

INTRODUCTION

Welcome to the Infineum *PC-9 Development Notebook!*

As an introduction to this notebook, we would like to offer a general description of the events shaping the development of this new category.

On December 1, 1998, API licensing commenced for API CH-4. This is currently the highest API performance category for emission-controlled four stroke heavy duty diesel lubricants. The previous quality upgrade in lubricants for this class of engines occurred less than four years earlier with the introduction of API CG-4. However, the cycle of change continues to accelerate as the Engine Manufacturers Association have already requested Proposed Category 9 (PC-9) for licensing by January 2002 - less than three years away!

Recent negotiations between certain diesel engine manufacturers and the U.S. Environmental Protection Agency (EPA) have resulted in a settlement that includes a tightening in the emissions limits by October 2002. To meet these requirements, diesel engine manufacturers expect to introduce new emission control technology, such as exhaust gas recirculation (EGR), to control nitrogen oxides (NOx) to the 2002 limits. The anticipated increase in lubrication severity caused by these planned design changes have prompted the request for PC-9.

Prior to the recent EPA settlement, the next upgrade in diesel lubricant quality by the API was expected to occur in 2004. This schedule would have provided reasonable time for ASTM to develop the new category, engine builders to better understand diesel engine design changes, and the lubricant industry to bring forward next generation lubricants to support next generation engine technology. The advancement of these tightened emission limits which also drive the need for PC-9 quality lubricants from 2004 to 2002, has created intense pressure for diesel engine manufacturers, lubricant marketers, and additive companies to meet this aggressive time table. The API and ASTM organizations are no exception as they now face the challenge of identifying and developing the tests to be used to define PC-9 quality lubricants. In addition, API have historically required full completion of all ASTM test development activities one year before a new category is available for

licensing. This is required so that all companies have adequate time to complete qualification testing against the new test requirements.

History shows that the development of a diesel engine lubricant performance category, such as PC-9, in less than 3 years is a formidable task. This task is further complicated by the introduction of EGR as part of the new emission control strategy. Hardware configurations and operating conditions for EGR applications are not fully defined and test engines for performance benchmarking and new product development are not expected to be available until later this year

Under these circumstances, conventional approaches to category development will not be adequate to develop PC-9 by 2002. Fundamental changes in the way our industry operates and true compromise by all industry participants is critical to the success of PC-9. EMA members must identify the absolute minimum number of tests to ensure that EGR equipped engines will operate satisfactorily in 2002. ASTM, CMA and API must develop these tests in the most time saving and cost effective manner. Category development costs must be driven to an absolute minimum and the approval costs associated with PC-9 must be maintained at a reasonable level. In summary, the requirements for PC-9 must be streamlined to include only those criteria essential to protect 2002 engines. If this can be achieved, PC-9 may have a reasonable chance to meet the requested target introduction date of January 2002.

The engine design and lubricant technology advancements envisioned for PC-9 represent significant change in our industry. With this change comes opportunity and Infineum fully expects to position our customers to capitalize on these potential opportunities through new product innovations. We are well positioned to take advantage of the broad range of expertise available within our recently formed joint venture to extend our already strong diesel lubricant technology to meet the challenges and opportunities of tomorrow.

As we did with the PC-7 Development Notebook, it is our intent to issue periodic updates to this document to keep you apprised of developments as they occur. Most often these updates will follow meetings of the ASTM Heavy Duty Engine Oil Classification Panel (HDEOCP). However, any industry event which markedly impacts the PC-9 development process would also result in an update.

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