



# HEC



*Hydrogen Engine Center, Inc.*

[www.hydrogenenginecenter.com](http://www.hydrogenenginecenter.com)

## **AMMONIA – FUELED ENGINES**

### **Update and New Technology**

### **Ted Hollinger**

**September 29, 2008**

**HEC**



# Field Trial Update

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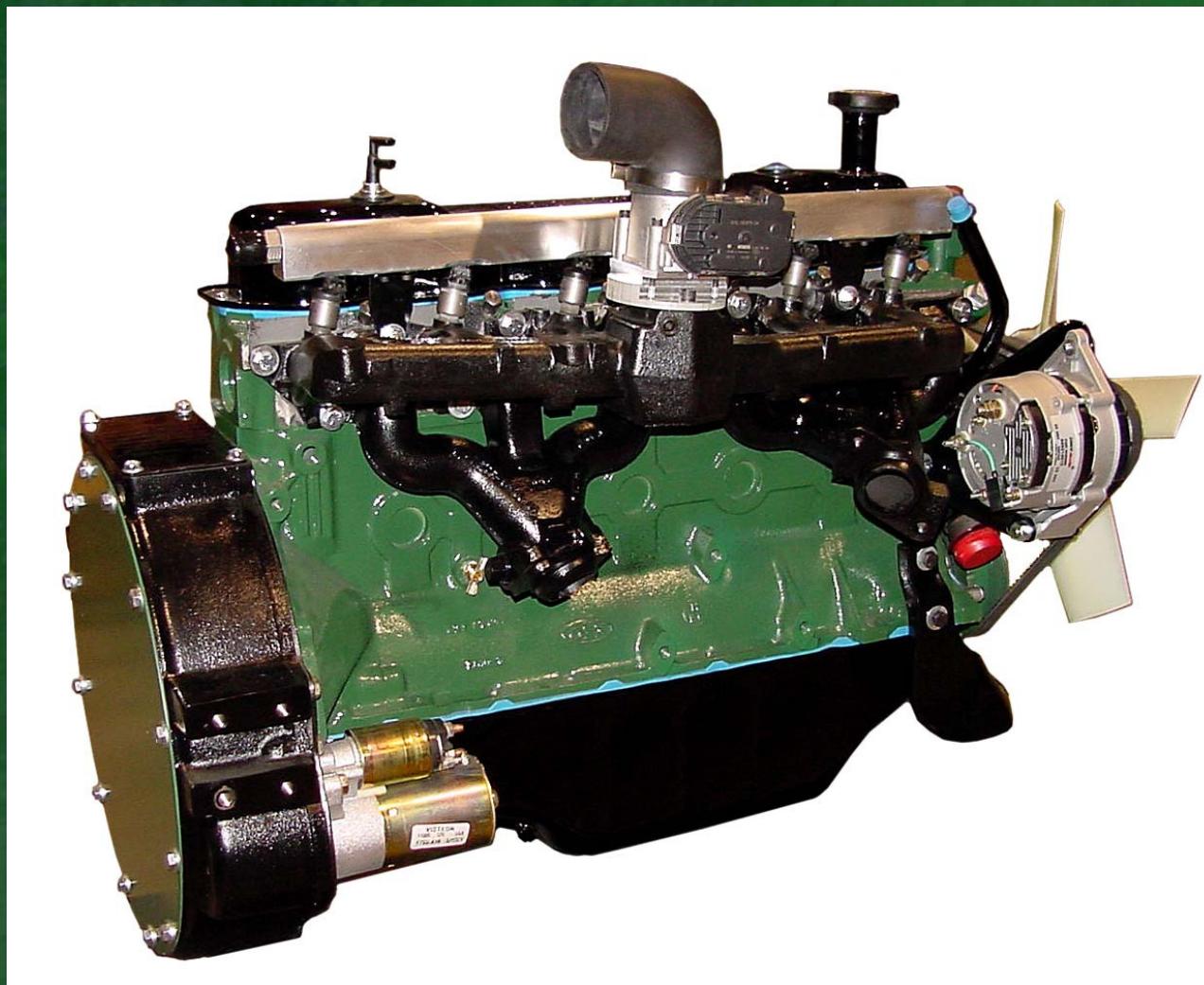


- Irrigation and Livestock watering application
- Location: Visalia, California
- Specifications – Pump System
  - Flow Rate: Up to 2000 gallons per minute
    - Running ~ 550 gallons per minute
  - Speed 1800 – 2200 RPM
  - Power Requirements: 35 HP
- Start up date: September 20, 2007

# HEC - Update

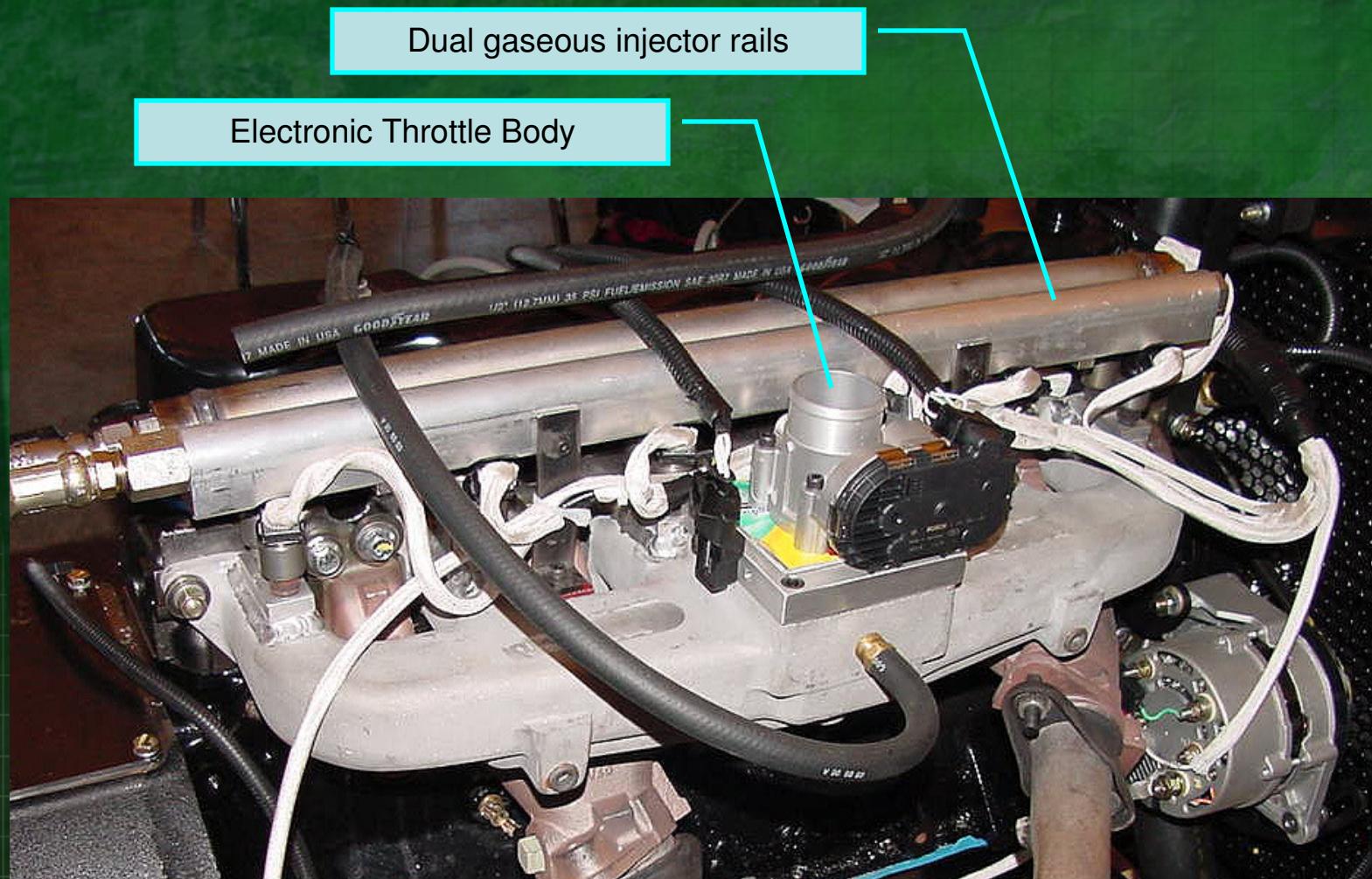


# HEC Oxx Power™ 4.9L Engine



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# HEC NH3 Oxx Power™ Engine



# Control is Key



- Controls fuel mix for starting and stopping
- Controls equivalence ratio
- Performs engine diagnostics
- Controls spark timing for best performance
- GPS is being added 1st quarter 2009
- Wireless telemetry also available in 1<sup>st</sup> quarter 2009



# Results to Date

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- Well over 1000 hours and still running
  - 1108.3 hours as of 8/13/08
  - running at 20.5 hours/day
- No problems to date
- Fuel injection of gaseous ammonia is successful
- Dual fuel injection (ammonia/propane) can be done with the Oxx Boxx engine controller system

# Newest Product Development



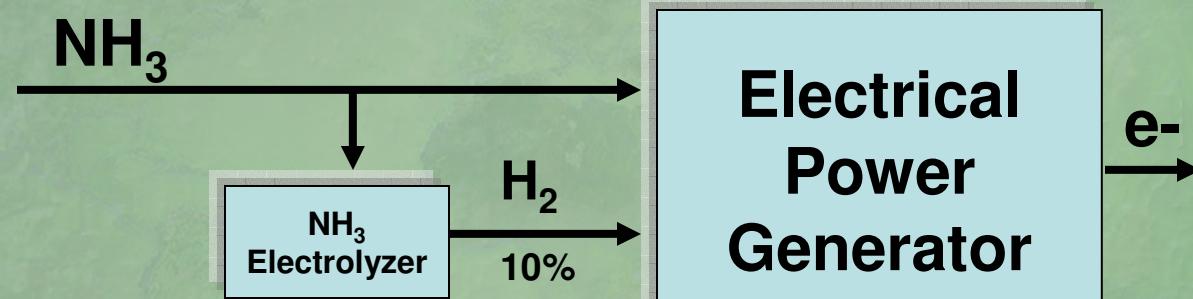
- NH3 Electrolyser
- Two patents filed
  - Continuous Generation of Hydrogen via Electrolysis of Ammonia
  - Ammonia Electrolysis Process and Apparatus
- Being developed at Quebec University
  - UQTR laboratory

# Video Clip of NH<sub>3</sub> Electrolyser



- Last work done by Tapan Bose at UQTR

# NH<sub>3</sub> Electrolyser Application



# Patent #1

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- Continuous Generation of Hydrogen via Electrolysis of Ammonia

# Patent #2

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- Ammonia Electrolysis Process and Apparatus

# Summary

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- IC engines can run reliably and cost effectively @ near zero emissions
- Ammonia can be a hydrogen enabler
- Hydrogen and NH<sub>3</sub> can be run successfully in SI engines
- Ammonia properties similar to LP
- HEC system can be implemented on other engines



# Thank You!

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