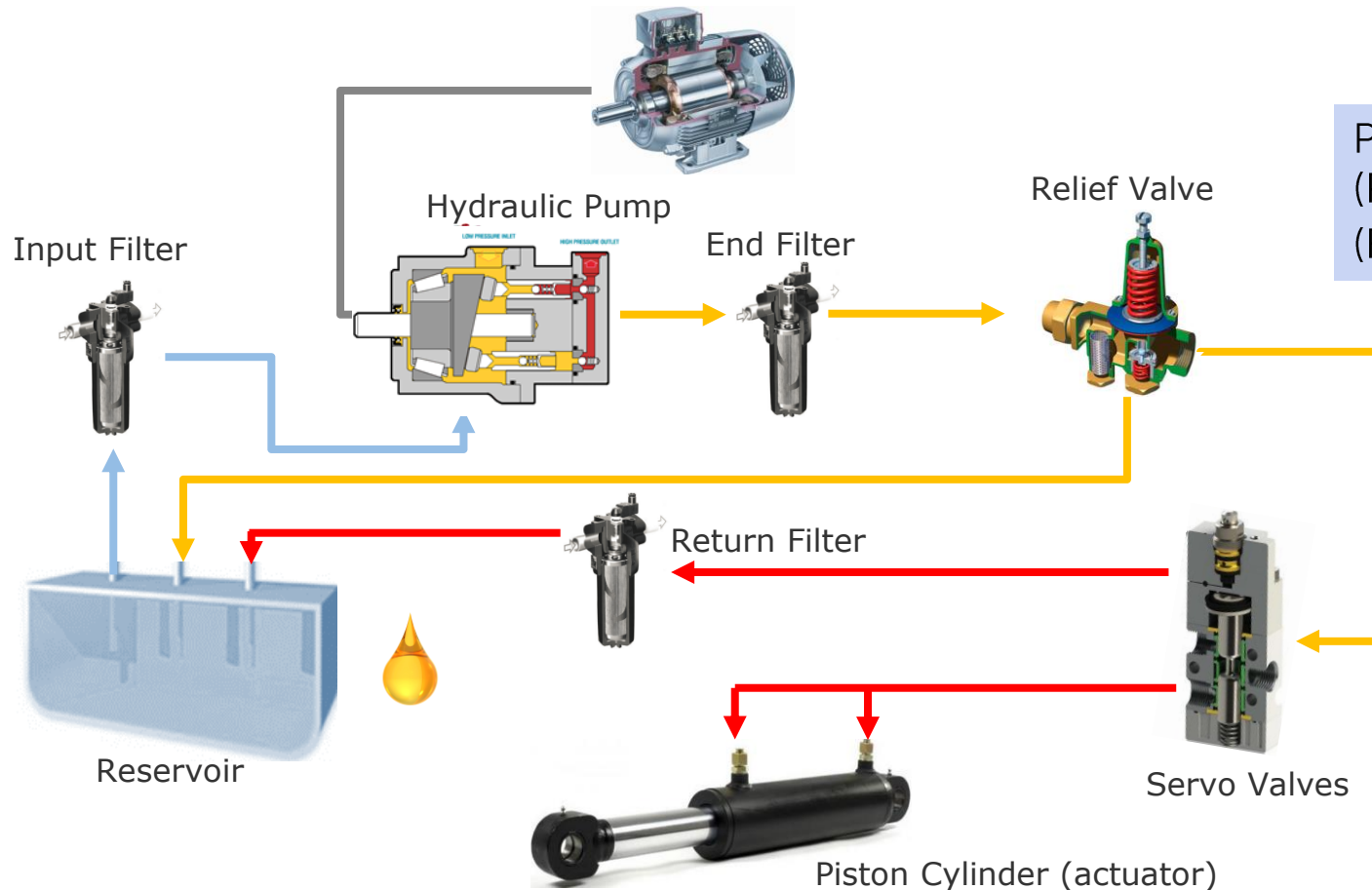


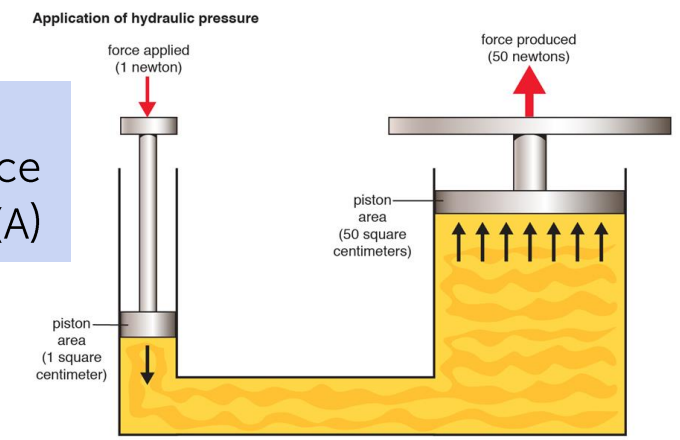
Lubricant Application: Hydraulic

Major components of Hydraulic System

Power unit (Electric Motor or Gasoline / Diesel Engine)



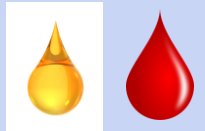
Question: What is the missing component?



Pressure (P) = Force (F)/Area (A)

- Mandatory hydraulic components:
1. Pump
 2. Valves
 3. Cylinder
 4. Oil Tank
 5. Connectors
 6. Seals
 7.???

Answer: **Hydraulic Fluid** – The live blood of hydraulic system
 The most important component, not “just an oil”

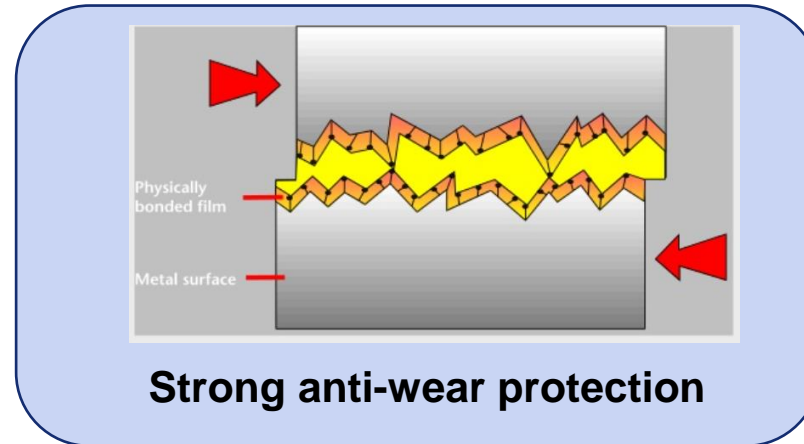
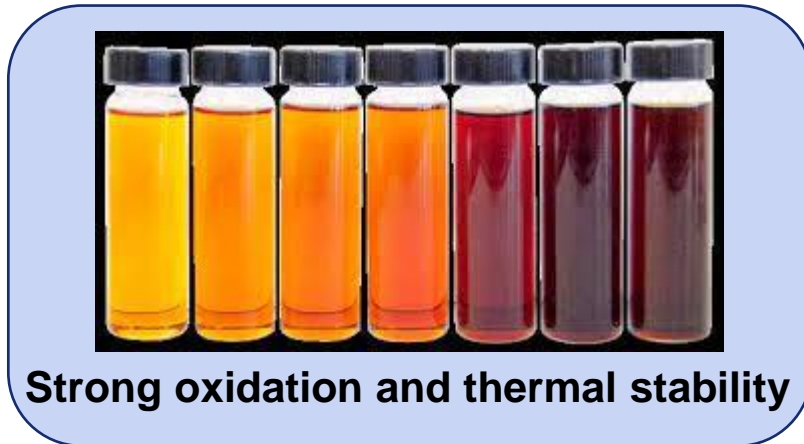
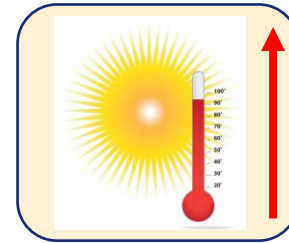
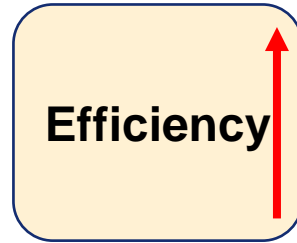
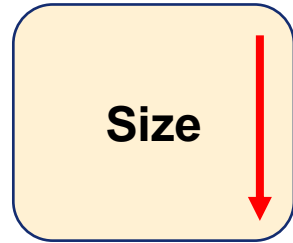
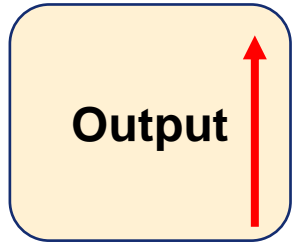


Why Hydraulic System are So Popular?

- ❑ Simple
- ❑ Efficient
- ❑ Compact
- ❑ Flexible
- ❑ Easy to control

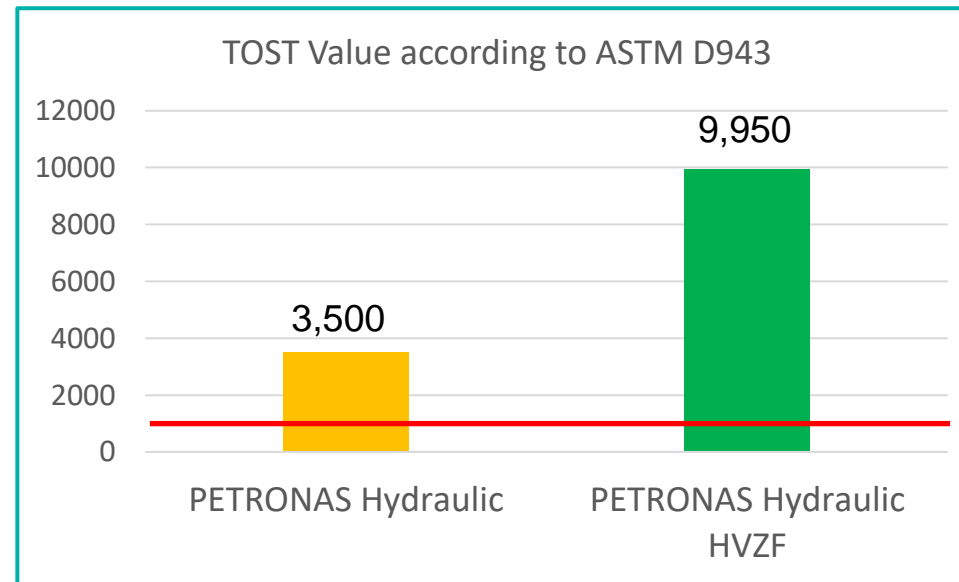


Current trend of hydraulic system and hydraulic fluid requirement



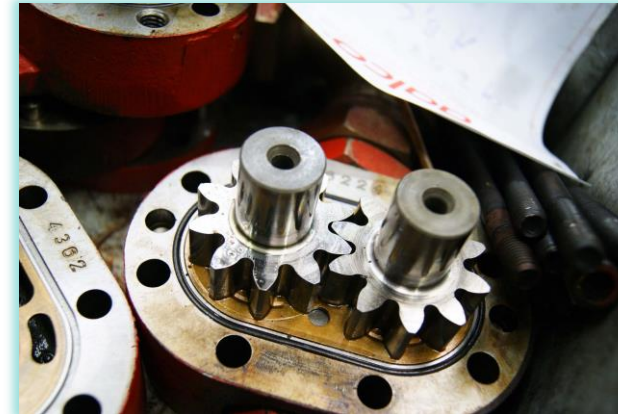
The advantages of zinc-free (ashless) anti-wear

- Excellent filterability – longer filter element lifespan
- Longer service life – As high as 200°C operating temperature
- Yellow metal protection
- Better thermal and oxidation stability – longer oil drain intervals
- Not aquatically toxic



Example of zinc-free hydraulic fluid: PETRONAS Hydraulic HVZF series

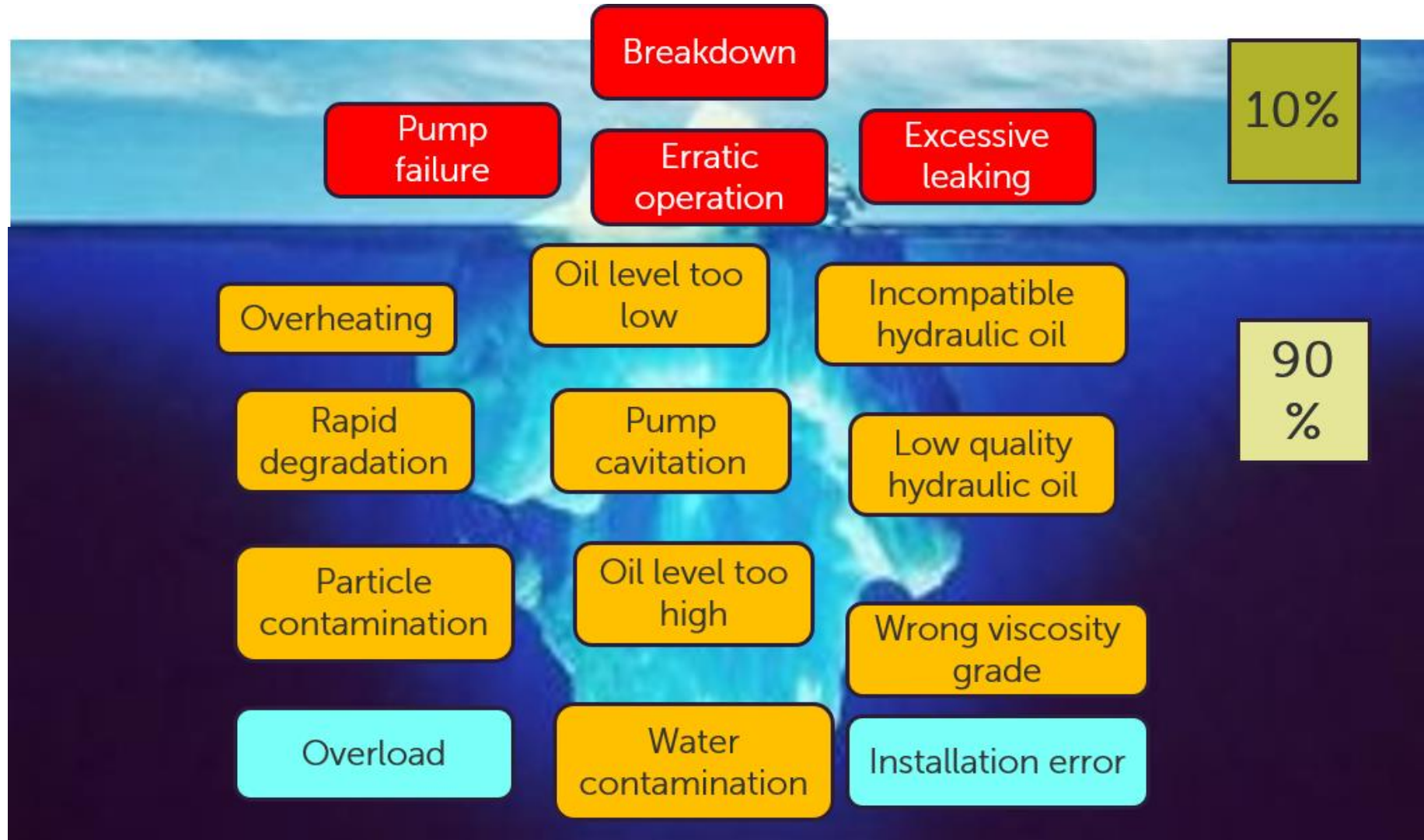
The most feared scenario...Breakdown!



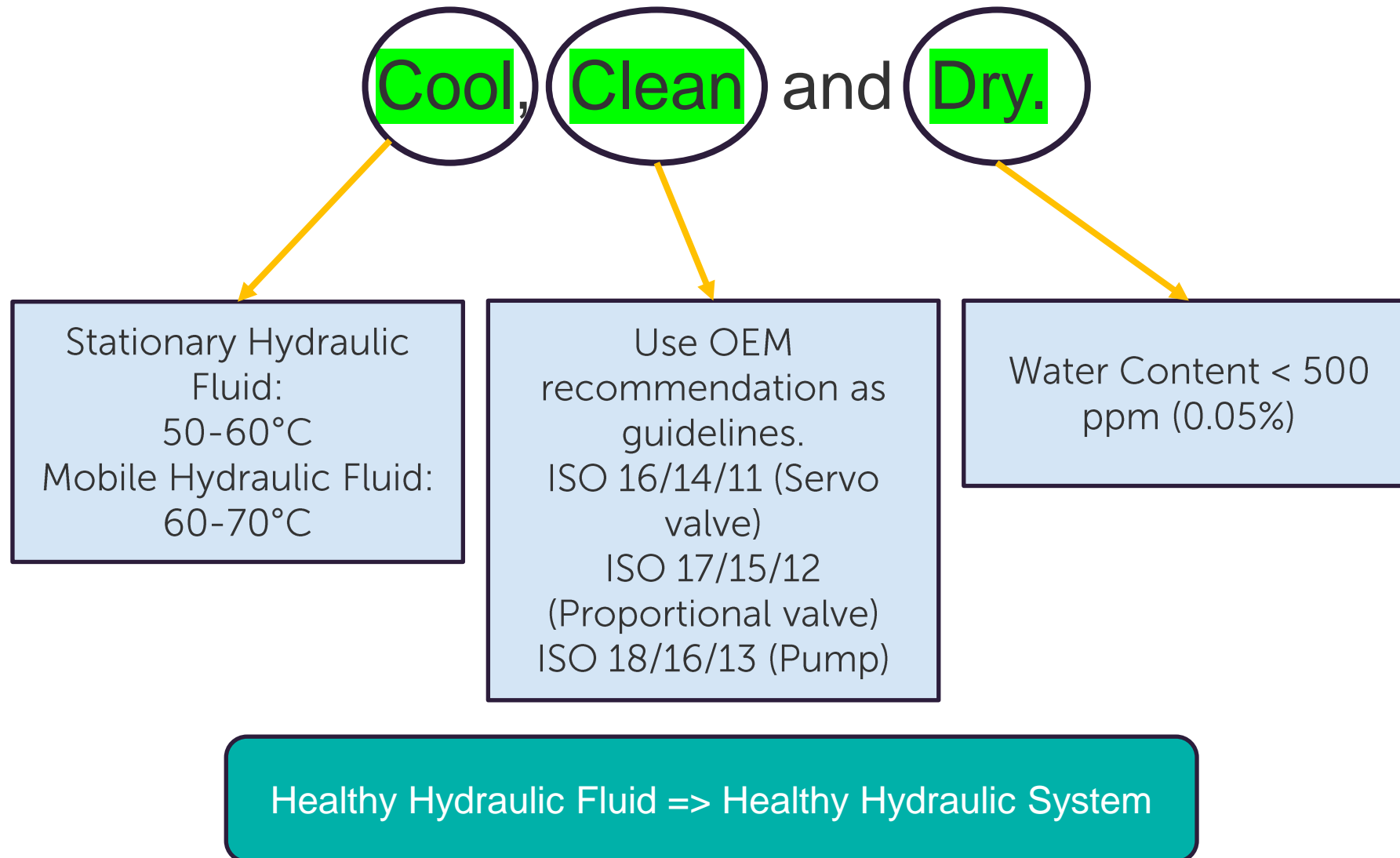
- Components replacement (pump, valves, cylinders, seal, filter)
- Extra manpower (service, troubleshoot, commissioning)
- HSE issues
- Lost of production (highest cost)





Why hydraulic systems fail?



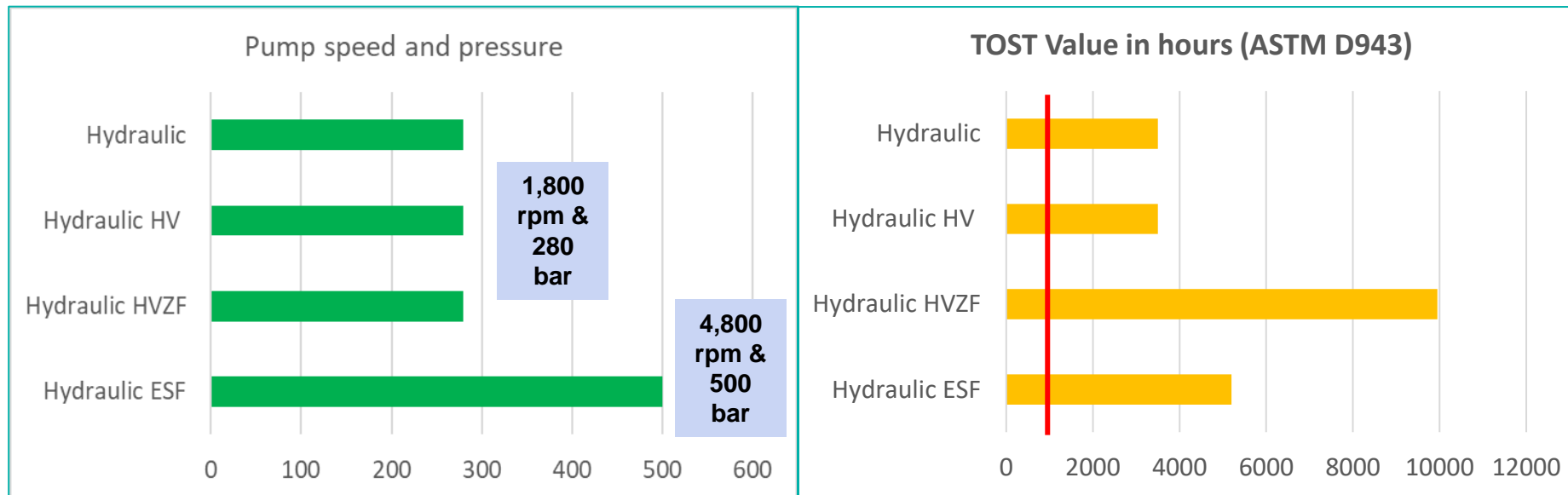
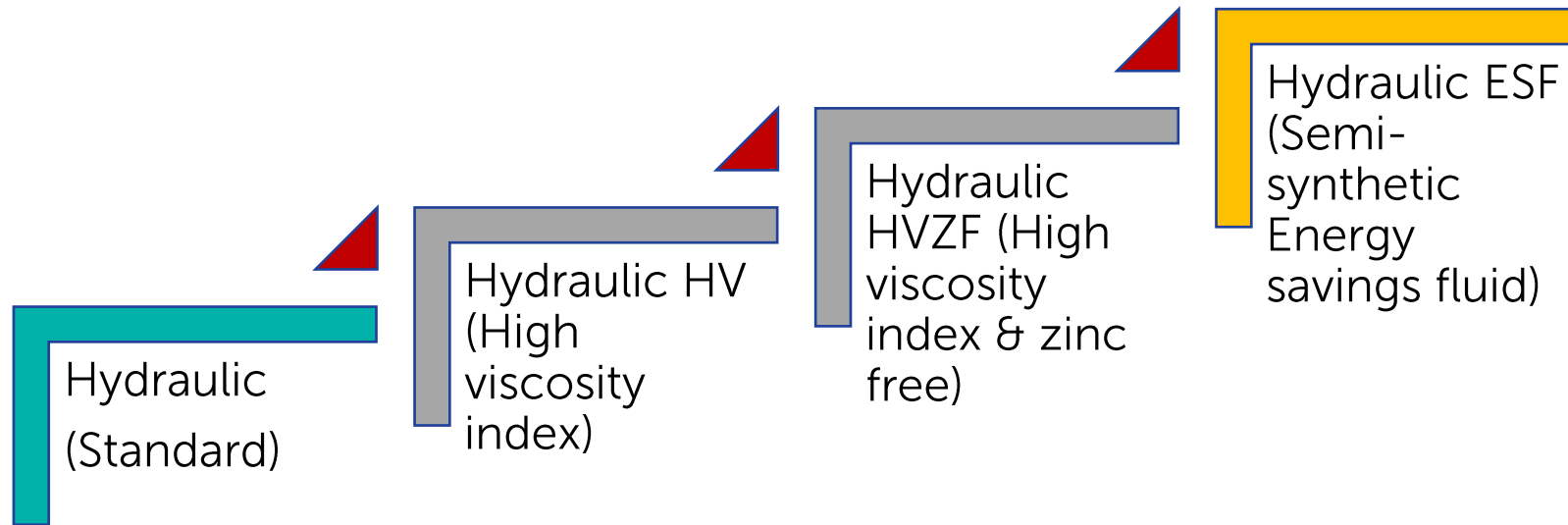
How to create a sustainable hydraulic systems?



International standard vs OEM standard

International Standard	OEM
<ul style="list-style-type: none">• ASTM D 6158 HM (2005)• DIN 51524 Part II HLP (2006)• ISO 11158 HM (FDIS 2008)• SAE MS1004• SEB 181 222 (2007)• US Steel 126,127 and 136• JCMAS HK P041 (2004)	<ul style="list-style-type: none">• Bosch Rexroth – Market leader• Parker Denison• Eaton Vickers• Fives Cincinnati
	

Range of PETRONAS Hydraulic Fluids



Proof of Performance



Product: PETRONAS Hydraulic HVZF 46
Customer: Skavaminas, Brazil
Hitachi 350 ZX Excavator
Severe operation: 20 hours a day
Feedback: "PETRONAS Hydraulic HVZF 46 ensured improved performance of the Skavaminas excavators."



Product: PETRONAS Hydraulic HV 46
Customer: Jotaeme Fitafer, Brazil
SCHMID HSR Press 630 tonne
Technical requirement: High VI with Rexroth RD 90220
Feedback: "PETRONAS Hydraulic HV 46 met the demanded expectations during 1 year of use."

Proof of Performance



Product: PETRONAS Hydraulic ESF 68
Customer: RPP Blue Metals
Volvo EC 210
Achievement: Meets OEM ambitious expectation of 5,000 oil operating hours
6-10% fuel savings
Customer's quote: "PETRONAS Hydraulic ESF 68 grants operational fuel savings of 6,000 lit/ vehicle per year"

Fuel savings: 1.36 litre/hour (summer)
1.94 litre/hour (winter)

In Malaysia: Cost of diesel fuel = RM 2.15 per litre
Total fuel savings per vehicle per year = RM 2.15 x 6,000 litre = RM 12,900.00
If a company own 20 vehicles = RM 12,900.00 x 20 = RM 258,000.00/year