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Adaptation of Advanced Diesel Engines for Military Requirements Under Severe Environmental Conditions

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Abstract: The overall goal of this program is to adapt commercially produced heavy duty diesel engines to meet the goals the military engines for maximum power, better fuel economy, and low signature in the field by white or black smoke and compactness for mobility. The commercial advanced heavy-duty diesel engines are produced to meet stringent emission standards, causing penalties in peak power and fuel economy. This project addressed three major thrust areas. The first area is to determine the effect of replacing the commercially available fuel with JP8 fuel. The second area is to examine the different control strategies used in advanced diesel engines to meet the emission goals and their effect on engine performance, fuel economy and exhaust emissions. This requires a basic understanding of the different strategies used in the commercial vehicles to meet the emission standards and to develop new strategies to optimize the fuel economy and maximize the power density without exceeding the low smoke limits allowable in the field. The third area is a fundamental investigation on the lubrication of the main engine bearings. Four codes have been developed in Matlab to calculate the loading of the engine main bearings and, determine the journal orbit and the oil film thickness.

Limitations:  APPROVED FOR PUBLIC RELEASE

Description: Final rept. 1 Sep 2002-31 May 2004

Pages: 76

Report Date: 15 OCT 2004

Contract Number: DAAD19-02-1-0372

Report Number: A439924

 **Keywords relating to this report:**

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