

Idea description Scavenge air-port execution that improves piston ring lock guidance on large 2-stroke engines

Situation today:

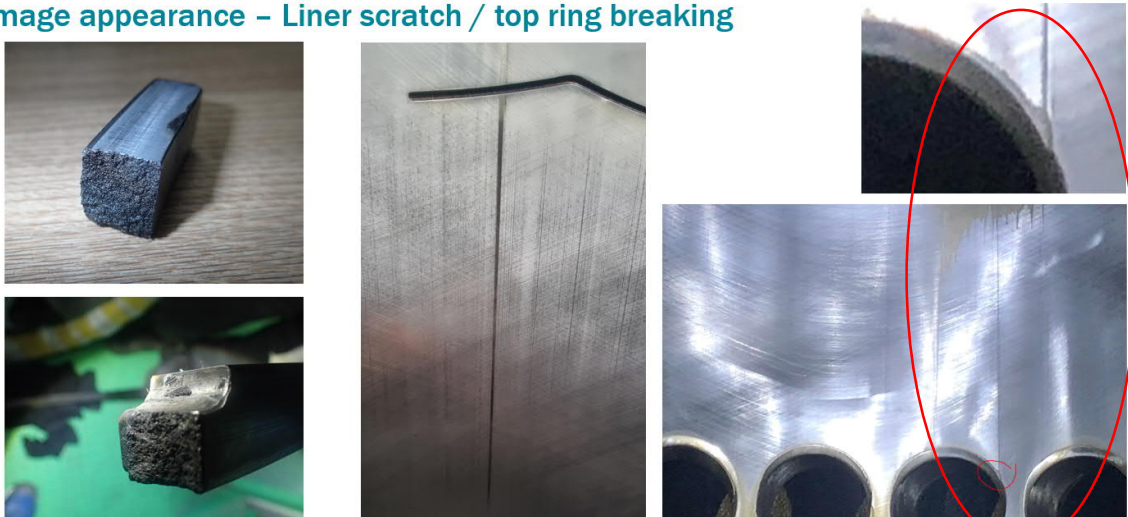
Large bore 2-stroke engine cylinder liners are usually designed with scavenge air-ports that are wider than the gastight lock fingers of the uppermost or lower piston ring. The gastight piston is usually installed in the uppermost ring groove. There are variations where gastight piston rings are installed in lower grooves as well.

Due to the thermal deformation of the piston ring, the inner diameter is normally hotter than the outer diameter that is cooled by the cylinder liner. Due to this delta T, the ring wants to stretch like a bimetal.

Problems:

The above-described delta T stretching effect can lead to situation that the ring finger of the gastight lock can move into the scavenge airport, so that it produces a scratch on the cylinder liner and in worst case fingers can break.

Damage appearance – Liner scratch / top ring breaking



Picture 1) showing X92B liner damages caused by ring fingers hooking up into the scavenge air port

Possible solutions:

The chamfering of the scavenge airport upper and lower area is optimised so that the ring finger ends should not hook into the port (red circle pic 1)

Another solution would be to reduce the port width so that the ring fingers have less chance to be bent into the port. Chamfering of the ring fingers is another solution.

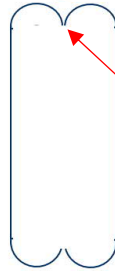
Invention:

All the above-described chamfering is time consuming but does not entirely solve the problem that part of the piston ring fingers can move into the opening of the port because of missing guidance.

Today's scavenge air port design



The alternative scavenge air port design



Chamfering necessary on centre rib

Picture 2), alternative scavenge air-port machining

The alternative scavenge air-port design improves the guidance of the piston ring lock fingers so that the piston ring lock fingers are better guided towards the end of the port. A prevention of damages is expected. Chamfering of the port is necessary only at the area marked above. This design makes sense when the piston ring lock fingers are shorter than the scavenge air-port. One could imagine to machine more than two half circles as well and or make the small rib (red arrow larger to prevent breakages. The centre rib could be for example 4 – 25mm)

Konrad Räss, Winterthur 29.06.2022