

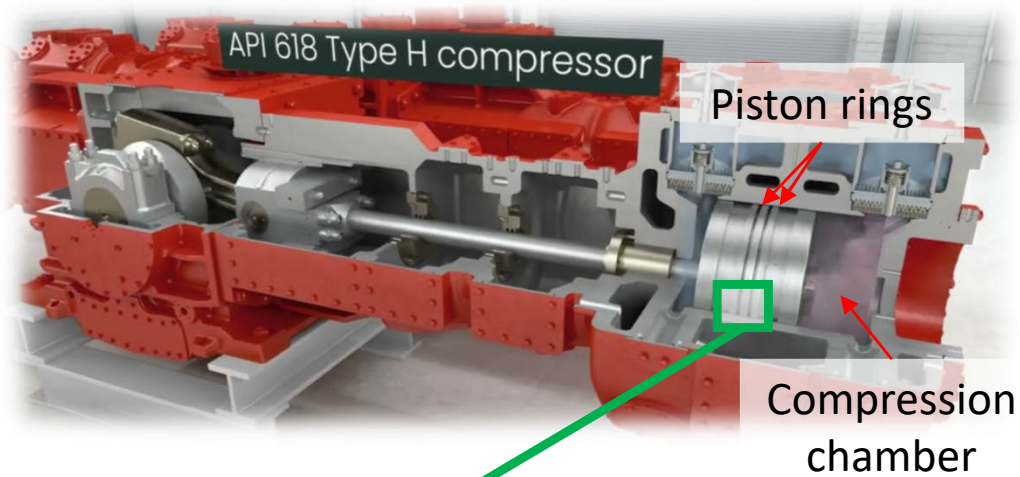


# Numerical model of the piston rings of an oil-free reciprocating compressor for hydrogen application

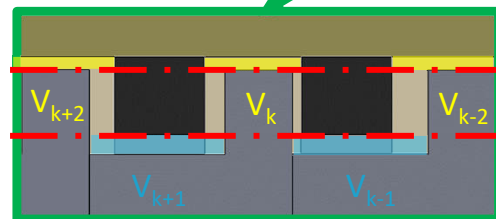
Author: Sandro Raspanti  
Department of Industrial Engineering  
Laboratory: Laboratorio LInEA



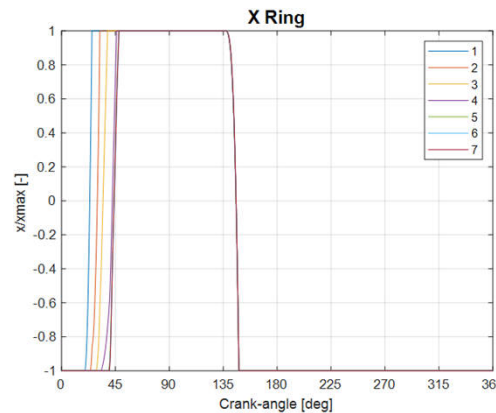
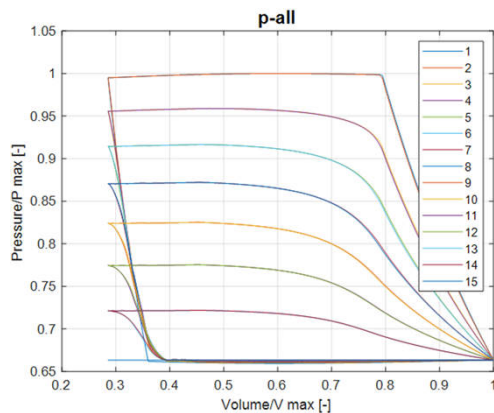
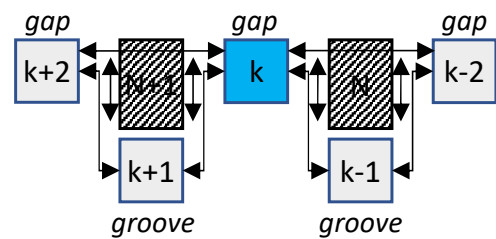
## Reciprocating compressor model



### Finite Volume Method

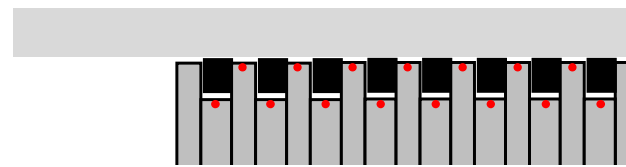


- Thermodynamic condition of groove and gap
- Cylinder simplified cycle
- Pressure forces
- Piston dynamic
- Ring friction
- Ring dynamic

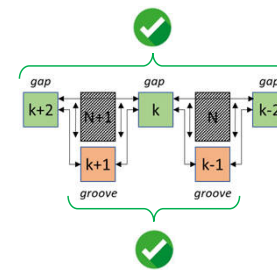


## Experimental setup proposal

### Rotoric solution

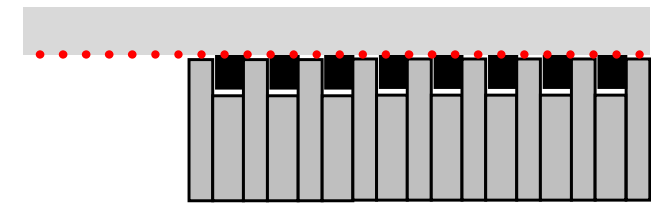


- Dynamic pressure, mean temperature

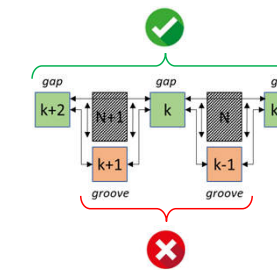


- Telemetry system
- Higher cost
- High installation complexity
- Best calibration dataset (gap and groove)

### Statoric solution



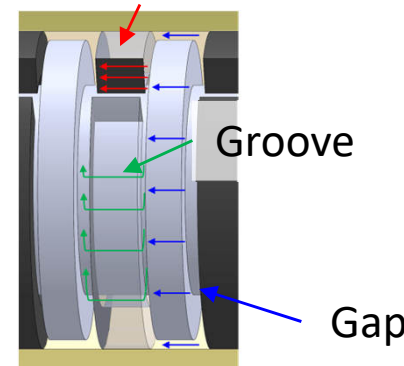
- Dynamic pressure, mean temperature



- Rake of sensors
- High post-process complexity
- Easy installation
- Lower price

## Output to be implemented in model

### Cut



- Leakage throw cut
- Leakage between gap and groove
- Leakage throw ring and liner
- Leakage throw ring and piston
- Friction power losses
- Ring temperature
- Ring wear

