

Pulse Jet Lubricating System

Wärtsilä Switzerland Ltd, which is licensor of Diesel united has developed pulse jet lubricating system.

Now, the field test of this system are carried out in service vessel.

We introduce here the general of pulse jet lubricating system.



Feature of Pulse Jet Lubrication

1. Background of development

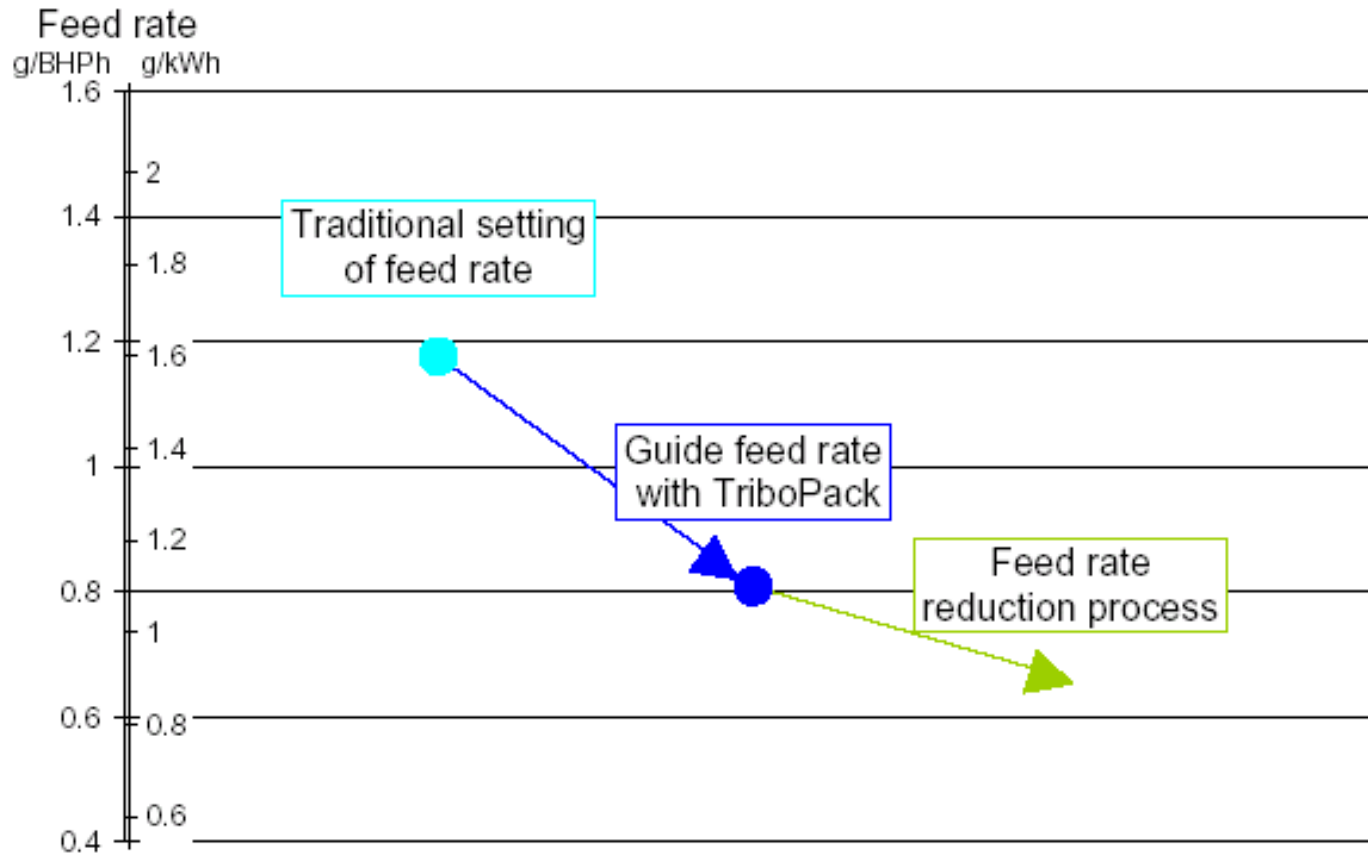
Pulse Jet lubricating system has been developed in order to achieve lower cylinder oil feed rate than conventional (accumulator) lubricating system.

2. Feature of conventional lubricating system

- ✓ Cylinder oil distribution by oil grooves and piston rings
- ✓ Lubricating period is adjusted by pressure difference in the cylinder
- ✓ Long time experience and reliability
- ✓ 1.1-1.3g/kwh (0.8-0.96g/psh) as actual result

Conventional (accumulator) lubrication

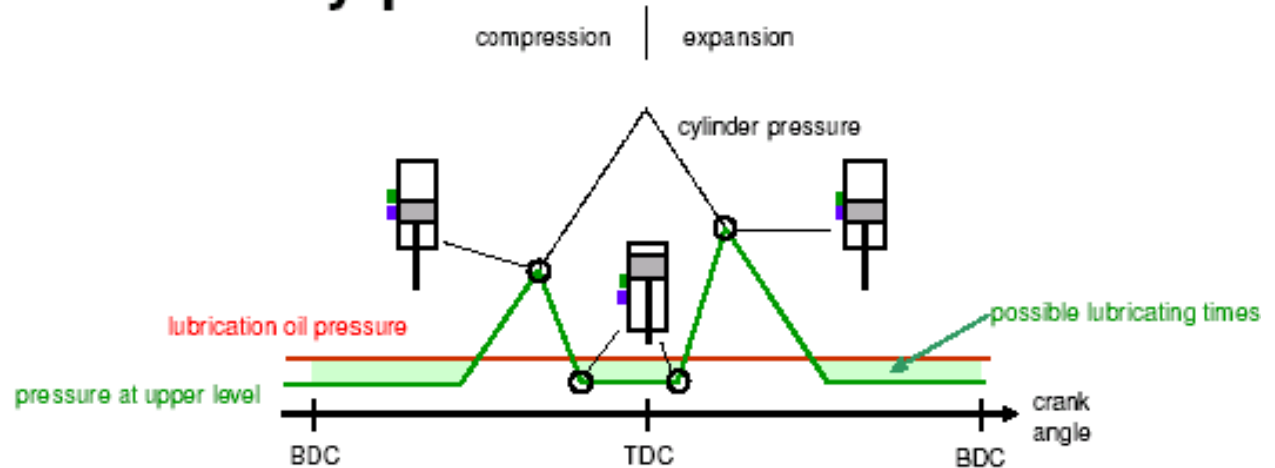
Transition of cylinder oil feed rate for RTA engines



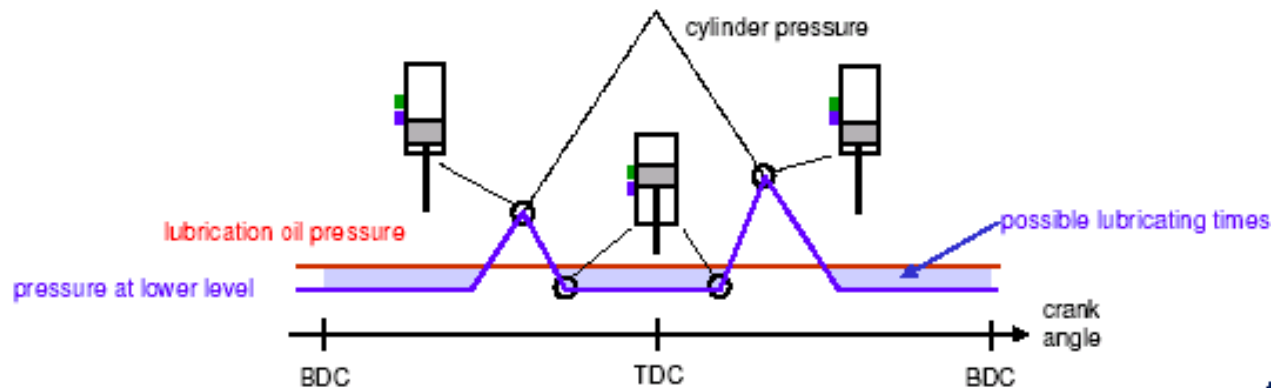
Conventional (accumulator) lubrication

Timing controlled by pressure difference

Upper level:



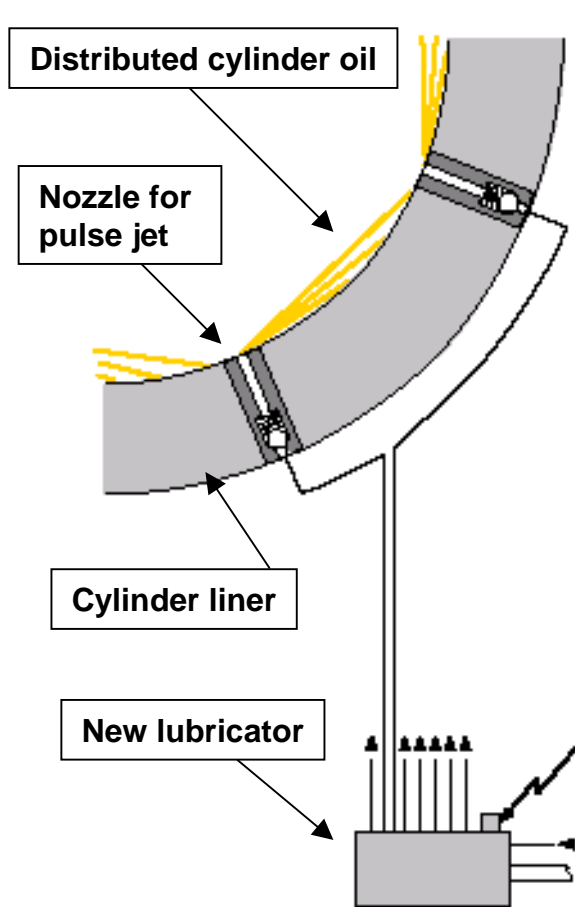
Lower level:



Cylinder oil is supplied only when the pressure of cylinder oil feeding is higher than the pressure in cylinder.

Pulse Jet Lubrication

Working principle



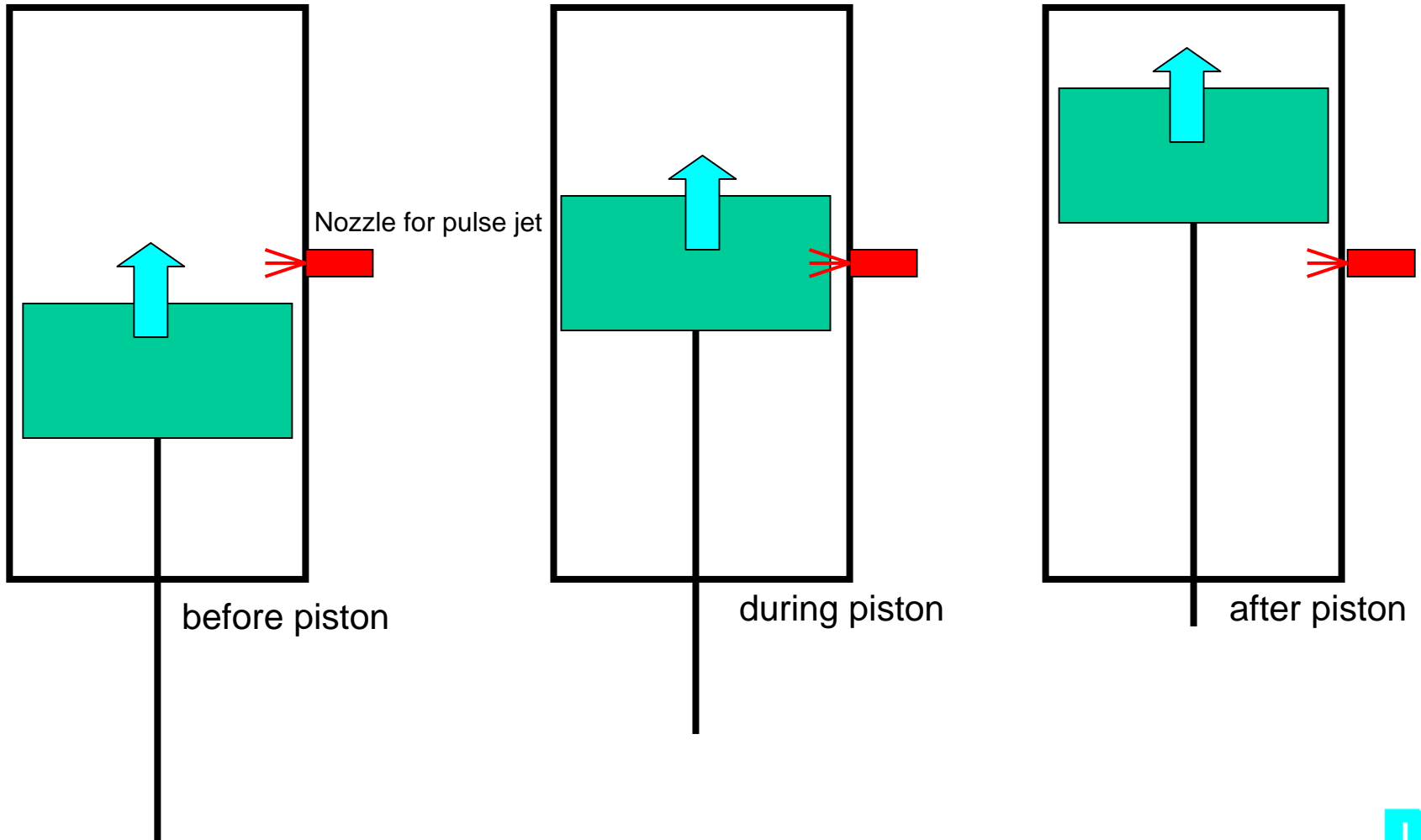
- ✓ Electrically controlled timing with full flexibility of timing point
- ✓ Oil distribution by a series of compact jet, no atomization, no loss of oil in scavenging air, no external leakage

Potentiality for further reduction of feed rate

- ✓ Precise dosage even for low feed rates
- ✓ Reliable oil quills (simple non return valves)

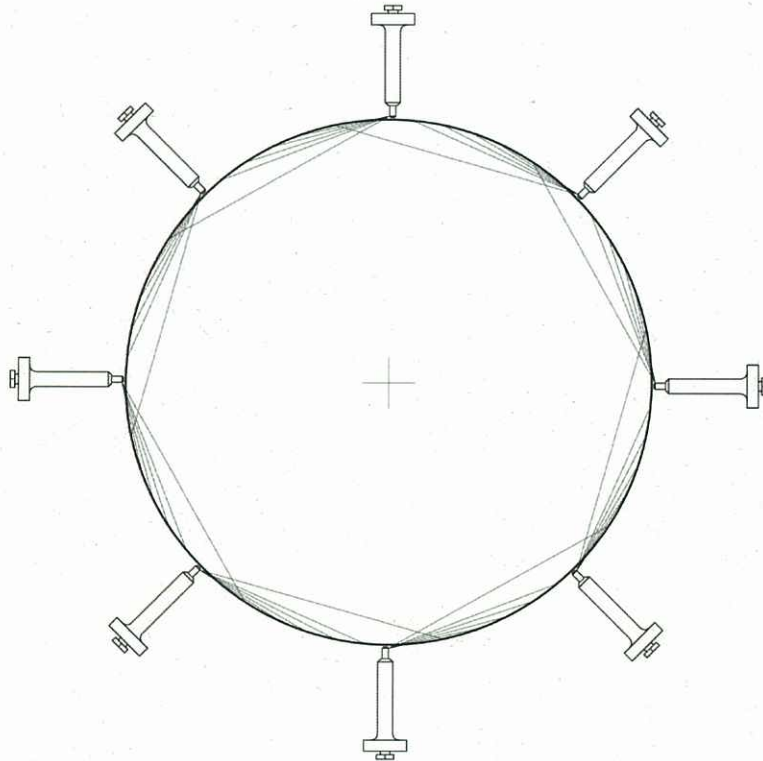
Pulse Jet Lubrication

Example of lubrication timing



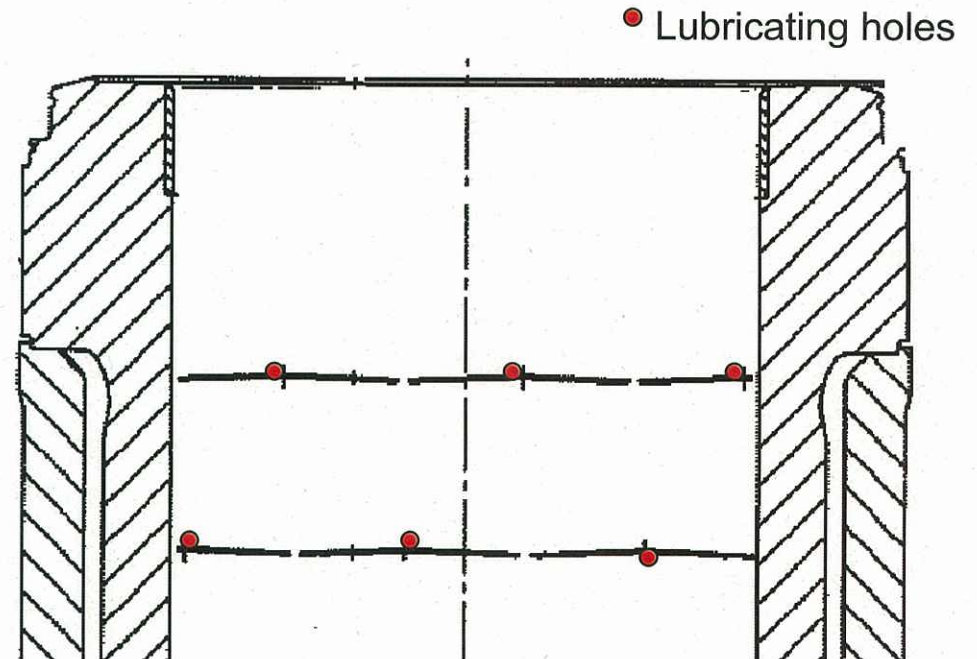
Comparison of lubricating point

Arrangement for RT-flex96C
(Pulse Jet lubrication)



- ✓ 8 quills per cylinder (single level)
- ✓ 5 oil jets per quill
- ✓ Total of 40 lubricating points on the liner surface

Arrangement for RTA/RT-flex96C
(Conventional lubrication)

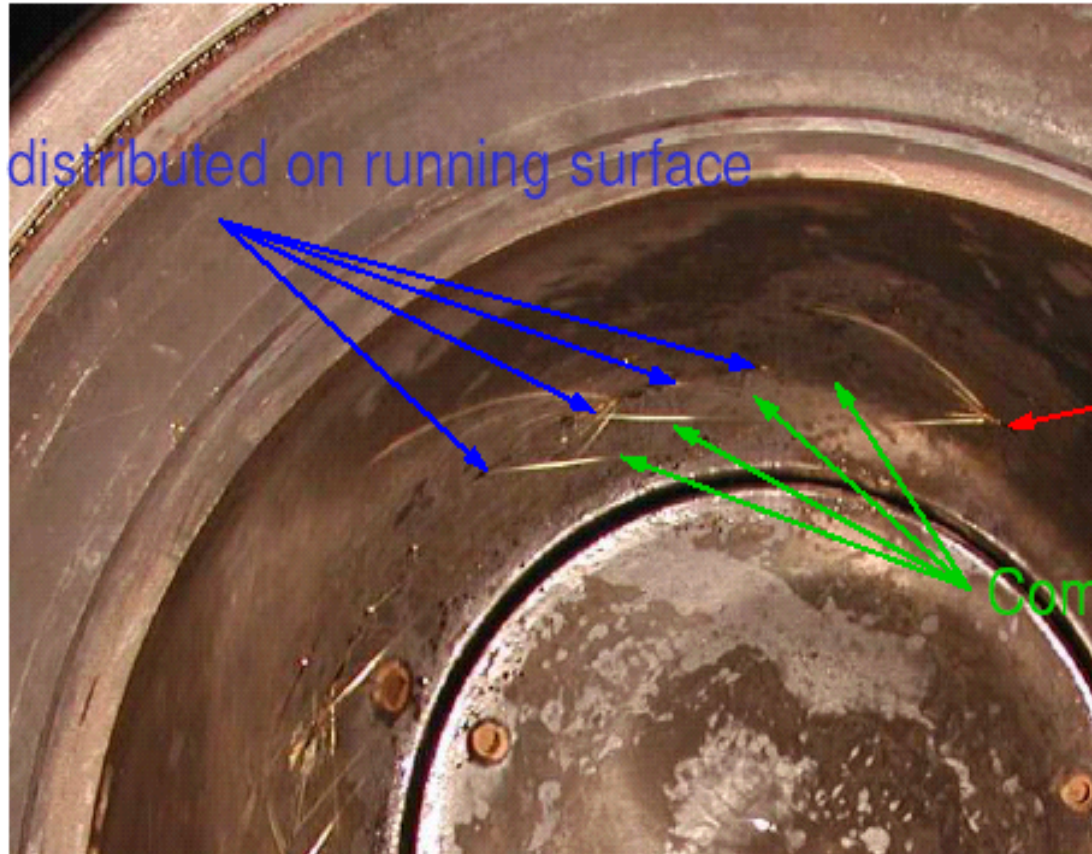


- ✓ 16 quills per cylinder (8 x 2 levels)
- ✓ Oil distribution by oil grooves and piston rings

Pulse Jet Lubrication

engine test, picture of oil distribution

Fresh lube oil distributed on running surface



Oil nozzle

Compact oil jets

Pulse Jet Lubrication

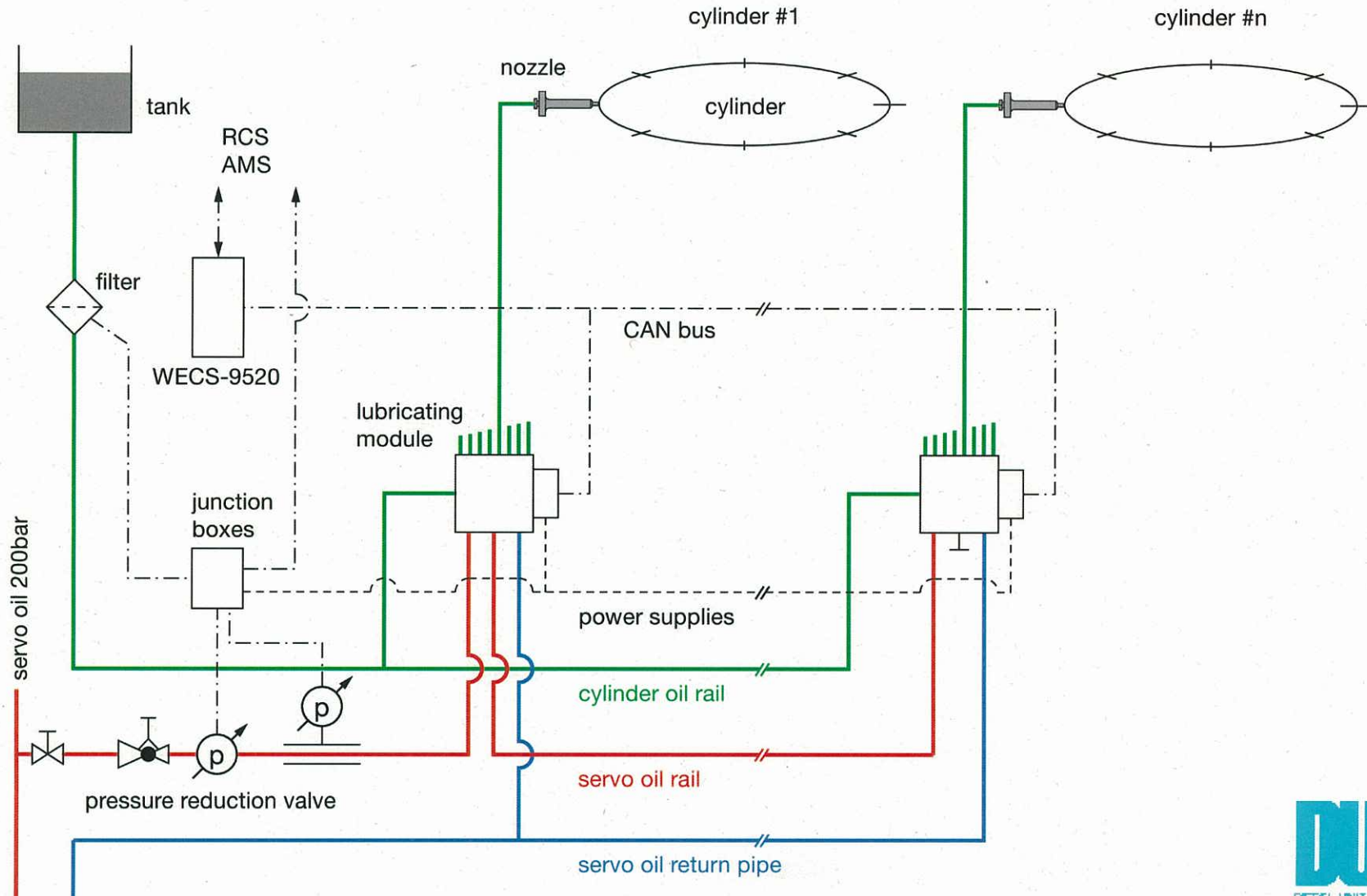
Picture of oil distribution (Test rig)

1. Oil quill
2. Groove for jet propagation
3. Equally distribution of lub.oil



Overview Pulse Jet for RT-flex engines

cylinder #1 until #n



Pulse Jet Lubrication

(Field test vessel with small bore engine)

Piston ring condition with 0.9g/kWh on Feb 2006

- ✓ cylinder liner and piston rings still in good condition in spite of cat fines.
- ✓ running hours of the systems: 10000h
- ✓ lowest feed rate: 0.6g/kWh during
- ✓ running hours with lowest feed rate: 2400h
- ✓ target of feed rate on field test
→ 0.6g/kWh (0.44g/bhph)

Pulse Jet Lubrication



- piston rings in good condition after 3000hrs (0.9g/kWh)

- Field test for large bore engine also has already started in 2005, and achieved 0.7g/kWh (0.52g/bhph) feed rate on March 2006. Total of 4000hrs from the system
- 750hrs with 0.8g/kWh feed rate, than reduction in March 2006
- First DU-SULZER engine equipped pulse jet lubricating system will be delivered on 2007.