

European Engine Oil Specifications & Testing Requirements



Dr. Tono Nasch
Lubricants Russia - 2006

I.S.P.

ACEA Sequences

- The sequences define the **minimum quality level** of a product for self-certification to EELQMS and presentation to ACEA members.
- **Performance parameters other than those covered by the tests shown or more stringent limits may be indicated by individual ACEA member companies.**



CEC Tests for ACEA Sequences

CEC



MB OM 364 LA	Light Duty Diesel	CEC L-42-T-99
MB OM 441 LA	Heavy Duty Diesel	CEC L-52-T-97
MB OM 602 A	Passenger Diesel	CEC L-51-A-98
MB M111 Sludge	Gasoline	CEC L-53-T-95
MB M111 FE	Gasoline	CEC L-54-T-96



VW IC	Passenger Diesel	CEC L-46-T-93
VW TDI 2	Passenger Diesel	CEC L-78-T-99



PSA TU3 Scuff	Gasoline	CEC L-38-A-94
PSA TU5 JP HTDT	Gasoline	CEC L-88-02
PSA DV4	Passenger Diesel	CEC L-93-04

CEC Engine Tests in ACEA 2004

	Piston	Wear	Deposits	Lubricant properties	diverse
					
A/B and C Categories Gasoline & Diesel Engines	TU5JP-L4 DV4TD VW TDI	TU3M Scuffing OM 602A	M111 Sludge	TU5JP-L4 DV4TD OM 602A	M111 FE
E Categories Heavy Duty Diesel Engines	OM 441LA	OM 602A OM 441LA		OM 602A OM 441LA	OM 441LA

Driving Forces for new Test Methods

- **Non availability of hardware**
- **Changes in lubricant performance demands**
- **Technical needs / field problems**
- **New engine design**

- **New CEC tests**

- **Turbocharger Deposit**
- **OM 646 LA**

- **New tests with specific OEM hardware (some OEM)**

OEM Inhouse Tests

- VW RNT 650 hrs
- VW RNT 250 hrs
- VW T4
- VW Audi FE
- VW FSI
- VW DPF
- VW Baumusterprüfung



- Opel OP1
- Opel RNT Valve Train
- Opel Aeration
- Opel Fuel Economy
- Opel Diesel Wear



- Volvo D12D
- Volvo D12D FE



- BMW N52 FE
- BMW N52 Aeration
- BMW N52 Oil Test
- BMW N42 RNT



- DC OM 611 LA
- DC M271 Wear
- DC M271 Sludge
- DC OM 501 LA



- Porsche 997



- MAN 2876 LF04



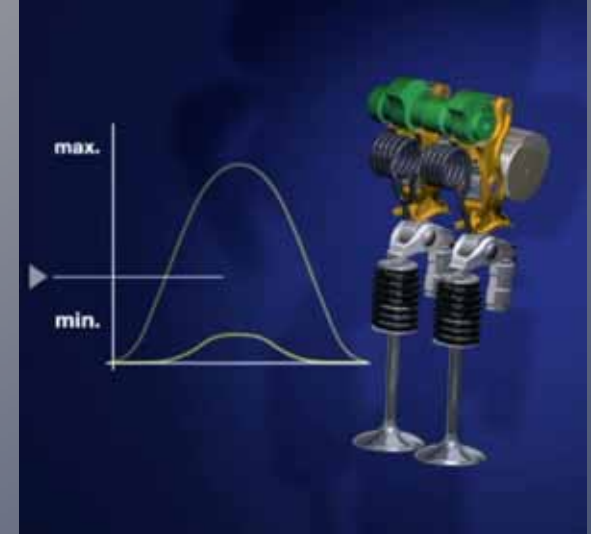
OEM Requirements for specific Wear Tests



multiple

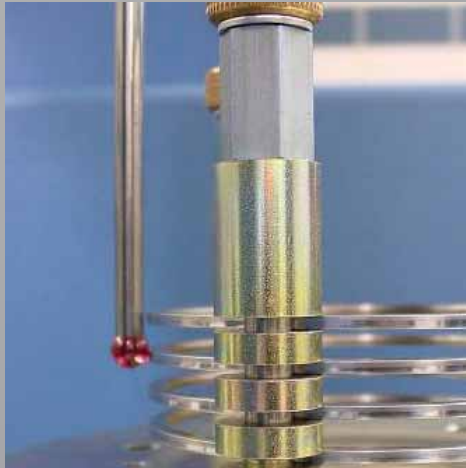


Unit Injection



Valvetronic

M 271 Wear Test – Test Criteria



- **Piston ring radial wear (1st ring / 2nd ring)**
- **Piston ring axial wear (1st ring)**
- **Piston ring groove wear (1st groove)**



- **Cam wear (inlet/outlet)**
- **Bore polishing**
- **Bearing wear**



- **Timing chain elongation**

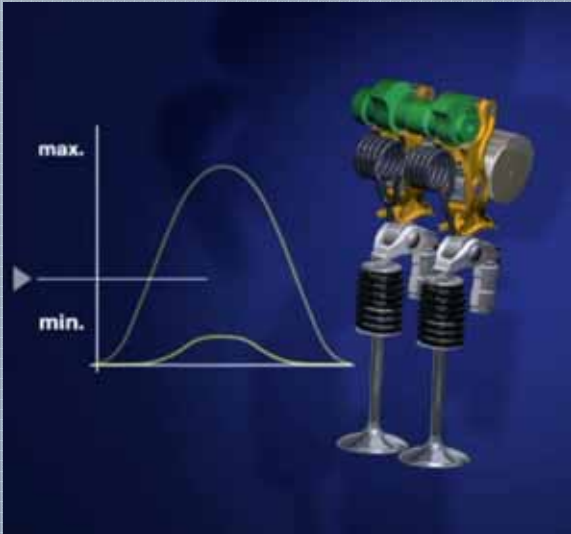
OEM Requirements for specific Wear Tests



multiple



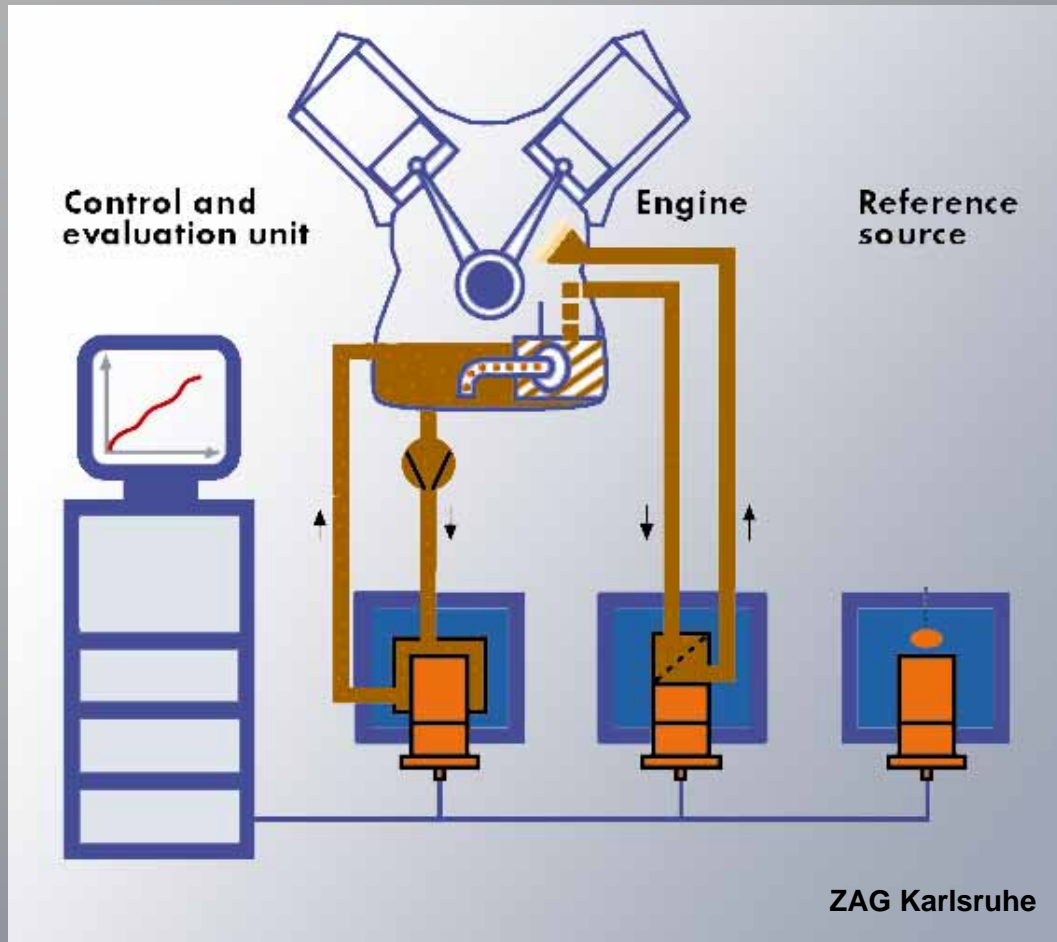
Unit Injection



Valvetronic

related to specific operating conditions

Radiotracer Wear Measurements (RNT)

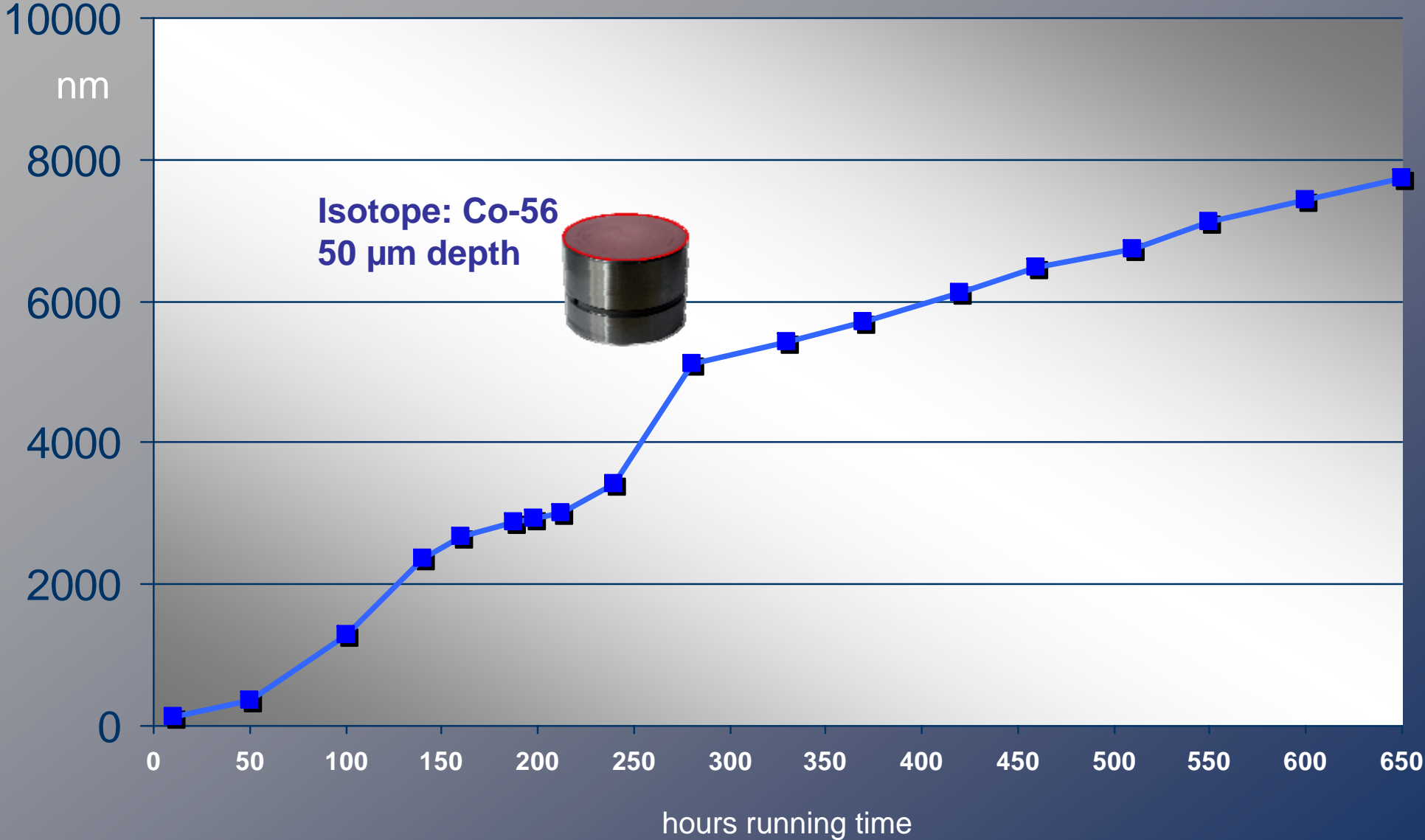


Benefits

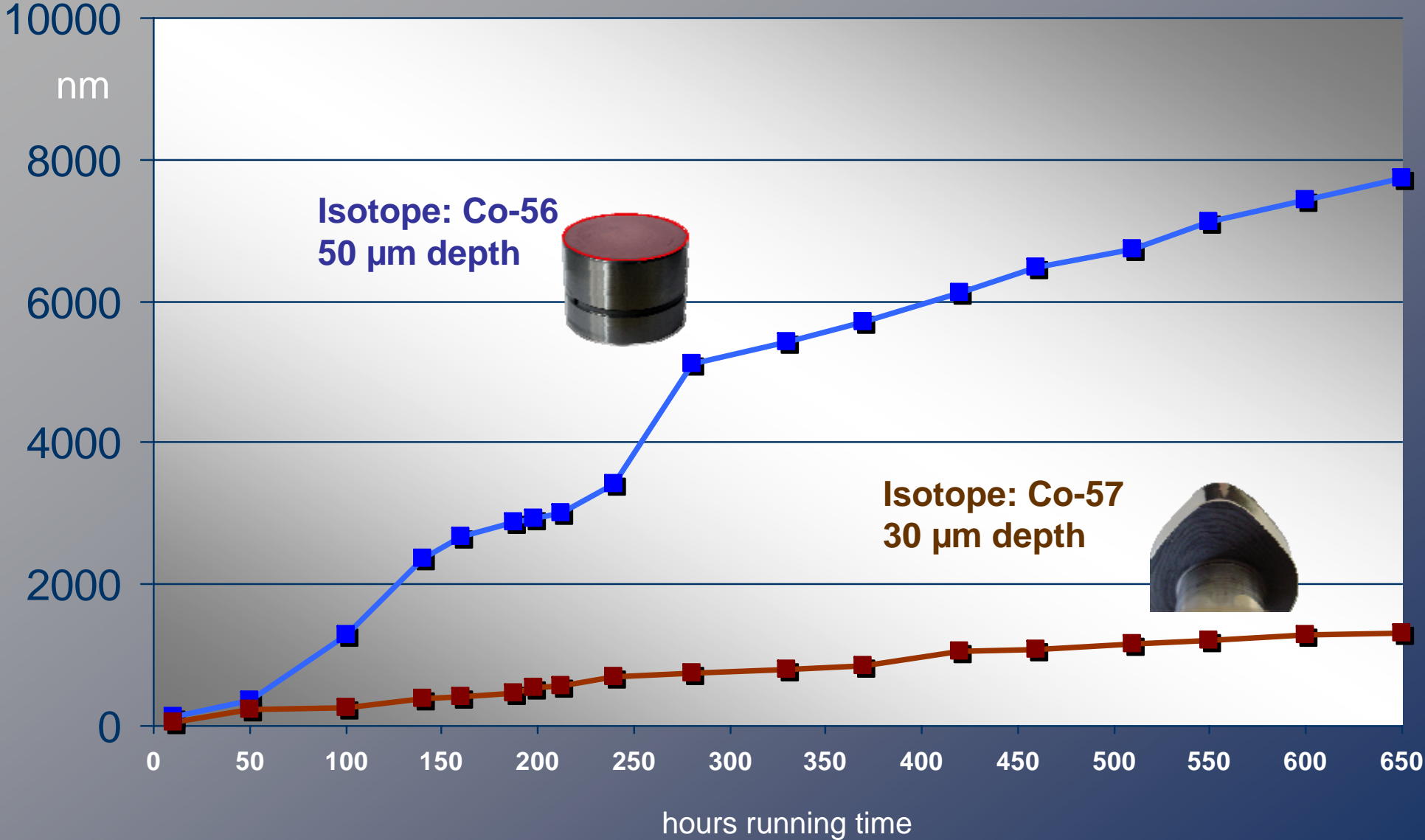
- online
- precise
- selective

wear measurements
of ferrous engine parts

Example: Online Wear VW RNT Test



Example: Online Wear VW RNT Test



VW 504.00 / 507.00 Engine Performance Requirements

ACEA A3/B4-04

- M111 Sludge with more severe limits
- VW TDI2 with more severe limits

VW Inhouse Tests

- VW T4
- VW Fuel Economy
- VW 650h RNT
- VW FSI (PV 1481)
- Endurance Tests “Baumusterprüfung”



Summary

- **European car manufacturers regard engine lubricants as an important construction element of the engine rather than just an engine liquid**
- **ACEA sequences represent the minimum requirements for engine oil quality**
- **In addition several OEM's established their own inhouse tests in order to ensure compliance with their specific engine design**
- **The evaluation of modern engine tests with new test criteria requires new precise measurement technologies**