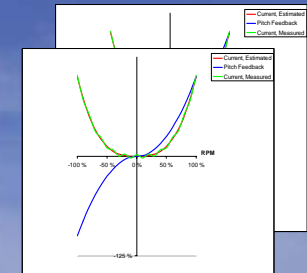
“Potmeter Out of zero” detection



...on the DP trial...



..like footprint in the sand...



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Thruster Ventilation

Air suction and “in and out of water effect”.....

....is what we call “*thruster ventilation*”.

Ventilation



"I hope my over speed protection works!"

*"Man, isn't this great!
My system keeps the
ship in position in this
weather!"*

*"How can I model this stuff?
I am supposed to work with
liquid, not air!"*

*"My maintenance budget
Is already sky high!"*



From “bollard pull” to “service speed”

Force



RPM/Pitch



speed

Speed



...and we are back to where we started...

Why current measurement on each thruster?

Safety



Performance



Economy





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