



**Silesian University  
of Technology**



# XI INTERNATIONAL

CONGRESS ON COMBUSTION ENGINES

ADAPTATION AND INNOVATION IN THE FACE OF CHANGING NORMS

POLISH SCIENTIFIC SOCIETY  
OF COMBUSTION ENGINES

**23<sup>rd</sup> -25<sup>th</sup> June 2025**

**[congress.ptnss.pl](http://congress.ptnss.pl)**

**Book of Abstracts**

**Silesian University of Technology  
Faculty of Transport and Aviation Engineering  
Zygmunta Krasinskiego str. 8, 40-019 Katowice, Poland**

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**11th International Congress on Combustion Engines**

**Katowice 2025**

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**23<sup>rd</sup>-25<sup>th</sup> June 2025**

**11th International Congress on Combustion Engines  
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**Polish Scientific Society of Combustion Engines**



**Silesian University of Technology  
Faculty of Transport and Aviation Engineering**



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## PTNSS-2025-042

### **Review on the effects of nanoparticles on automotive engine cooling system: proper type, size, and concentration with base fluid selections**

*Gadisa SUFE*

Nanotechnology is of great importance in the cooling systems of internal combustion engines. Today, the concept of enhancing heat transfer is critical and attracts engineers to have effective heat transfer in engine cooling systems to have optimum performance. However, the preparation of homogeneous nanofluid is the challenge raised by many researchers since the formation of precipitation by nanoparticles in base fluid causes solution instability. This paper focused on experimentally and numerically investigated parameters to obtain results for the type, size, and concentration of nanoparticles with the proper base fluid in vehicle engine cooling systems to improve the stability of the solution and enhance the thermal conductivity of the fluid. A comprehensive analysis of the collected data has shown that metallic oxide nanoparticles have the best stabilities and size ranges of 10 to 20 nm at a concentration of 0.1–0.5% in water-based fluid.

## PTNSS-2025-043

### **Improving the cleanliness of outlet gases in inland shipping in terms of environmental compliance using HHO technology**

*Andrzej KRYŻAN, Jan MONIETA*

The primary propulsion of inland waterway vessels is compression-ignition engines, usually fuelled with diesel fuel. Spark ignition propulsion applies to small, tourist, sport, and recreational boats and large engines fuelled with by gas on water bodies and in industrial operations. However, this is marginal to inland waterway transportation. The purpose of the paper is to present the technology of feeding internal combustion engines with gas created by the hydrolysis of water, HHO, and then present the possibility of significantly reducing emissions of harmful outlet gases while reducing fuel consumption. Hydrogen was produced from water under laboratory conditions using a hydrogen generator that was developed and built. Sheet metal cutting was carried out using a torch with hydrogen fed from the generator. A hydrogen system has been installed in the engine room of an actual floating barge. Tests were carried out with the Wola turbocharged engine fuelled with hydrogen, and a saving of 9% was achieved on the first attempt, a significant figure considering the type of engine. Tests have also been carried out on the MAN company engine, allowing it to achieve substantial fuel consumption savings. HHO technology, when applied to internal combustion engines, offers the following benefits: reduction of pollutants and emissions of harmful components of outlet gases and greenhouse gas emissions, fuel economy, and removal of deposits in the combustion chamber. There are also savings in consumables (filters, oils). An increase in the operating durability of internal combustion engines with hydrogen-assisted fueling has been observed.



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