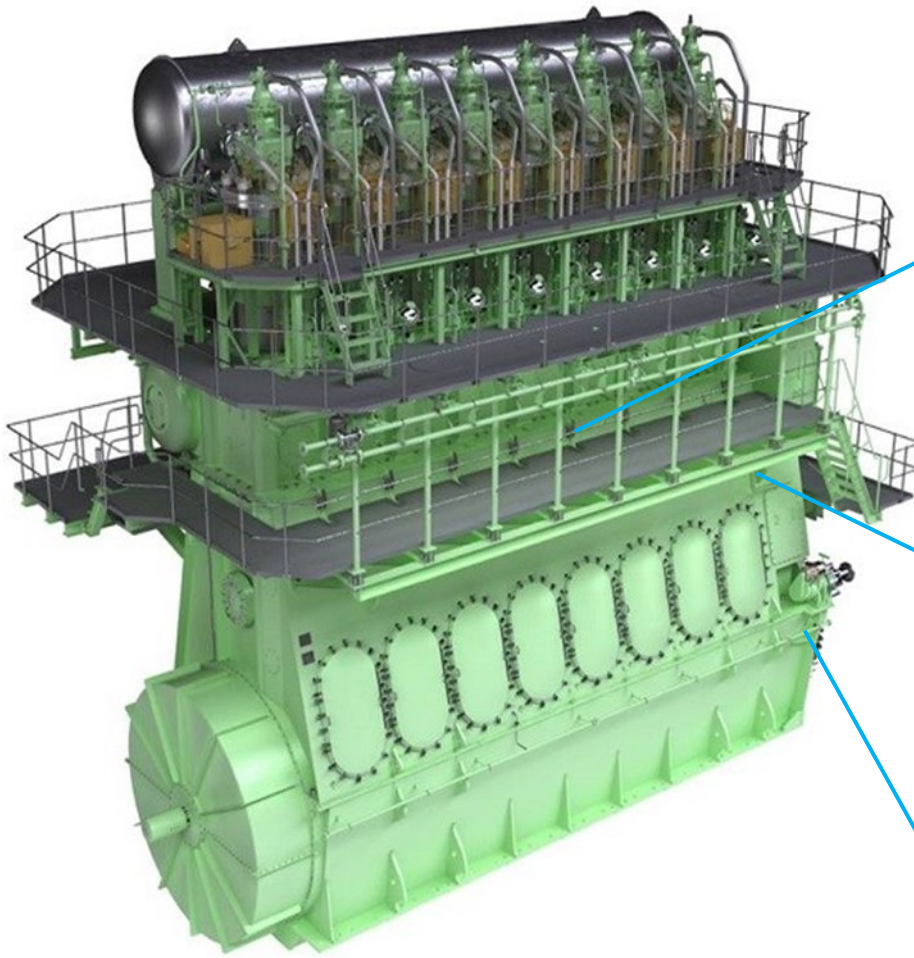


Automatic Drain Cleaning System

ADCS Overview for 2 stroke engines

Smart-Marine



Individual Drain Cleaner (IDC)
Taking out sludge and oil from each cylinder.
Keeping drain pipe and sampling valve clean.



Common Drain Cleaner (CDC)
Effectively mowing hard sludge and oil along the engine to the drain tank –
Keeping the pipes completely clean.



Sludge Collecting Unit (SCU)
Effectively separates solid sludge directly into UN transport approved 210L standard steel drum.



Stuffing Box drain Cleaner (SBC)
Effectively clean the stuffing box drain pipe and separate solid sludge in settling pan.

Smart-Marine ApS
Info@smart-marine.com

Your Challenge

Unexplored savings facilitated by the cylinder drain system of your 2-stroke marine engine.
Gain several savings and benefits from ADCS.

Up to 70% of the to days sailing 2-stroke engines are facing hidden problems with their drain systems.
Please see “Does your engine need ADCS” at the bottom of this document and take the test.

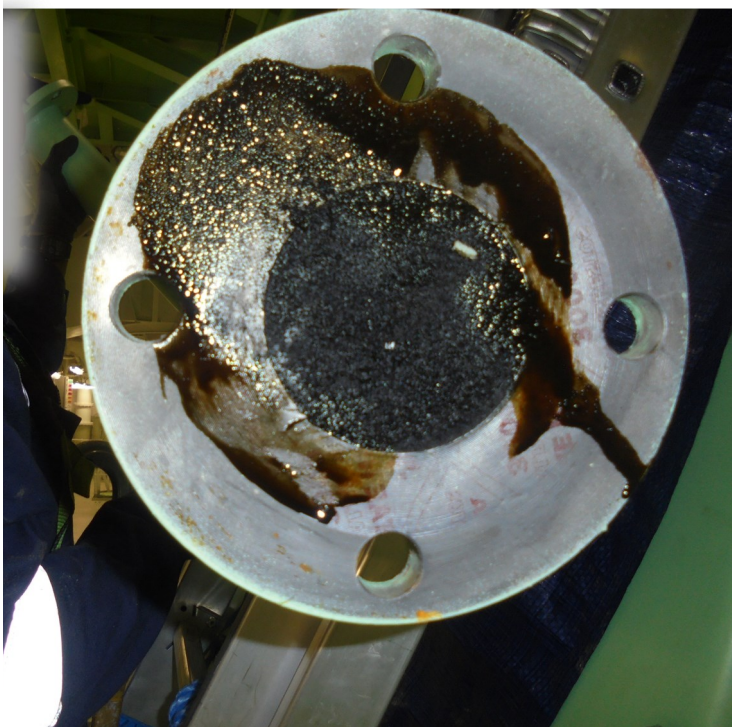
Marine engine crews have over the years learned to accept regular “digging out” of harmful hard sludge from the piston underside space.

Some crews might have noticed that, taking cyl. oil drain samples (SDA) at high load sometimes takes quite some time. Some crews might even face problems with clogging of sample valves.

Partly or fully clogged drain pipes may not always be given enough attention.

Below main challenges is related to restricted flow in drains – due to partly or fully clogged pipes.

- Increased Fuel consumption - up to 1,5%
- Increased Lube oil consumption 5-16%
- Increased wear on piston rod and stuffing box parts.
- Increased wear and problems with hydraulic components and fine filters - due to contamination of system oil.
- Incorrect dosing of cyl. oil - based on misleading readings from cyl. oil drain samples (SDA)
- Higher risk of cyl. liner scuffing accidents - too late detection / corrective action.



The partly or fully clogging of the drilled channel in the engine frame has a huge negative impact on engine operation:

- Scrape Down Analyses (SDA) made from oil samples, taken at each cyl. drain are misleading - showing incorrect iron content and other misleading parameters.
- This phenomenon occurs when fresh oil, dripping from the cyl. liner, is pressed through an 50cm long “plug” of solid sludge - forced by the scavenge air pressure.
- The “sludge plug” works as a kind of filter/buffer. The fresh and representable oil (dripping from the liner) will either absorb or segregate iron and other content - depending of the balance, when passing through the “sludge plug”
- The results are incorrect readings - often with elevated iron readings at normal operation.
- Incorrect (too low/late) Iron readings during abnormal cylinder condition and initial scuffing condition.
- Both situations generate unnecessary operational expenses.

Automatic Drain Cleaning System

Your Challenge

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- Crew often struggle with blocking of sample valves and long sample collecting time.
- The drilled channel in engine frame and pipes need constant cleaning.
- Several cases shows significant sludge accumulation after only one week!
- Accumulation of hard / solid sludge in piston under-side space.

- Cumbersome and dirty manual cleaning work.
- Often in unsafe positions.
- Involving risk of skin contact with harmful substances.



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Our solution

Clean drain systems guaranteed success through effective automated sludge removal.

- We offer tailor-made solutions to match your specific need.
- Very fast SDA oil sampling time (few minutes) - Crews often report sampling time of 6-17 hours.
- Representative “real time” SDA oil samples - giving fresh oil directly from the liner.
- Proven function and reliability - installations running trouble-free for years.
- Tested in corporation with MAN-ES.
- Suitable for retrofit and new engines.
- All augers and motors are overload protected by shear-pin.
- No wear to drain pipes - the augers rotate extremely slow and are running in oil.
- Patented products.



Our solution

Installing an ADCS system on your engine ensure constant cleaned engine - giving several valid effects

Based on the simple technique, having a smooth flexible auger slowly (3rpm) turning inside the drain pipes.

The auger effectively transport the solid sludge along with the flowing oil. - No wear to pipe or auger, due to constant lubrication.

Reduced contamination of system oil:

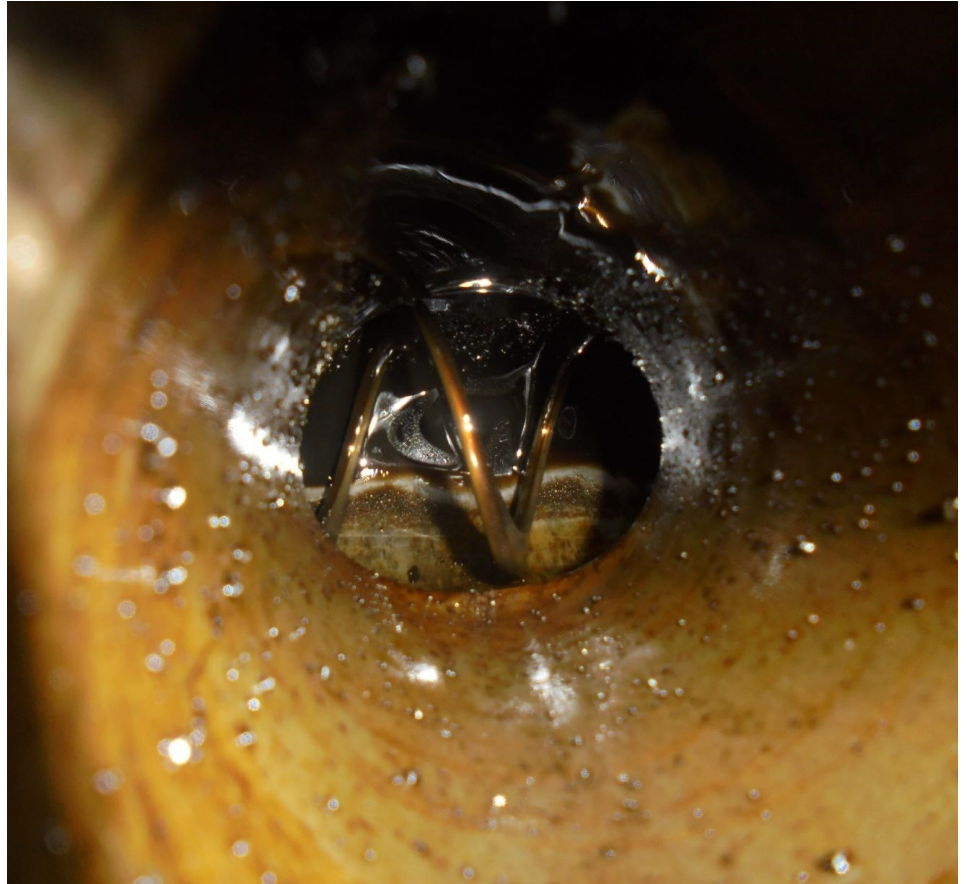
- Cleaner oil will promote cleaner engine crank-case and longer critical component life time.
- Reduced SFOC (fuel consumption), by improvement in the mechanical efficiency.
- Less wear and operational problems with hydraulic fine filters and components.

Improved Cylinder liner condition:

- Longer life time on Cylinder liner and piston rings.
- Reduced SFOC (fuel consumption) due to constant operation at correct high Pmax.
- Prevention of liner scuffing – by fast detection and timely corrective actions.

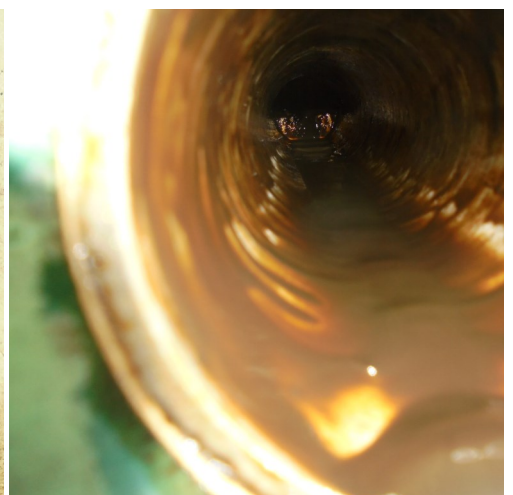
Free and unrestricted flow in engine cyl. drain pipes:

- Safe and fast detection of abnormal conditions as lube oil / cooling water leaks.
- Fast collection of SDA samples giving “real time” and correct readings – providing the operator with the right information to optimize lubrication and prevent scuffing incidents.



Cleaner engine – less accumulation of solid sludge:

- Reduced consumption of cyl. L.O. – through optimized dosing based on reliable “real time” SDA samples.
- Less risk of scavenge fires.
- Reduced wear on piston rod and stuffing box parts.
- Less fouling of T/C turbine blades.
- Less fouling of exhaust gas boiler.
- Significant improved safety and working environment for crew.
- Significant savings on man hours spend for manual cleaning - in some cases up to 1000 h/year
- No clogging of sample valves.
- Reduced (No) consumption of cleaning chemicals / materials or diesel.



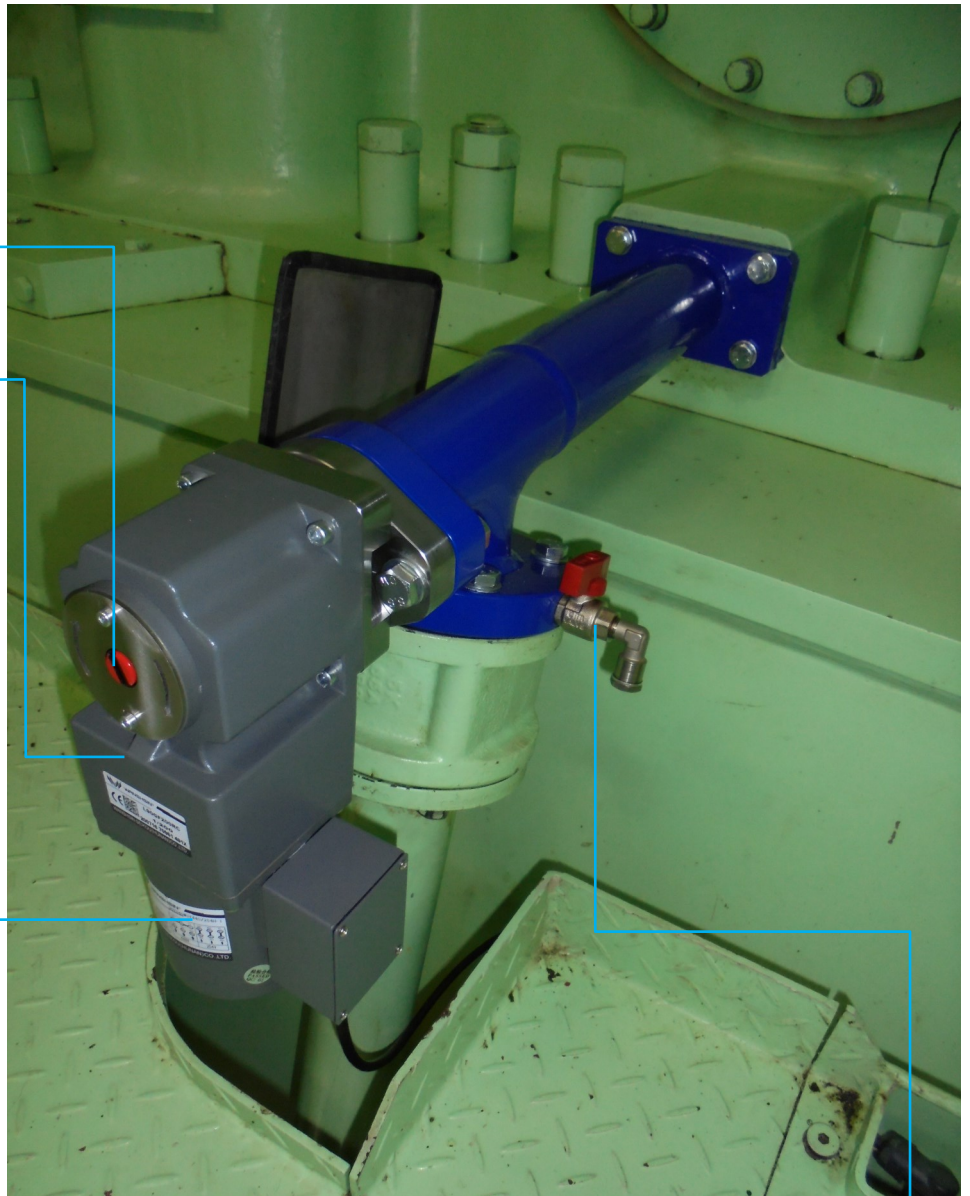
Automatic Drain Cleaning System



Our products

Individual Drain Cleaner (IDC)
Mounted at each individual cylinder drain - fully automated.

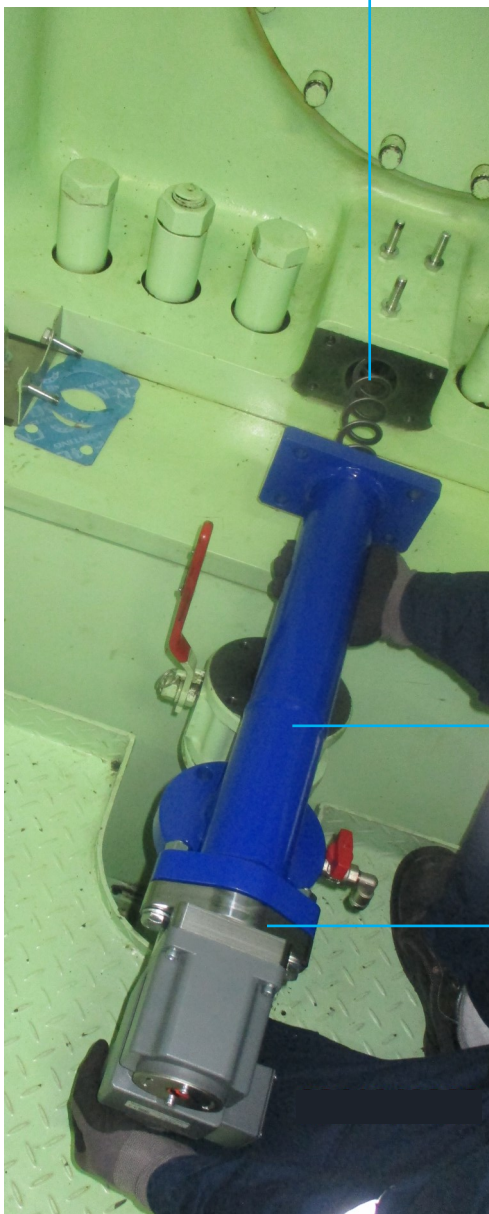
- Rotation and overload indicator.
- Maintenance free high quality gearmotor.
- Ultra low energy consumption - less than 5W average.
- Special maintenance free long life flexible auger - cleaning from the piston under side space.



- Sample valve and channel designed so it does not block up.

- Tailormade individual drain pipe - fits perfectly, for easy exchange with original pipes.

- Special high quality shaft seal (maintenance free)



Automatic Drain Cleaning System

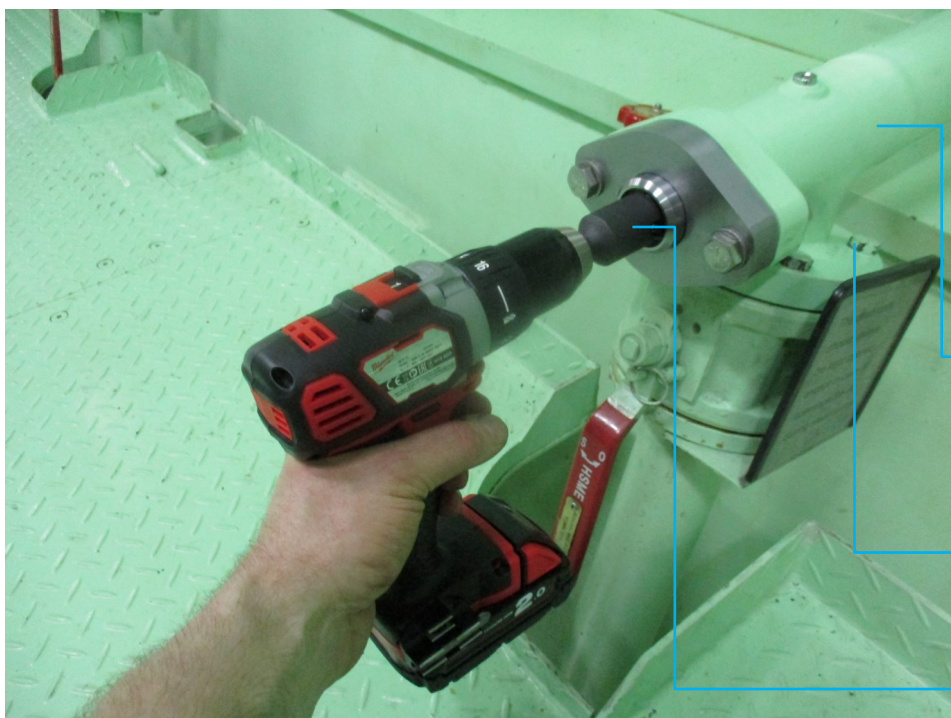
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Our products

Individual Drain Cleaner (IDC)
Mounted at each individual cylinder
drain - fully automated.

- Flanges and pipes are specially fabricated to perfectly match original pipe fit.
- Original isolation ball valve turned/relocated and mounted in a position allowing ergonomic operation.
- Wiring will follow existing cable routes on the engine.
Using approved high quality shielded cables.



IDC - Manuel

Mounted at each individual cylinder
drain - budget/initial solution with
hand held actuator.

- can easily be upgraded with motors to automated system.

- The new pipes are delivered complete with integrated auger and mechanical unit.
- Easily installed by crew in few hours. (Just exchange with original pipe - no wiring or other installation needed)
- Quick-shift adaptor. Each pipe need 20 sec. activation/rotation daily.

Automatic Drain Cleaning System



Our products

Common Drain Cleaner (CDC)

Effectively mowing hard sludge and oil along the engine to the drain tank.

– Keeping the pipes completely clean.

- Flexible auger slowly turning inside the entire length of the common drain pipe.

- Mounting bracket for support via original bolt position.



- Sludge / oil outlet pipe - leading to the sludge tank or Sludge Collecting Unit (SCU)

- Tailormade adaptor pipe. The system can be adapted to virtually all engine designs.

Automatic Drain Cleaning System

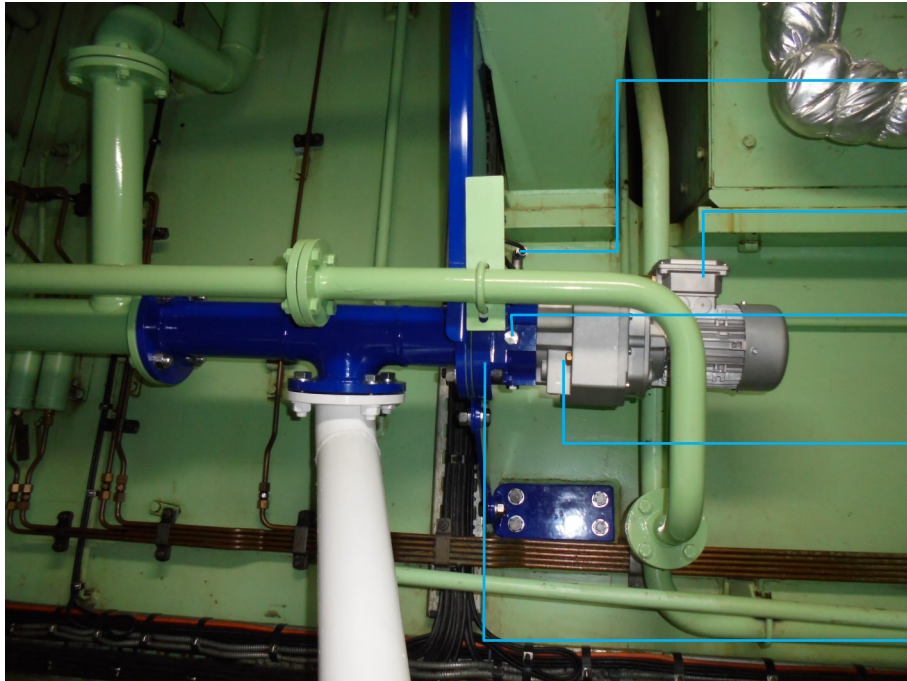


Our products

Common Drain Cleaner (CDC)

Effectively mowing hard sludge and oil along the engine to the drain tank.

– Keeping the pipes completely clean.



- Rotation monitor for auger - aft end.
- High quality gearmotor (3 rpm) with very low energy consumption.
- Inspection plug.
- Oil level glass.
- Mechanical unit with shaft / bearings and special high quality shaft seals.



- Original drain pipe.
- Rotation monitor for auger - forward end. (option)



- ADCS control cabinet. Runs fully automated.
- Equipped with various interfaces for integration in vessel alarm/control system.
- “Stand alone” option.
- Interface and function for integration with liner wear monitoring systems.

Automatic Drain Cleaning System

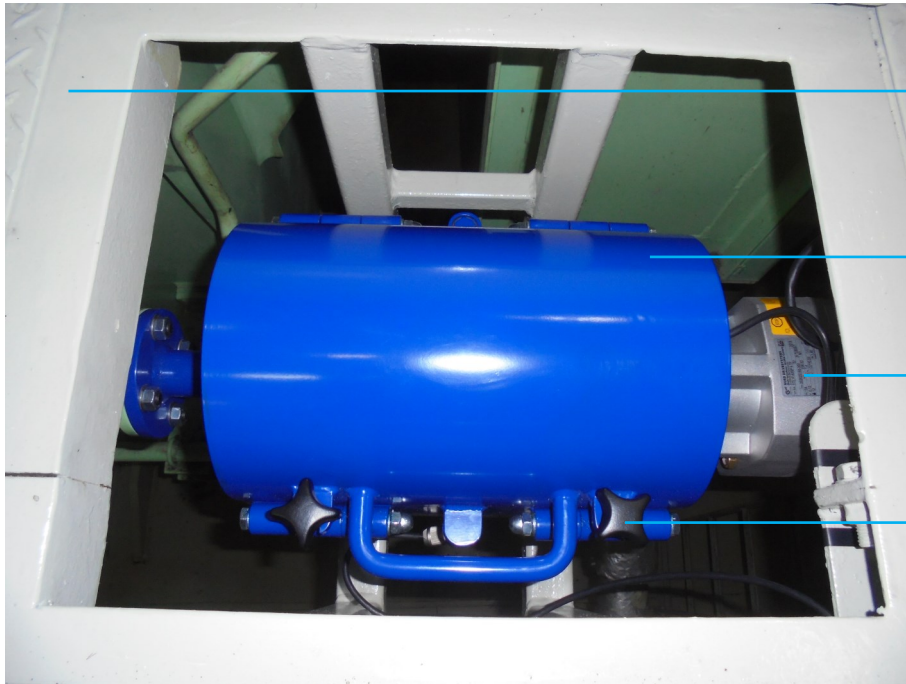
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Our products

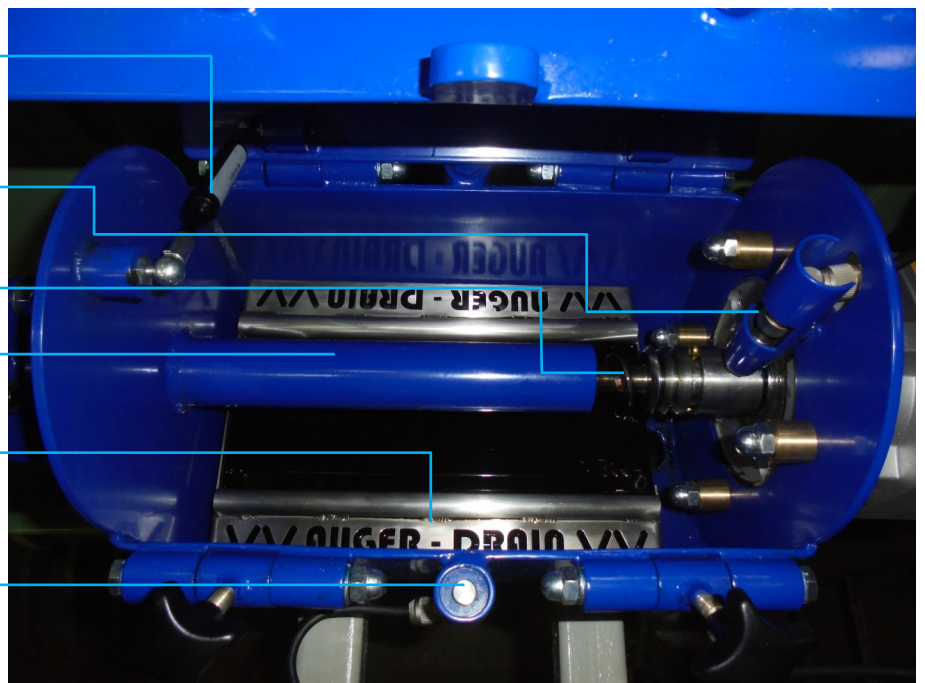
Stuffing Box drain Cleaner (SBC)

Effectively clean the stuffing box drain pipe and separate solid sludge in settling tray.



- SBC mounted below floor.
- SBC lid.
- High quality gearmotor (3 rpm) with very low energy consumption.
- Locking screws for lid.

- Gas spring for lid opening.
- Rotation monitor for auger - aft end.
- Flexible auger - cleaning entire length of the drain pipe.
- Stuffing box drain pipe.
- Drip tray / sludge settling tray.
- Safety sensor - stops auger rotation when opening lid.



Automatic Drain Cleaning System

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Your benefits

Financial Benefits

- Reduced SFOC (fuel consumption) up to 1,5% due to operation at correct high Pmax and higher mechanical efficiency.
- Reduced consumption of Cyl. L.O. 5-16% – through optimized dosing based on reliable “real time” SDA samples.
- Improved combustion – improved liner and piston condition.
- Reduced total cost of ownership.

Contact us for more information:

Info@smart-marine.com

www.smart-marine.com

Phone: + 45 29622580

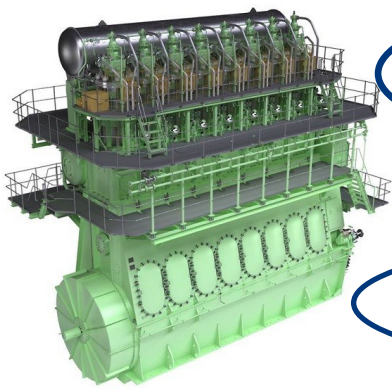


Enviromental Benefits

- Significant improved safety and working environment for crew.
- Significant savings on man hours spend for manual cleaning - in some cases up to 1000 h/year
- Reduced (No) consumption of cleaning chemicals / materials or diesel.
- Significant reduced CO₂ footprint.
- No essential energy consumption.

Operational benefits

- Prevention of liner scuffing – by fast detection and corrective action.
- Longer life time on cylinder liner and piston rings.
- Cleaner engine – less accumulation of solid sludge.
- Reduced contamination of engine system oil - less wear and malfunction of hydraulic fine filters and components.
- Reduced wear on piston rod and stuffing box parts.
- Less risk of scavenge fires.
- Less fouling of T/C turbine blades.
- Less fouling of exhaust gas boiler.
- Safe and fast detection of abnormal conditions as lube oil / cooling water leaks.
- Very fast collection of SDA samples giving “real time” and correct readings – giving the operator the right information to optimize lubrication and prevent scuffing incidents.
- No clogging of sample valves.
- No clogging of the general drain systems in engine room.
- Uninterrupted voyages - no need to stop for cleaning.
- Maintenance free components - simple and solid design.
- Easy installation.
- Fully automated.



Does your engine need ADCS?
Automatic Drain Cleaning System



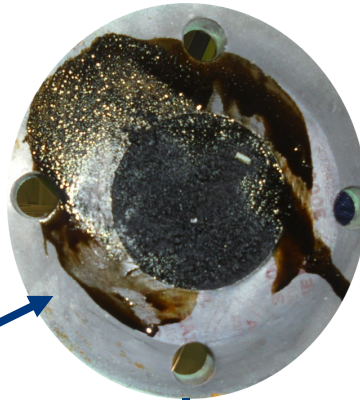
Remove the individual cyl. drain pipe to
2 random cylinders. At next port / stop.



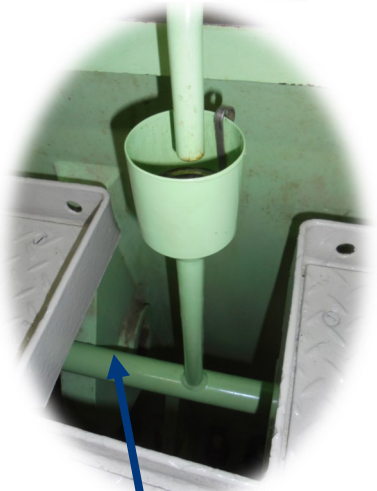
Drilled channel completely free of sludge?

Drilled channel partly clogged with sludge?

Remove forward blind flange on the common drain
pipe at next port / stop. Use a powerfull flashlight
to inspect the inner pipe in full length. Check any
build-up of sludge at the pipe bottom.



Common drain
pipe partly or
fully clogged
with sludge?



Open up the stuffing
box drain pipe
around the center of
the engine. Check
sludge build-up?

If you have sludge build-up in any of these pipes
Your engine will gain several benefits from ADCS

Please contact: info@smart-marine.com

