

Low Temperature Pumpability of Used Heavy Duty Diesel Engine Oils from Field Trials

Presentation to HDEOCP
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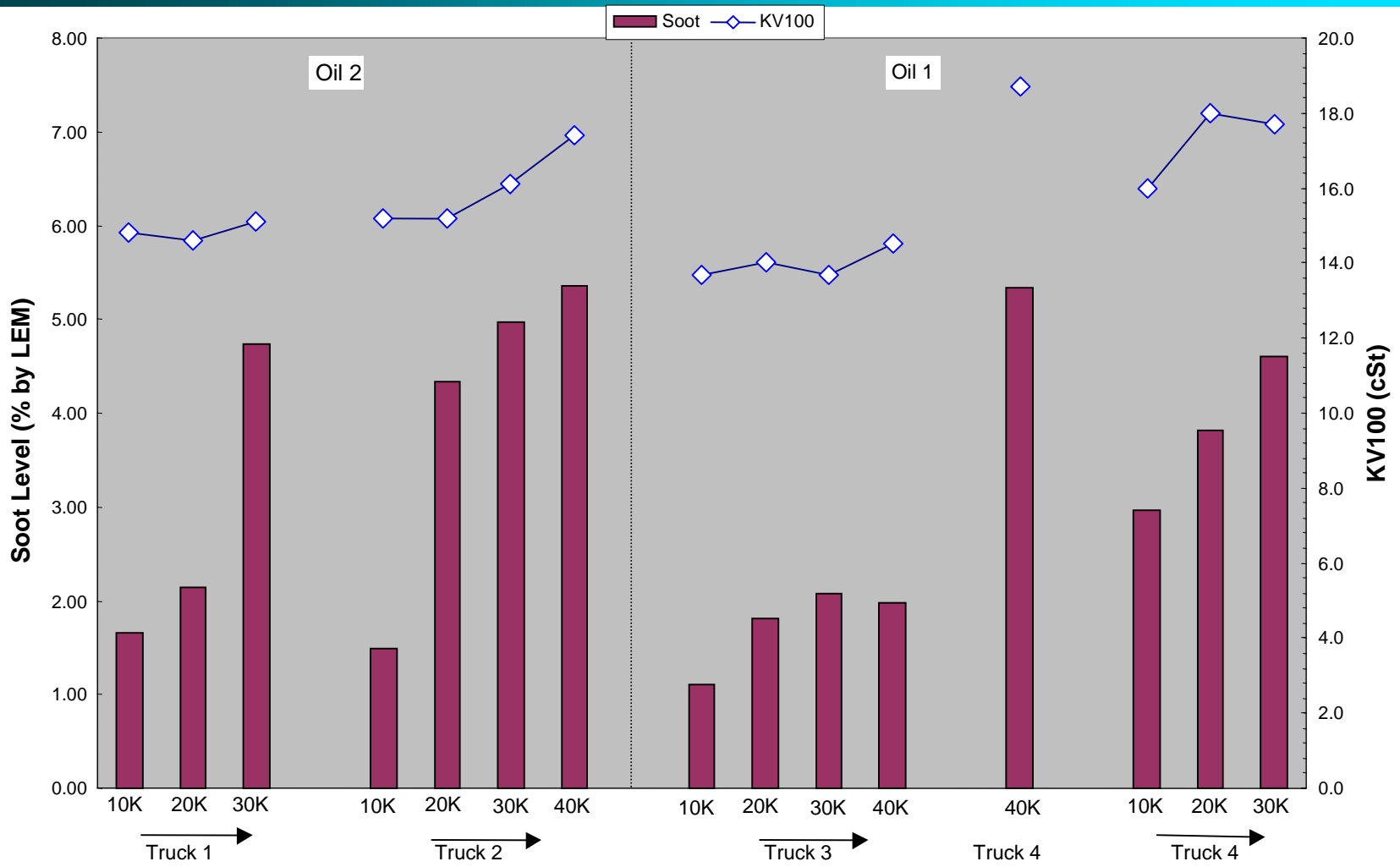
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1. Field Test Overview

- ❖ Two SAE 15W-40 oils blended to similar KV100 and CCS
- ❖ Used identical DI additive and Group I basestock
- ❖ Blended to similar KV100 and CCS
- ❖ Both oils comfortably passed fresh oil MRV-TP1
- ❖ Mack E7-375 engines, short haul, full load, 40K miles ODI
- ❖ Oil samples collected at ~10K miles to ODI

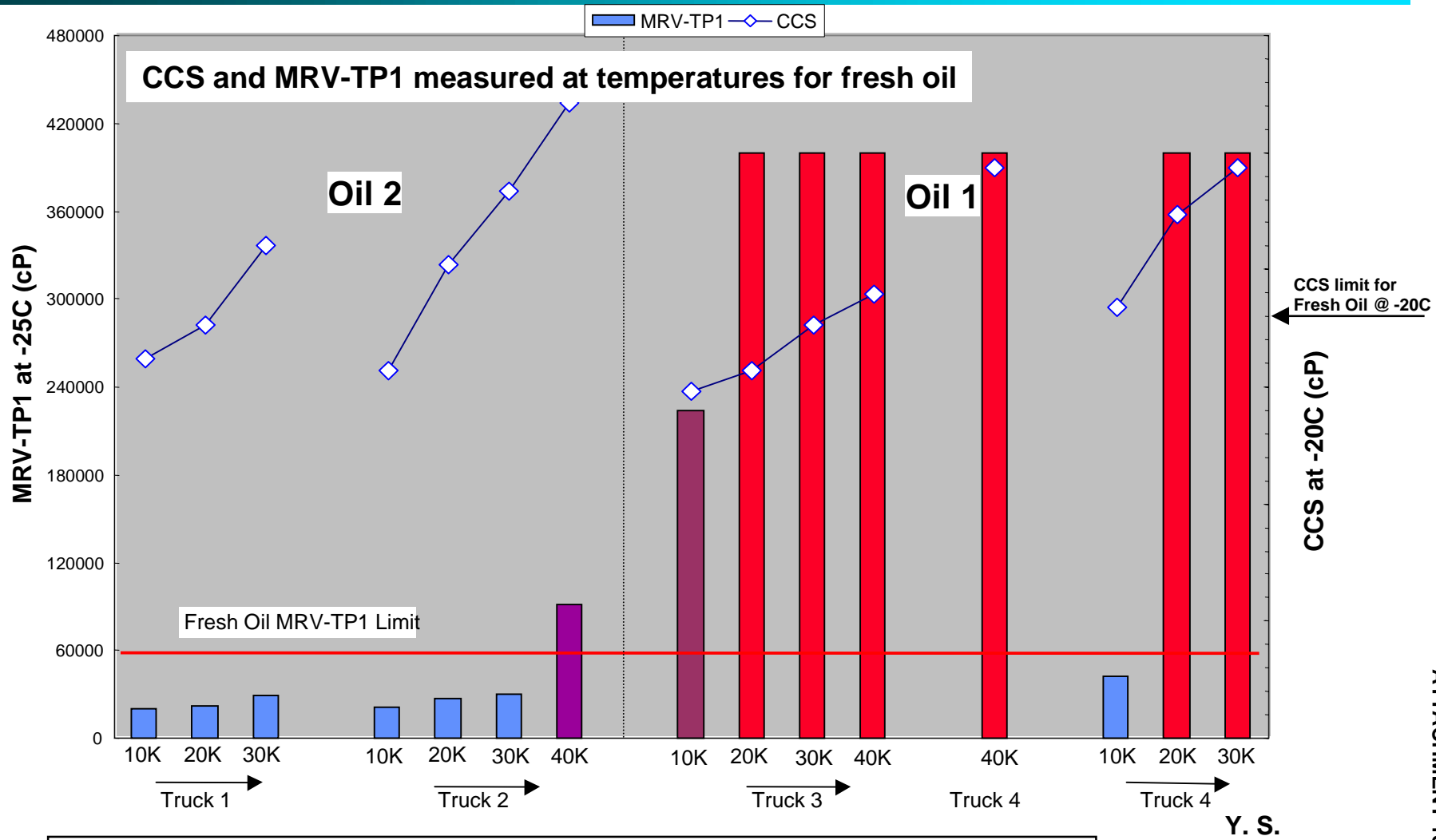
	Oil 1	Oil 2
KV @100C, cSt	15.2	15.47
CCS @-20C, cP	5660	5660
MRV-TP1 @ -25C, cP	15363	21995

Soot and KV100 versus Mileage



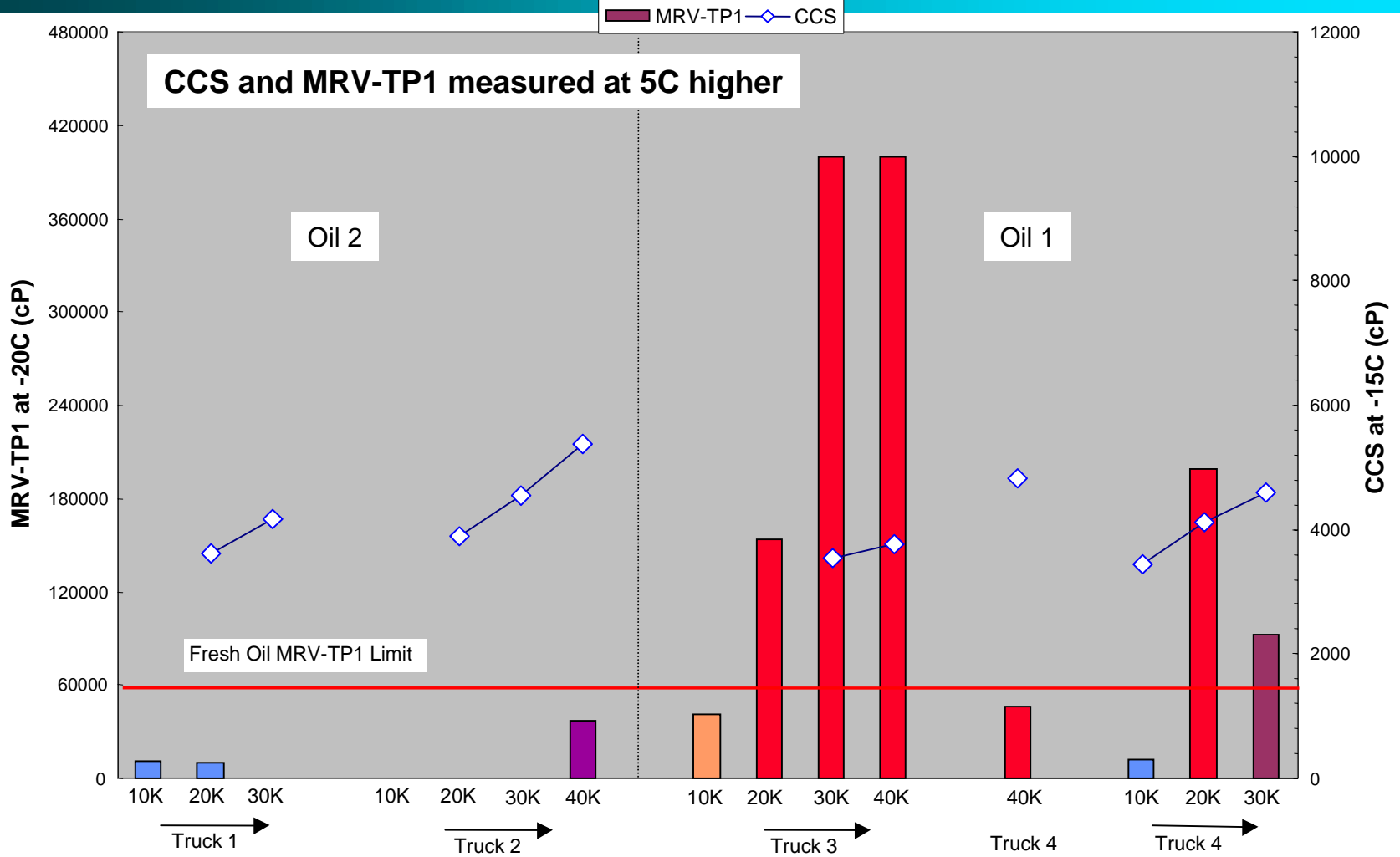
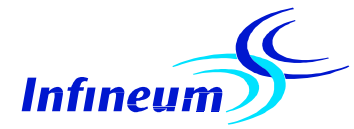
- Soot level increased with service
- Additive technology maintains excellent control of KV100

CCS and MRV-TP1 (@Standard Temperature)

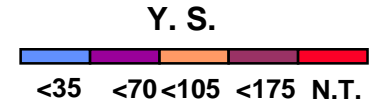


- Both oils show similar CCS increases in service
- Oil 1 significantly worse in MRV performance

CCS and MRV-TP1 (@5C Higher)



- Oil 1 continues to be poor in MRV performance even at 5C higher temp



2. Used Oils from Modified Mack T8E Tests

- ❖ Two commercial oils were sooted to ~10% soot in modified Mack T8E tests
- ❖ KV100 and MRV-TP1 were measured on end-of-test oils

	Oil A	Oil B
End-of-Test Soot, %	10.5	9.2
KV100 Increase, cSt	46.34	81.90
Relative Viscosity @4.8% Soot	1.34	1.39
Slope of Relative Vis @5.8% Soot	0.38	0.40
Used oil MRV-TP1 @ -25C, cP	102225/<140 YS	64050 / <70 YS

- ❖ MRV-TP1 performance of used oil is not predicted by KV100 increase, relative viscosity or viscosity slope
 - If anything, an inverse correlation is evident

- ❖ **Certain oil exhibit potential for low temperature pumpability problems in the field**
 - **Some technologies may experience problems at soot levels as low as 2%**

- ❖ **Used oil MRV performance is NOT predicted by**
 - **Fresh oil MRV**
 - **KV100 increases or other common rheological measurements**