

PC-9 Matrix Design Task Force

Status Report

To

ASTM Heavy Duty

Engine Oil Classification Panel

December 5, 2000

(Modified to address Changes Requested
by the HDEOCP on November 2, 2000)

PC-9 Matrix Design Task Force Update

Final Formulations Matrix (9 Test Oils)

Code	Technology	Base Oil	Featured Oil for This Test
PC-9A	X	1	T-10/EGR
PC-9B	X	2	---
PC-9C	X	3	---
PC-9D	Y	1	---
PC-9E	Y	2	M11/EGR
PC-9F	Y	3	---
PC-9G	Z	1	---
PC-9H	Z	2	---
PC-9J	Z	3	1Q/EGR

PC-9 Matrix Design Task Force Update

Final Experimental Test Matrix Designs (The Movie*)

PC-9 Matrix Design Task Force

Revised -- November 10, 2000

PC-9 Matrix Design Task Force Update

I. Assumptions

- o 3 DI/VI combinations, 3 base oils, and 1 Featured Oil/Test type**
- o Every factor level should be run at least 3 times to maintain Power, and at least 4 valid test results in each Matrix stand to account for bias**
- o At least 8 degrees of freedom (DF) to estimate test variability, and at least 6 repeats on identified Featured Oils**
- o Main effects and 2-Way Interactions (Except with Stand) are estimable**
- o Independent Labs must run the majority of the Featured Oils (HDEOCP)**
- o Dependent Labs are Limited to 4 runs per stand (HDEOCP)**
- o Featured Oils should be run first in the Matrix (HDEOCP)**
- o Decision rules for Industry Matrix Testing have been satisfied**

PC-9 Matrix Design Task Force Update

II. Experimental Test Matrix Design Oils

Nine Matrix Oils are Formulated (Blended Lubricants)

	Technology		
Base Oil	X	Y	Z
1	PC-9A	PC-9D	PC-9G
2	PC-9B	PC-9E	PC-9H
3	PC-9C	PC-9F	PC-9J

Note:

PC-9A is the Featured Oil for the T-10/EGR,

PC-9E is the Featured Oil for the M11/EGR,

PC-9J is the Featured Oil for the 1Q/EGR.

PC-9 Matrix Design Task Force Update

III. T-10/ EGR Test Design

Lab/ Stand						
Lab 1		Lab 2	Lab 3		Lab 4	Lab 5
1	2	3	4	5	6	7
A	A	A	A	A	A	A
G	A	G	D	A	A	D
E	E	B	H	E	H	B
C	J	F	C	J	F	J

PC-9 Matrix Design Task Force Update

IV. M11/ EGR Test Design

Lab/ Stand					
Lab 1		Lab 2	Lab 3		Lab 4
1	2	3	4	5	6
E	E	E	E	E	E
H	E	H	B	E	B
A	G	D	G	A	D
F	C	C	F	J	J
E			E		

PC-9 Matrix Design Task Force Update

V. 1Q/ EGR Test Design

Lab/ Stand						
Lab 1		Lab 2	Lab 3		Lab 4	Lab 5
1	2	3	4	5	6	7
J	J	J	J	J	J	J
C	J	C	F	J	J	F
E	E	H	B	E	B	H
G	A	D	G	A	D	A

PC-9 Matrix Design Task Force Update

VI. NOTES

- o The Featured Oil is run 10 Times in every Test
- o Each Stand Tests every Base Oil and Technology

PC-9 Matrix Design Task Force Update

Proposed Timeline:

- **PC-9 Formulations Matrix**
 - Technologies Selected *April 11, 2000*
 - Technologies Available *September 7, 2000*
 - Base Oils Available *October 10, 2000*
 - Blends Prepared (Available) *November 27, 2000*

- **PC-9 Matrix Testing**
 - Matrix Start *December 2000*
 - Matrix Completion *March 2001*
 - Data Evaluation Completed *April 30, 2001*