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DEVELOPMENT OF COMBUSTION CHAMBER NOZZLE BY SUPERPLASTIC BLOW FORMING  
WITH DIFFUSION BONDING

**Abstract**

This paper describes development of combustion chamber nozzle for liquid rocket engine. Chamber nozzle is under development by superplastic blow forming and diffusion bonding instead of the conventional manufacturing method. Chamber nozzle is a part of liquid rocket engine combustion thrust chamber and is composed of outer case and inner case with cooling channels. The following development results of the components up to now are presented in this paper.

For the material characterization of duplex stainless steel in outercase, test results such as tensile test at high temperature and the free bulging test are presented. Outer case is formed according to the process based on the results from finite element analysis of the superplastic blow forming for the outer case. The results of experimental forming are compared with those of analysis. Finally the test results of diffusion bonding process for the outercase and inner case are presented.