USCG Propeller Injury Mitigation

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Program Review

- Part 1 – Human Factors
- Part 2 – Boat Characteristics
- Part 3 – Device durability, practicality

Sept. 2006	Sept. 2007	Early 2008			
Boat Protocol	Boat Protocol II	HF Protocol	Durability, etc.	Consolidated Testing	Promulgate

Boat Characteristics

September 2007 Testing

- 17' Bowrider, Sterndrive
- 18' Center Console, 90hp Outboard
- 18' Bass Boat 225hp
- 3 Guards & Manufacturers On-Site
  - Production/Full Cage Type
  - Production/Octagonal Ring Type
  - Prototype/Ring/Nozzle Type

Device Procurement

- April E-Mail to known prop-guard mfg's
  - From USCG Web List
  - Public Posting on USCG Site
- June E-Mail to Above + Meeting attendees
- SPIN/Marion Irving Decruz personal contact with mfg's
- Result was total of 3 different guards volunteered by mfg's to fit statistically significant product

Full Cage Guard

Full Cage Guard

- Production Guard
  - Included Instructions
- Fit All Product
- 20 Minute/Simple Hand Tool Installation
  - No Drilling/Lower Unit Modification
- Not Recommended by Manufacturer for High Speed Boats (e.g. bass boat)
- Slower Top-End Speed
- Slow Steering Response
- Predictable/Benign Behavior
- No Learning Curve
- Plug and Play

Octagonal Ring Type Guard

Octagonal Ring Type Guard

- Production Guard
  - Included instructions, calibration tool (stick)
- Advertised as a DIY/Self Install
  - Significant modification/machining needed to fit product
  - Done by the Mfg. on-site
  - Lower Unit Drilled
- Recommended for All Product
- No Top-End Speed Loss
- Unpredictable Steering Behavior
  - Significant Torque increase (3-5 X over normal)
  - Issues with Coming out of and going in to a turn
- Porpoising at mid-speed
- Significantly Different Trim Characteristics
- Instructor needed/large learning curve.

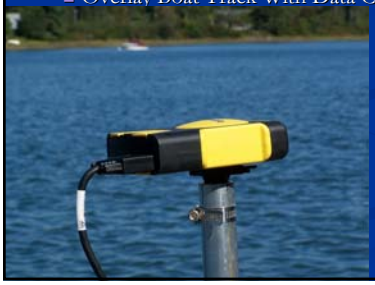
Ring/Nozzle Type

Ring/Nozzle Type

- Prototype
  - Designed for 1 brand/90 hp outboard.
  - MFG Brought own boat, was able to modify Guard for our purpose.
  - No Longer Have Access to Guard (Only 2 Exist)
- No Top-End Speed Loss
- Low Speed Backing Improved
- Unpredictable Steering Behavior
  - Significant Torque increase (3-5 X over normal)
  - Issues with Coming out of and going in to a turn
- Significantly Different Trim Characteristics

Improved Instrumentation

- GPS Tracking – 8 inch Accuracy, 1 second collection
  - Overlay Boat Track With Data Collected



Steering Torque

- Wireless sensors transmitting to an on-board laptop

Pitch, Roll, Yaw, Acceleration

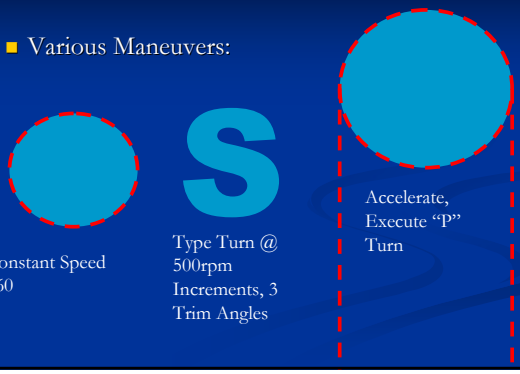
- Wireless Sensors

Steering Angle

- Record Angle Of Rudder

TESTING

- Various Maneuvers:



TESTING cont…

- Additional Testing Continues in ME
- Addition of a Trim Angle Measurement Sensor
- Experiment with Loads
  - E.G. Waterskiing & Wakeboarding
  - Increased Capacity/Gear Loads

STATUS
BOAT CHARACTERISTICS

- Continuing Maine Testing
- Solomons Testing in November 2007
- Software Plug-In Will Be Available for Popular Data Acquisition Software.
- Maneuvering Protocol DRAFT to be Complete Mid 2008.
  - What Characteristics Were Learned?
  - Evaluate This Sections Contribution to the End Product.

The Overall Picture

- Human Factors Phase 1
  - Discussing Scope of Project With Potential Contractors
  - Contractor in Place 2008 (Pending Funding)
- Practicality Phase 3
  - Dependant on Phase 1 & 2 Data

RESULTS

- Mathematical Weighting of Data
  - What is Detrimental and How Bad Is It?
  - Severity of Issues To Be Determined By NBSAC Subcommittee
- End Up With Scaled Result
- Product May be Strong in Some Areas/Weak In Others.

Other Progress

- ABYC has a DRAFT Lanyard/Engine Cut-off Switch Standard.
  - Lanyard style and Wireless
  - Is an "If Installed" Standard
- NPRM on Mandatory Lanyard Installation
  - NBSAC Meeting Next Week.
  - Cost-Benefit Analysis & Technical Details