

**NSB GROUP**

*global maritime competence*



# AE Cylinder Exchange Based Product (AEX)

NSB GROUP advanced diesel engine  
maintenance program

Powered by **stx** Engine



# NSB GROUP & STX Engine

## A long-lasting friendship

A long-lasting business collaboration of over 15 years  
in marine diesel engines

**2005**  
First delivery

STX-MAN diesel generator  
set delivery for **DSME-NSB**  
new ship building project

**2009**  
Total 56 Sets/117 MW

STX-MAN diesel generator  
set delivery completion  
for **DSME-NSB** new ship  
building project

**2019**  
Service level agreement

**STX Engine & NSB GROUP**  
sign a service level agreement  
for diesel generator set  
maintenance for more than  
ten vessels operated by  
REEDEREI NSB

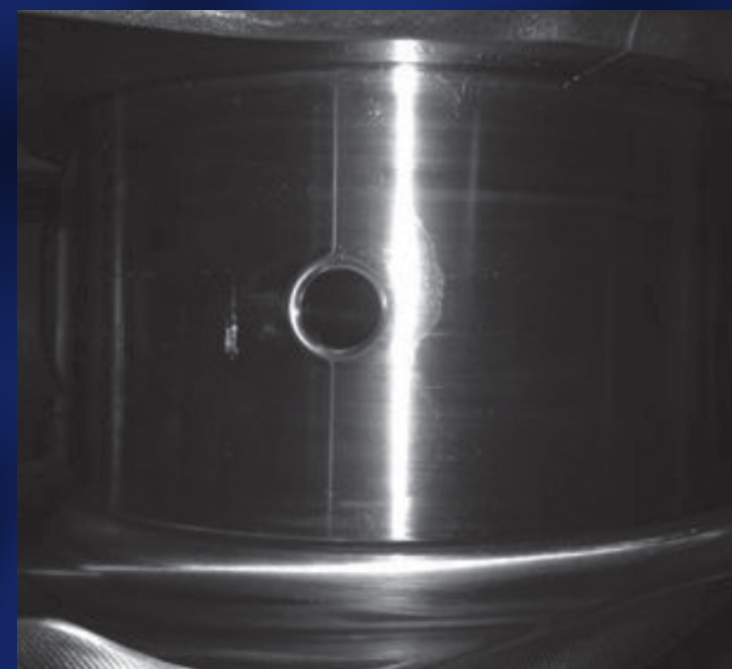
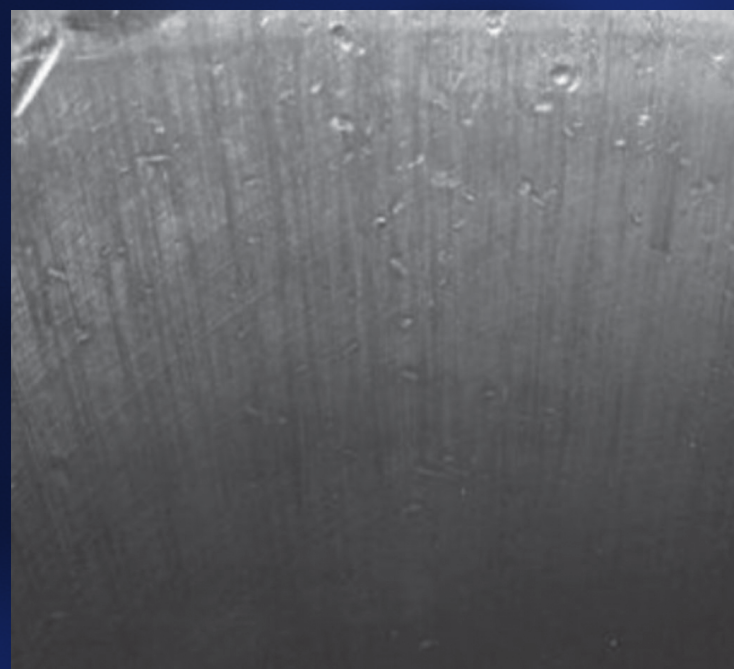






# Why is timely maintenance important?

- 1** **Improper AE overhaul causes**  
unnecessary lub oil consumption
- 2** **Proper AE overhaul ensures**  
optimization combustion condition with fuel savings
- 3** **Professional working force is essential**  
to secure safety



## Challenges ship managers deal with

Cost <  
Maintenance planning <  
Parts delivery <  
Engine performance <  
Trouble-shooting <  
Repair <  
Crew's skill <



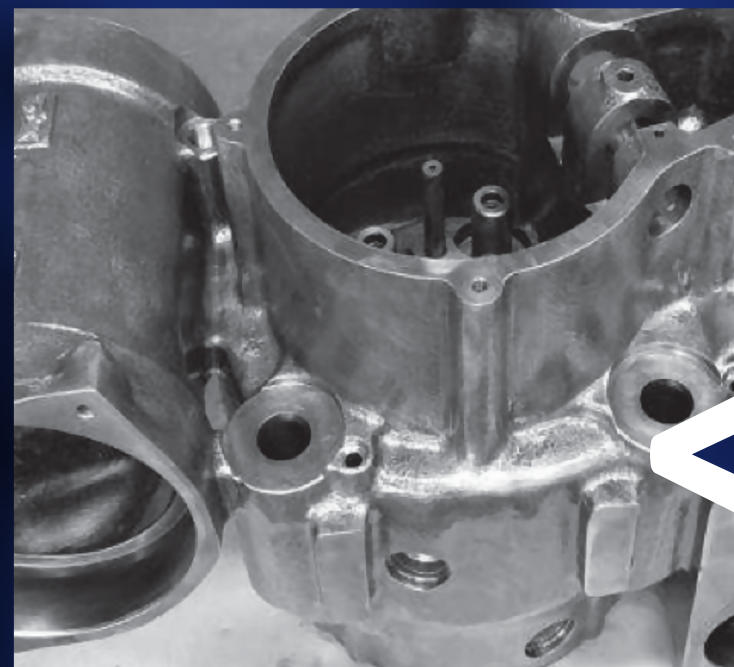
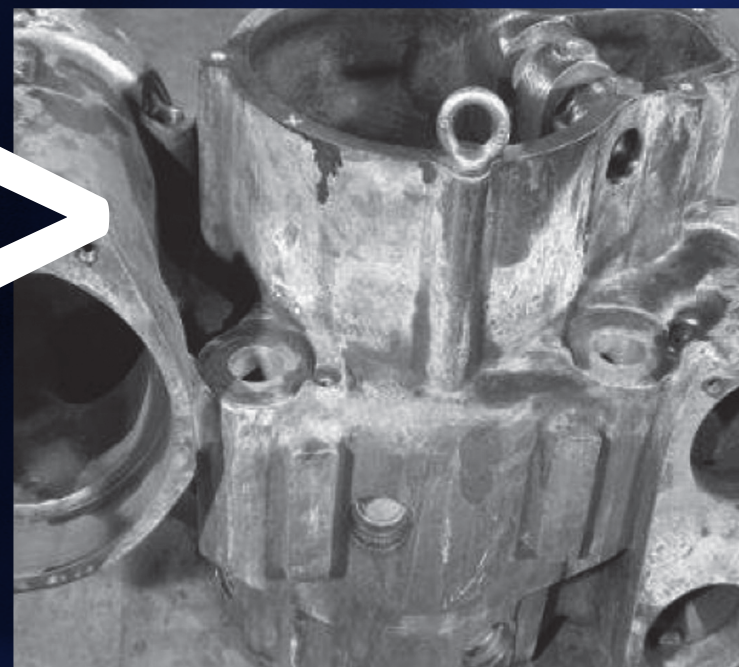


# What is our AE Cylinder Exchange Based Product (AEX)?

An innovative and advanced **diesel engine maintenance program** carried out by **NSB GROUP** in collaboration with **STX Engine** at globally qualified workshops aimed to save operational and maintenance costs on ships.

It ultimately allows overhauls of auxiliary engines on board of vessels to be performed more economically and faster by vessel personnel.

**Condition  
before  
workshop  
maintenance**

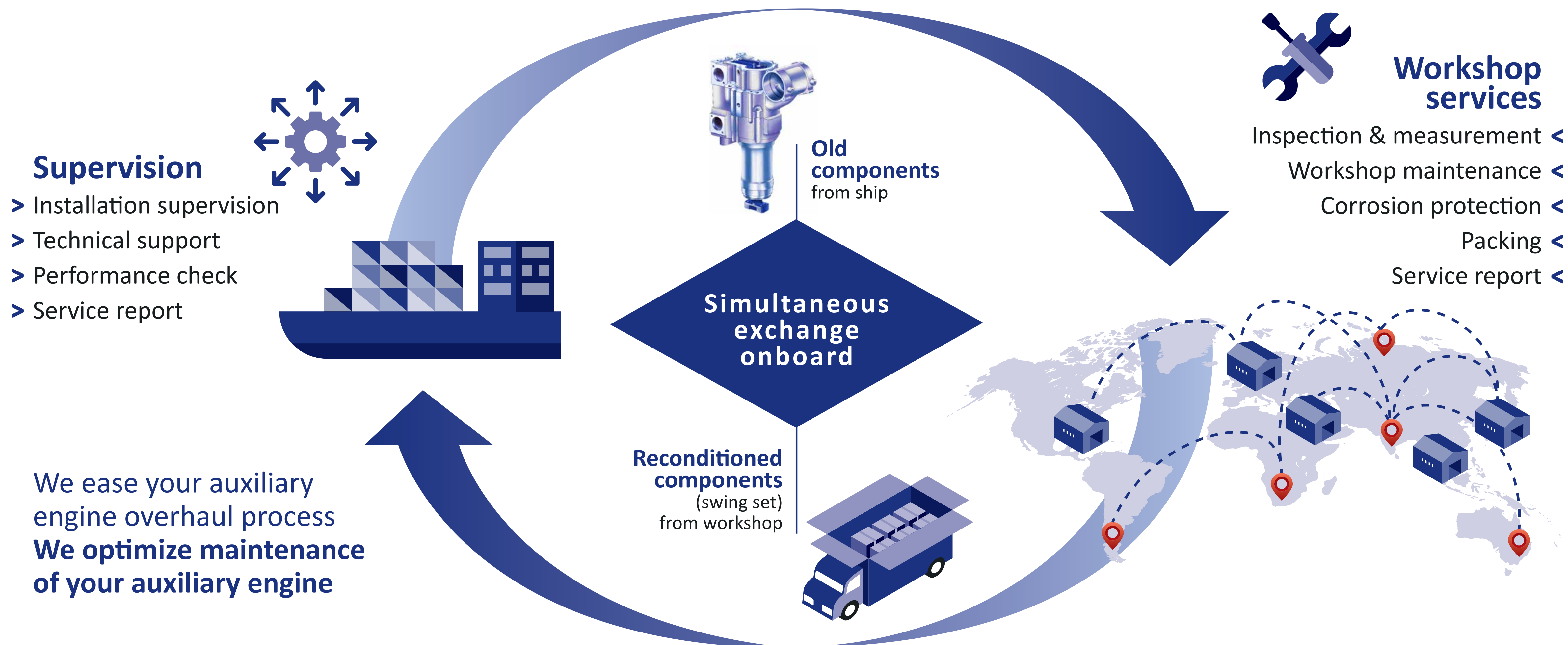


**Recondition  
after  
workshop  
maintenance**

- Cost-saving** <
- Scheduled/  
well planned** <
- Fast service** <
- Qualified  
workmanship** <
- Single & simple  
process** <
- Safe procedure** <



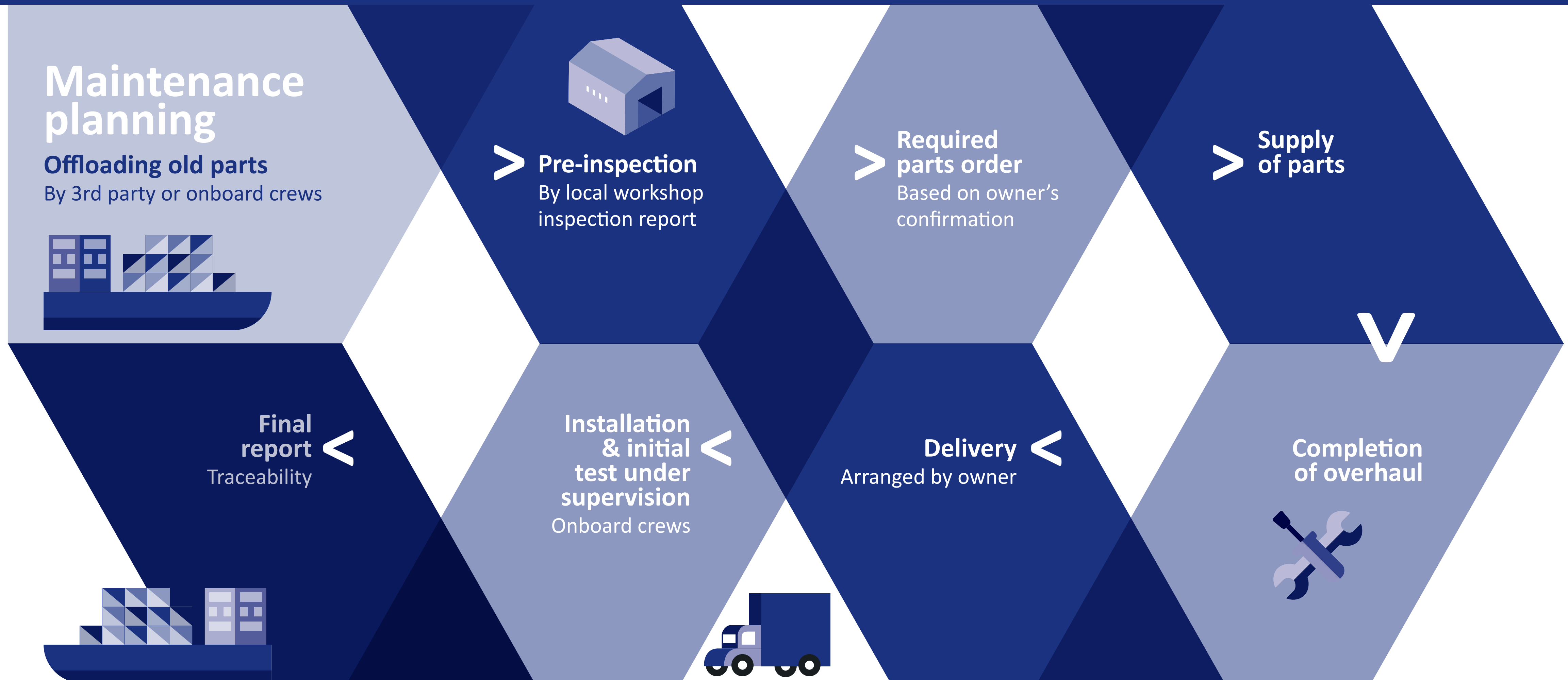
# Concept of AE Cylinder Exchange Based Product (AEX)





# Project & maintenance process

## Service level agreement based on fleet & time volume

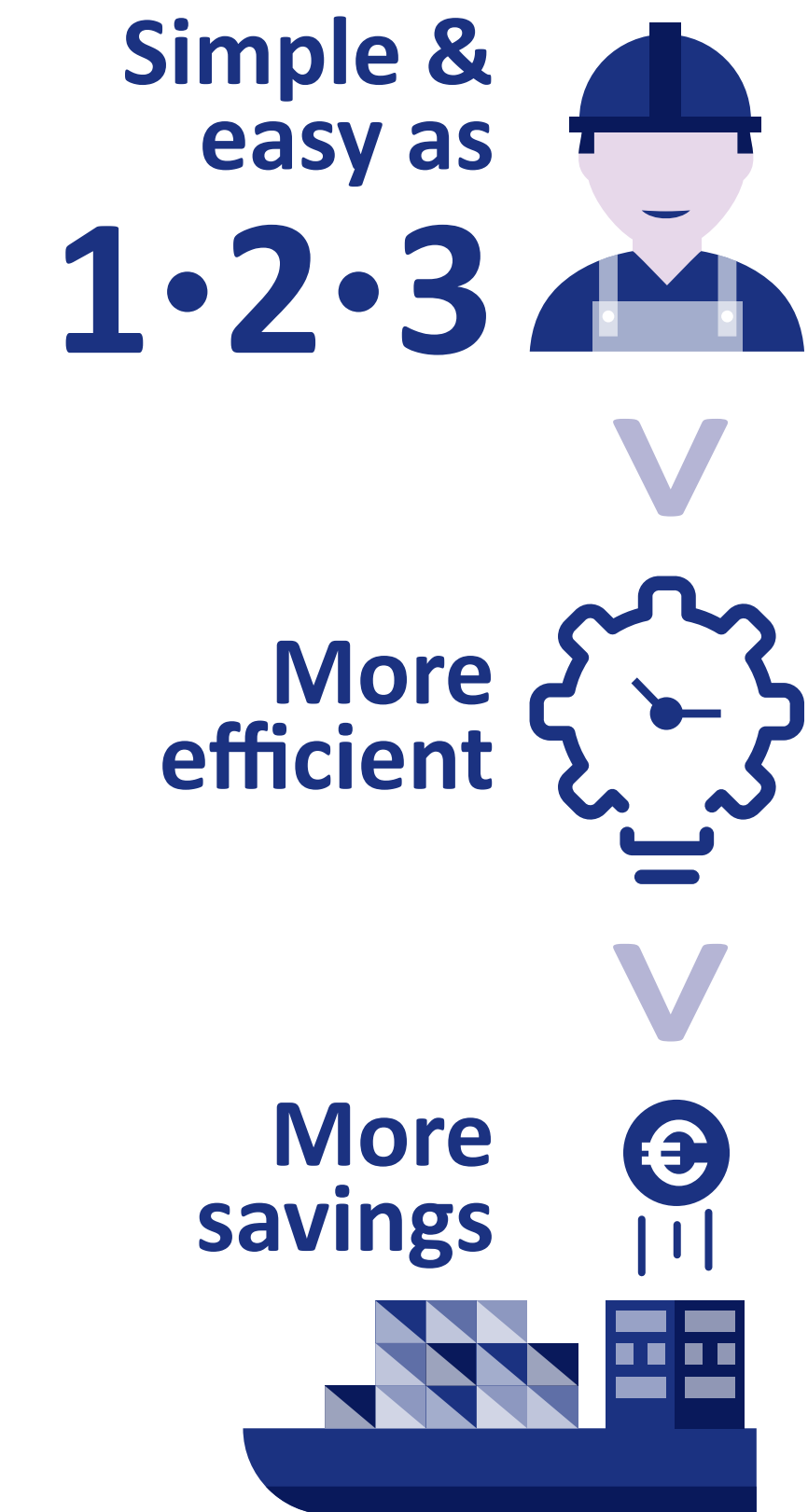




# Benefits of our AE Cylinder Exchange Based Product (AEX)

- > **Low-cost** maintenance
- > **Warranty** on service, workshop works & spare parts
- > **High-quality** level reconditioning of components
- > **Reliable** engine performance
- > **Full-time** technical support

- > **Shorter** overhaul working time
- > **Improved operation** for long TBO
- > **Latest design** improvements
- > **Performance evaluation** on regular basis
- > **Budget** planning
- > **Overhaul planning** years ahead
- > **Reliable** cooperation



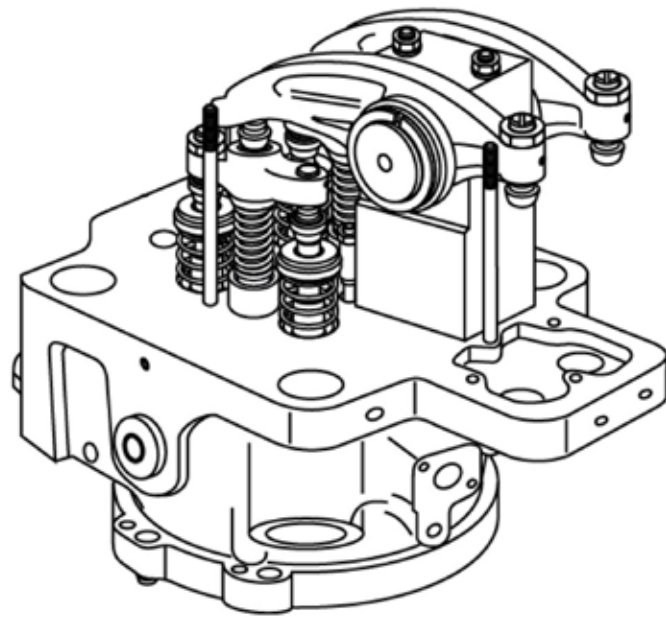


# Workshop maintenance scope

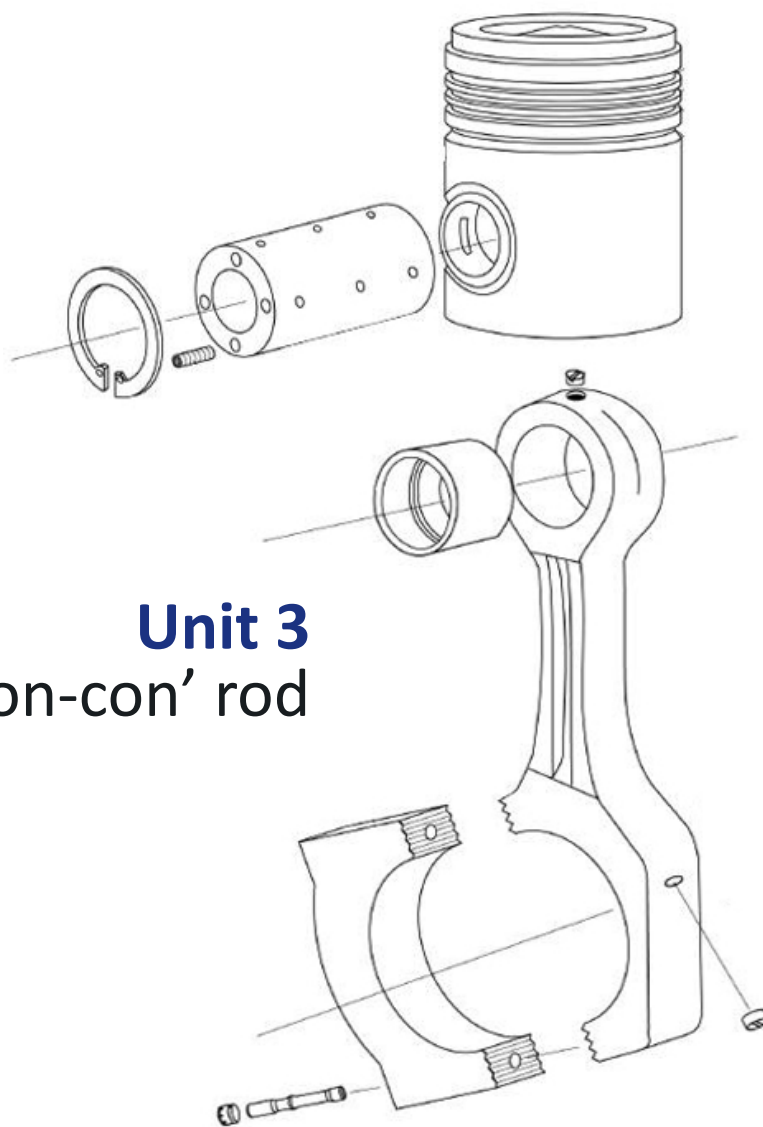
## STX-MAN L23/30H for 20K

\* DWGs are based on L23/30H

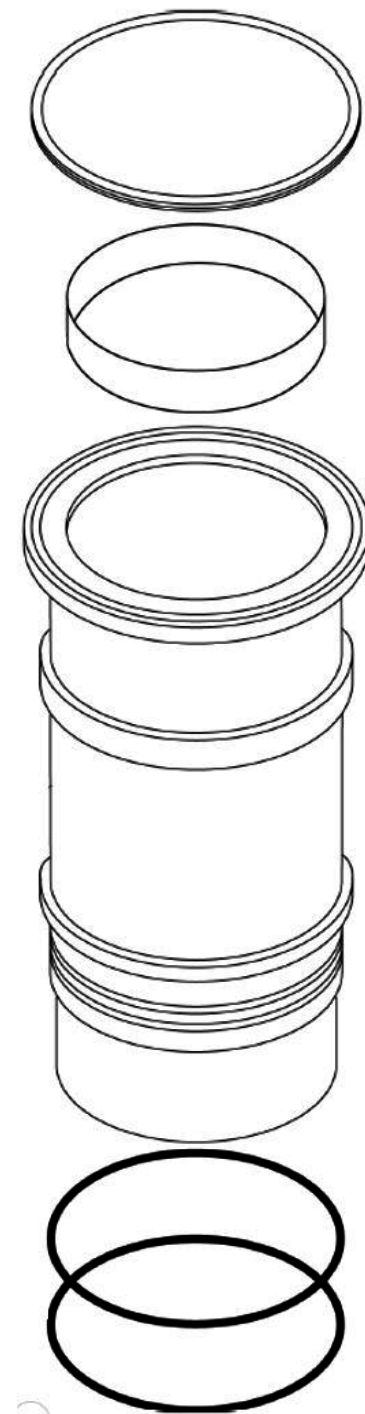
**Unit 1**  
Cylinder head  
W/J



**Unit 3**  
Piston-con' rod



**Unit 2**  
Cylinder liner



- Cylinder head < *with water tighten test*
- Water jacket <
- Cylinder liner <
- Piston <
- Connecting rod <
- Valves & seats <
- Piston rings <
- O-rings & gaskets <
- Bearings & bushs <
- Damaged parts etc <
- Customer request items <

**Recondition  
parts**

**Consumable  
& replace parts**

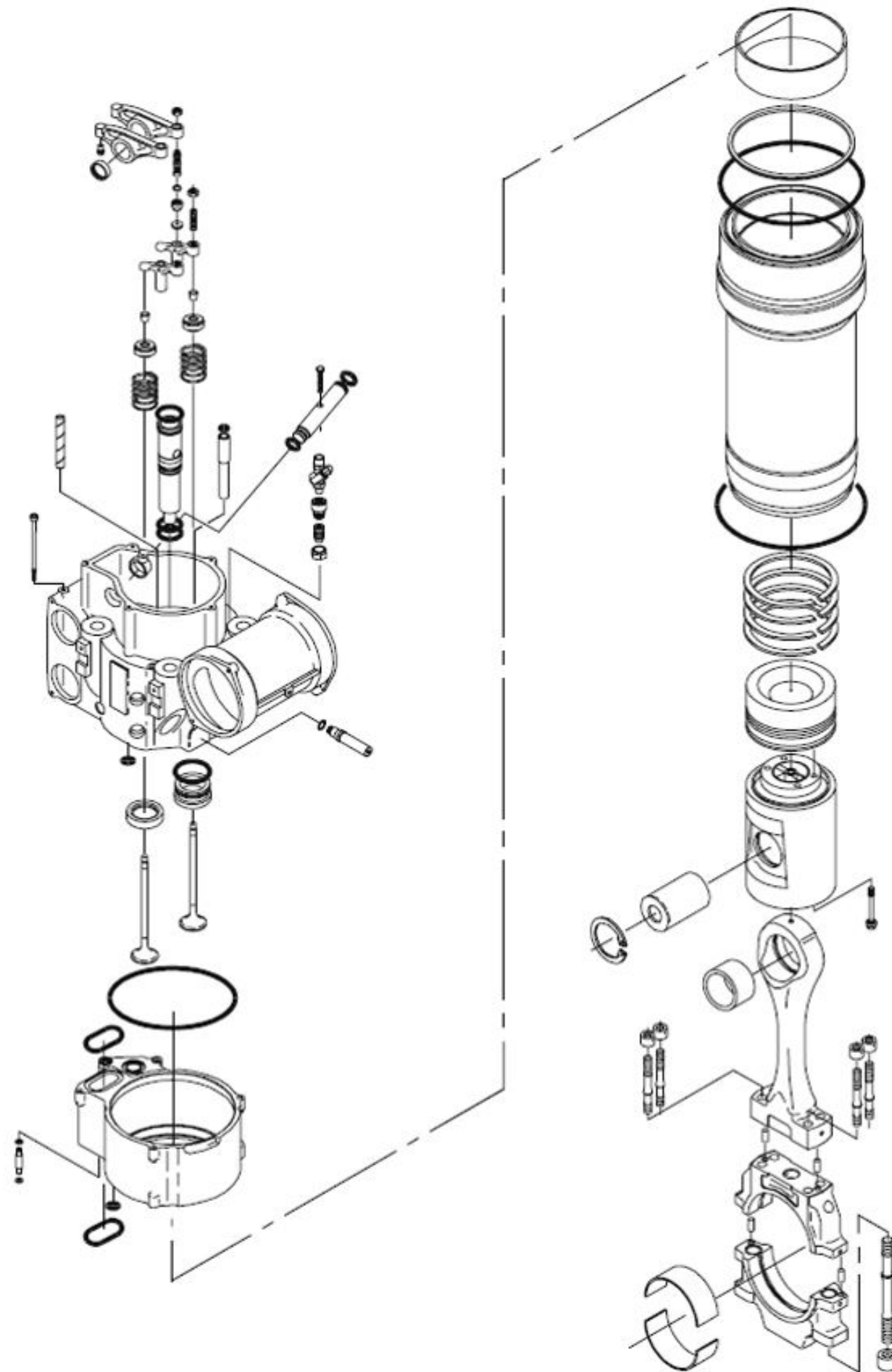


# Workshop maintenance scope

## STX-MAN L27/38 for 20K

\* DWGs are based on L27/38

Just one  
Cylinder unit



Cylinder head <  
*with water tighten test*  
Water jacket <  
Cylinder liner <  
Piston <  
Connecting rod <

**Recondition  
parts**

Valves & seats <  
Piston rings <  
O-rings & gaskets <  
Bearings & bushs <  
Damaged parts etc <  
Customer request items <

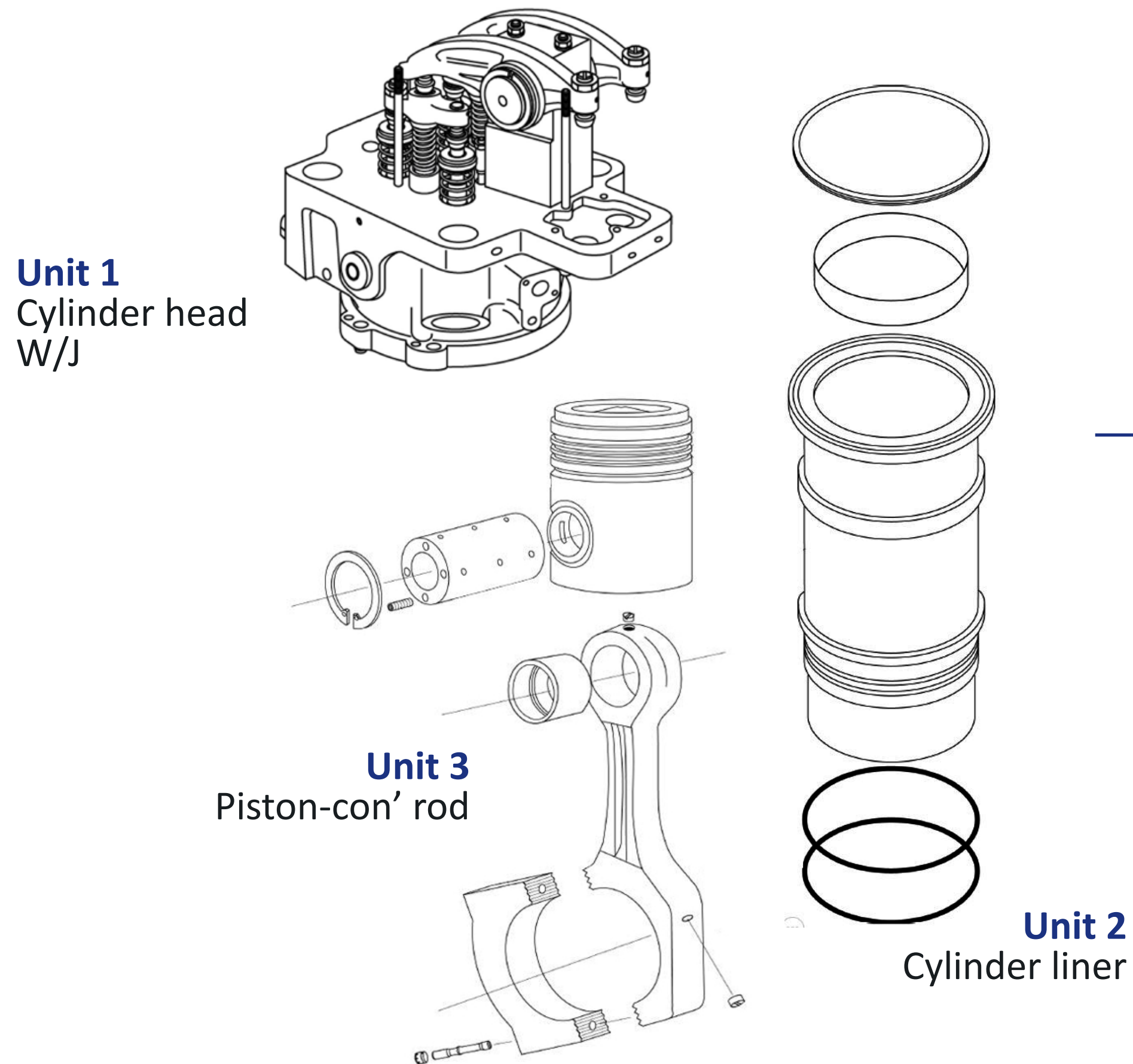
**Consumable  
& replace parts**



# Workshop maintenance scope

## STX-MAN L28/32H for 20K

\* Same scope with L23/30H



Cylinder head <  
*with water tighten test*  
Water jacket <  
Cylinder liner <  
Piston <  
Connecting rod <

**Recondition  
parts**

Valves & seats <  
Piston rings <  
O-rings & gaskets <  
Bearings & bushs <  
Damaged parts etc <  
Customer request items <

**Consumable  
& replace parts**



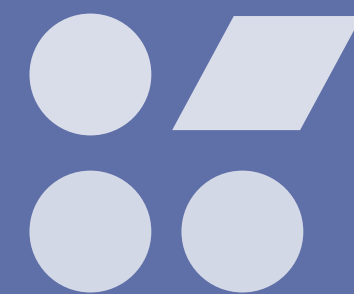
# Exchange program vs onboard maintenance

<div> <div> <div>Based on L23/30H, L27/38 &amp; L28/32H</div> <div>Service scope</div> </div> <div> <div>Onboard maintenance</div> <div> <ul style="list-style-type: none"> <li>&gt; Overhaul for cylinder head, piston, liner and each bearing</li> <li>&gt; Spare parts for onboarding work</li> </ul> </div> </div> </div>		<div> <div> <div>Our proposed AE Cylinder Exchange Based Product (AEX)</div> <div> <ul style="list-style-type: none"> <li>&gt; Re-conditioning at the workshop (service &amp; spare parts)</li> <li>&gt; Replacement cylinder head, piston, liner and each bearing (service &amp; spare parts)</li> </ul> </div> </div> </div>	
<div> <div>Advantages</div> <div> <ul style="list-style-type: none"> <li>&gt; Simple work process (spare parts stock in vessel in advance and engineer onboard at convenient port)</li> <li>&gt; Faster action for service</li> </ul> </div> </div>		<div> <div> <ul style="list-style-type: none"> <li>&gt; More precise inspection</li> <li>&gt; If required, machining or additional work will be done through special tools at the workshop</li> <li>&gt; High quality</li> <li>&gt; Immediate action for unexpected additional parts by maker stock</li> <li>&gt; Simple work process on the vessel due to exchange work</li> <li>&gt; To reduce costs even more, possible to carry out by vessel's staff under supervision of STX engineer optionally</li> </ul> </div> </div>	
<div> <div>Weakness</div> <div> <ul style="list-style-type: none"> <li>&gt; If dealing with missing or defective parts - waiting until new parts are delivered</li> <li>&gt; Restricted work environment</li> </ul> </div> </div>		<div> <div> <ul style="list-style-type: none"> <li>&gt; Work period takes more time due to round trip for transportation and high-quality work</li> </ul> </div> </div>	



# What sets us apart

We answer our clients' needs and support them in achieving smooth operations offering the most convenient services

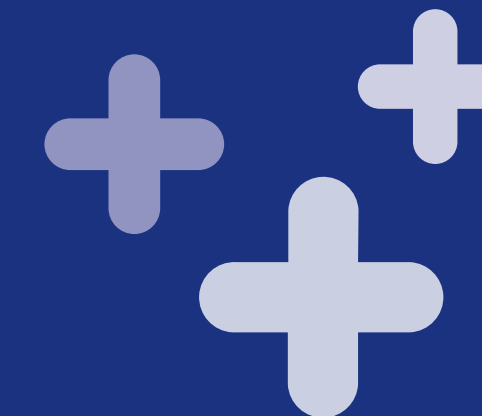


## Differentiators

- > Lower price than competitors
- > Service & spare parts directly from STX
- > Experience & licensed with MAN engines
- > Spares reworked onshore with high-quality tools & by highly-qualified engineers
- > Qualified engineering supervision during installation onboard
- > Faster process through parallel workflows
- > Detailed service report

## AEX Trio

- > Sustainable
- > Cost-saving
- > Agile & easy



## Values

- > Faster
- > Reliable
- > Quality
- > Flexibility
- > Cost-efficient
- > Time-saving/time-efficient
- > Entire overhaul in one process



# Our service network





# NSB GROUP

*global maritime competence*



## Get in touch with us

**NSB GROUP**

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