



## Development of a Stand-Alone Urea-SCR System for NO<sub>x</sub> Reduction in Marine Diesel Engines

Clinton R. Bedick, Derek Johnson, Nigel N. Clark, David L. McKain  
Center for Alternative Fuels, Engines & Emissions (CAFEE)  
Department of Mechanical and Aerospace Engineering  
West Virginia University  
Morgantown, WV

Paul J. Moynihan, Tom Balon  
MJ Bradley and Associates, Inc.  
Concord, MA

- A stand alone-urea SCR system was developed targeting  $\geq 50\%$  NOx reduction in marine diesel engines
- System was designed to be simple and robust, able to operate without electronic communication with the engine

- Pitot-tube flow measurement
- Siemens NOx sensor
- Automotive injector and fuel pump for urea delivery
- Titanium/vanadium SCR catalyst
- Independent Mototron Motohawk controller



- Ideal for older model year mechanically controlled retrofit applications
- NOx sensor and flow measurement system showed excellent agreement with laboratory measurements
- Verification testing showed that 50% NOx reduction could be achieved with low ammonia slip, depending on cycle