Technology Update in Marine Engines

Travis Hayes
• Travis & Cathy Hayes, Owners of Hayes Marine
• Honored to be Third Generation Dealership
• Located inside Trade Winds Marina
• The Hayes Marine Mission:
  – To exceed our customers' expectations through education and honesty to enrich their boating experience and create customers for life.
• Third-Generation owners, Grandfather Paul Hayes purchased existing boat dealership in Augusta, GA in 1961.

• I grew up in the dealership working for my father Bob Hayes, mostly in the shop servicing boats & engines

• Worked for Mercury Marine for 15 years as an Applications Engineer
  – Integrated engine/fuel/electrical/drive systems
  – Worked with:
    • Sea Ray
    • Triton
    • Chaparral
    • StingRay
    • Boston Whaler
    • and many other manufacturers
Hayes Marine Team

• Kevin Fields
  – Customer Service & Parts Manager
• Jeff Ellingsworth
  – Shop Foreman
  – 20+ years in boat building & electronics installation
• Patrick North
  – Certified MerCruiser Technician
• Don Waters
  – 30+ years of Technical experience (all brands)
• Peter Lyle
  – Boat Rental and Detailing Manager
• Seasonal Staff
• Topics:
  – Marine Engine History
  – Types of Marine Engines
  – Emissions
  – Ethanol Fuels
  – Q & A
How Did Marine Engines Get Their Start?

• 1906 after Ole Evinrude made a 5-mile roundtrip by rowboat, he formed his idea for a practical boat motor

• 1907 the first field tests of Evinrude's outboard motor, a 1 1/2 horsepower, 62-pound iron engine

• Why? He wanted to get his ice cream to his fiancée before it melted!
Sectional View of 2 H.P. Rowboat Motor with Automatic Reverse

1909
Types of Marine Engines

• Inboard
  – Ski/Tow
  – Larger Cruisers
  – Pod Drives

• Sterndrive
  – Mainly Runabouts/Deck boats

• Outboard
  – 2 stroke (Traditional)
  – 2 stroke (Direct Injection/Low Emissions)
  – 4 stroke
Why the Move to 4 Stroke Outboards and Direct-Injected 2 Strokes?

• Emissions
  – Starting in 1996, EPA required manufacturers to reduce Hydrocarbons, Carbon Monoxide and Oxides of Nitrogen by 75% over 9 years
  – 2008 all outboards would be “clean”
  – Manufacturers look at doing this in two different forms:
    • “Clean 2 stroke” or Direct Injected engines
    • Four Stroke
There is more to come for outboards...

• A further reduction in emissions is slated for ~2015
  – EPA is still studying next reduction to 90% lower than 1996 levels
  – Only way to make 90% lower emissions on outboard is through Catalytic converters on 4 Stroke engines
  – This will more than likely be the end of two stroke outboards
Emissions for Sterndrive/Inboard

• These engines were always 4-stroke engines
• Based on automotive engine that have been converted to marine standards
• Starting in 2010, Sterndrive engines have to be 4-Star certified. Engines “manufactured” after 1/1/2010 would have to be catalyzed.
• You can find 2010, 2011 & 2012 boats with non-catalyzed engines
Star Label/Rating system

• **STAR LABEL Means Cleaner Marine Engines**
• CARB (California Air Resources Board) has established a rating system for clean engines as follows:
  - 1 star = low emission (EPA standard 2006)
  - 2 stars = very low emission
  - 3 stars = ultra-low emission
  - 4 stars = super-ultra-low emissions
Star Label/Rating System
What does this mean for us the consumer?

- Better for the environment
- Reduce air emissions by 75%
- Reduce water pollution by reducing the amount of gasoline released into surface waters
- More fuel efficient – burn 35-50% less gasoline
- Use up to 50% less oil
- Much quieter and thus less disruptive to wildlife
- Easier to maintain
- Easier to start
- Have a quicker throttle response
What makes a marine engine different than a car/truck engine???

• LOAD!

• Many people believe the technology that drives their boat is roughly the same as what powers their car or truck. That couldn’t be any farther from the truth. Marine technology has to be far more durable and reliable, due to the unusually high levels of stress that are put on boat engines and drive systems.

• Think of it this way. Picture a car driving down the road at 60 mph. That style of driving puts relatively little stress on the engine. To match the stress a marine engine faces at the same speed, that car would have to be driving up a 30 degree incline at 80 mph – while pulling a boat! Think of the strain on that engine now.
This is the load a boat engine sees every day!
Lets talk Ethanol Fuels!
• phase separation
Ethanol Issues/Facts in Marine Engines

• Once fuel phase separates it can not be treated
• It is acceptable to run marine engines on E 10
• It is NOT ACCEPTABLE to run marine engine on E 15
• No Snake oil to “fix” ethanol issues and phase separation
• When the fuel phase separates you have to pump and clean the fuel system
• Best solution for marine engine & ethanol
  – Use non-ethanol fuel if you can find it
  – If you do not use your boat for over 30 days, stabilize the fuel and store the tank full.
Ethanol Issues/Facts in Marine Engines (Continued)

• Have a clean and well maintained fuel system, regularly check filters, consistently use quality/trusted fuels, check tanks periodically, maintain engine regularly

• Take extra care when converting from E 0 (this is were we have seen all of our issues and problems with Ethanol based fuels)

• All gasoline types need the same type of simple prevention if not immediately consuming fuel

• Don’t immediately assume E 10 is the problem
Ethanol Issues/Facts in Marine Engines (Continued)

- Link to Ethanol FAQ and Mercury Webinar:
Resources

- www.mercurymarine.com
- www.epa.com
- http://www.dep.state.fl.us/air/emission/sbeapl/LowPollMarineEngines-Factsheet.pdf
Questions?
Thank you for your time and hospitality!

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