

디젤엔진 연료분사펌프 캐비테이션 손상 방지를 위한 실험적 연구

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Experimental Study for the Prevention of Cavitation Damage in the Diesel Fuel Injection Pumps

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Abstract : Cavitation phenomena during the injection process of the conventional fuel injection pump for a medium-speed diesel engine can cause surface damage with material removal or round-off on the plunger and barrel port and may shorten their expected life time. An experiment of flow visualization was carried out to investigate the main cause of these cavitation damages and find the prevention method. Experimental results of flow visualization show that these damages are mainly affected by fountain-like cavitation and jet-type cavitation generated before and after the end of fuel delivery process and therefore the prevention method was designed to control these cavitation flows. From the visualization and endurance test, it was proved that this method can effectively prevent cavitation damages by controlling cavitation flows.

Key words : Fuel injection pump, Cavitation, Flow visualization, Diesel engine

PURPOSE

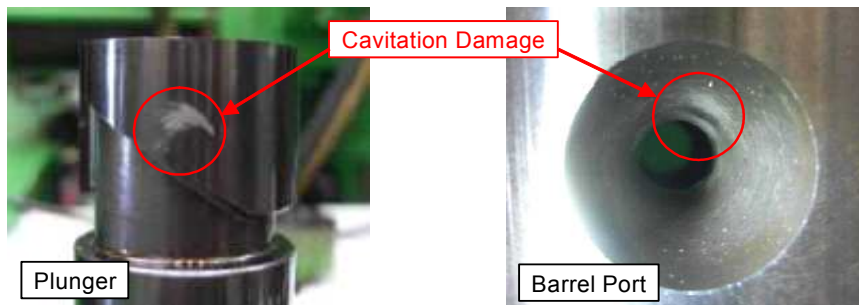
This study was performed to investigate the main cause of cavitation damages on the plunger and barrel port and find the prevention method for the diesel fuel injection pumps

SCOPE

1. Flow visualization of cavitation phenomena to investigate the main cause of cavitation damages
2. Development for the prevention method of cavitation damages by controlling cavitation flows
3. Verification for the prevention method by the flow visualization and endurance test

RESULTS

As a result of this study, cavitation damages on the plunger are mainly affected by fountain-like cavitation generated before the end of fuel delivery and the damage on the barrel port caused by jet-type cavitation generated after the end of fuel delivery. Based on this results, the prevention method of cavitation damage was designed by controlling cavitation flows. And the prototype fuel injection pump was developed which has grooves on the surface of plunger. From the visualization test of the new type of fuel injection pump, fountain-like cavitation has almost disappeared and the direction of jet-type cavitation has changed not to directly collide against the wall of barrel port. Lastly, the prevention method of cavitation damage on the plunger and barrel port was also verified by the endurance test.



Cavitation Damages in the Diesel Fuel Injection Pumps

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