

# Optimization methodology of Urea-SCR system to achieve higher NO<sub>x</sub> reduction performance

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## Abstract

NO<sub>x</sub>(Nitrogen Oxides) is one of the strongly regulated exhaust gases in automotive industry. Urea-SCR(Selective Catalytic Reduction) technology is widely used as a countermeasure to effectively reduce NO<sub>x</sub> emission from diesel engine. Despite progressive development of its technology for decades, more advanced control and optimization of urea SCR systems are still required, since global NO<sub>x</sub> emissions standards are expected to become more stringent. This study was investigated on several influential parameters of urea SCR system to improve NO<sub>x</sub> reduction performance. This study used a commercialized UWS(Urea Water Solution) supply system and a SCR catalyst which was installed in the exhaust line of a non-road CRDI(Common Rail Direct Injection) diesel engine. In this study, it was found that the low space velocity of SCR catalyst is essential for high NO<sub>x</sub> reduction performance, especially at low temperatures. Early dosing of UWS enhances the overall NO<sub>x</sub> reduction performance if UWS dosing was carefully controlled to avoid urea deposits. Over dosing of UWS with ASC is good strategy for higher NO<sub>x</sub> reduction performance. However, NO<sub>x</sub> reproduction in the ASC, which has an adverse effect on the overall NO<sub>x</sub> reduction rate, occurs at high exhaust gas temperatures. System insulation also showed slight improvement of the NO<sub>x</sub> reduction performance.

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**Keywords:** *Urea SCR(Selective Catalytic Reduction), NO<sub>x</sub>(Nitrogen Oxides), UWS(Urea Water Solution), Non-Road Diesel Engine, ASC(Ammonia Slip Catalyst)*

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Research student during master thesis in engine laboratory at Korea Institute of Machinery & Materials.(Mar 2016 to Feb 2017)

Research associate in engine laboratory at Korea Institute of Machinery & Materials. (Mar 2017 to June 2018)

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