Engineers develop near-zero emissions engine technology

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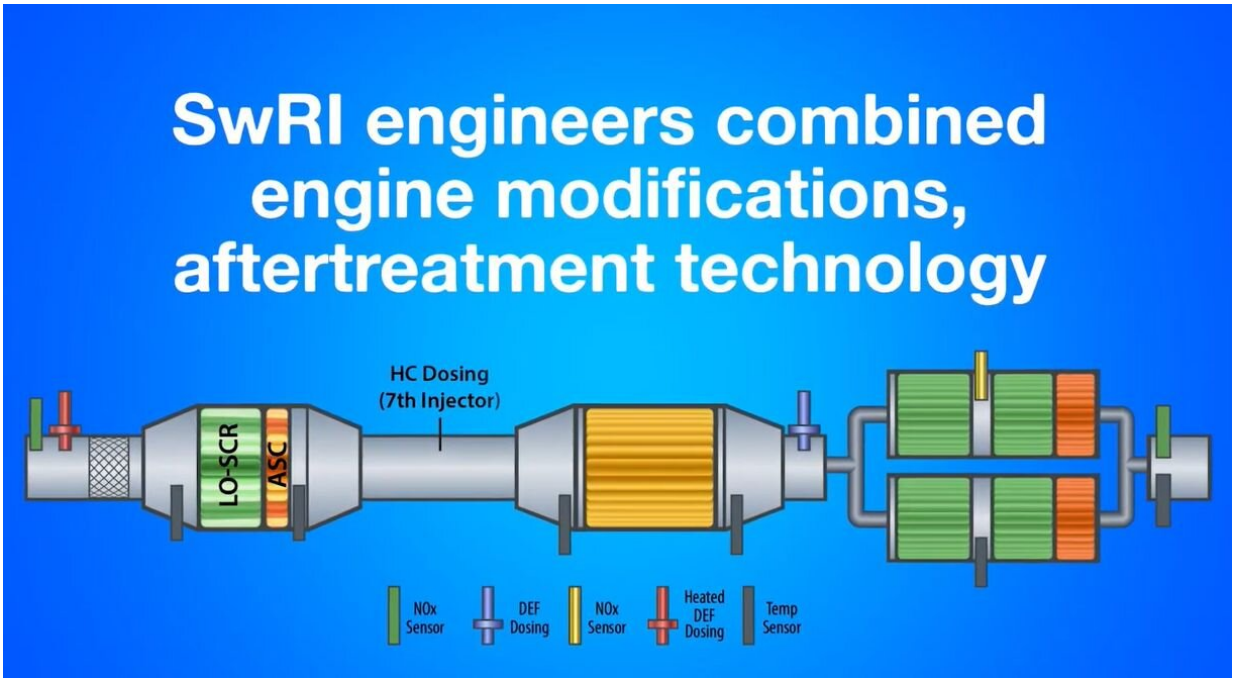

Southwest Research Institute engineers have developed the next generation of clean diesel engine technology to reduce hazardous nitrogen oxides (NO_x) and carbon dioxide emissions while minimizing fuel consumption. Working with regulatory agencies, vehicle manufacturers and suppliers, SwRI combined engine modifications with integrated aftertreatment technology and control strategies to reach near-

zero emissions levels. SwRI developed the technology for the California Air Resources Board (CARB), a state organization charged with combatting air pollution.

"Through the continued efforts of a multidisciplinary team, SwRI has developed one of the most fuel-efficient, low-emission diesel engines in the world," said SwRI Research Engineer Bryan Zavala, a member of the low NO_x development team. "Created to address California's pollution challenges, this technology could be a solution for communities around the globe dealing with the effects of NO_x."

According to the Environmental Protection Agency, nitrogen oxides are harmful to human health and the environment. The State of California plans to enact tighter emissions standards in 2024 and will require that heavy-duty engines produce less pollutants. Taking a systems approach to address the problem, SwRI engineers met CARB's stringent emissions goals to reduce NO_x by 90% while simultaneously lowering carbon dioxide emissions.

"The low NO_x technology developed at SwRI illustrates significant strides toward improving today's heavy-duty engines and lowering greenhouse gas emissions," said CARB Vehicle Program Specialist Dr. William Robertson. "These types of simultaneous NO_x and greenhouse gas solutions are key to creating sustainable heavy-duty transportation and meeting our public health obligations."

In 2013, CARB contracted SwRI to investigate potential approaches for achieving an ultra-low NO_x target in three stages. Stage one assessed the feasibility of lowering engine NO_x emissions. In stage two, SwRI engineers developed a low-load certification cycle to gauge the performance of engine aftertreatment systems in low-load conditions, such as while idling. Stage three, which is ongoing, has consisted of developing the near-zero emissions technology and evaluating it.

Engineers modified a 2017 Cummins X15 engine architecture, integrated aftertreatment technology and enhanced controls to produce the desired results.

"Making a relevant impact on pollutants requires a whole system approach," said Zavala. "Throughout the program, we have had an open dialogue with regulatory agencies, vehicle manufacturers and suppliers to evaluate the feasibility of a new low NO_x standard."

SwRI continues to evaluate the system and its NO_x reduction performance under realistic operating conditions such as hydrothermal stress and catalyst contamination to validate real-world performance. Final results are expected in summer 2020.

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