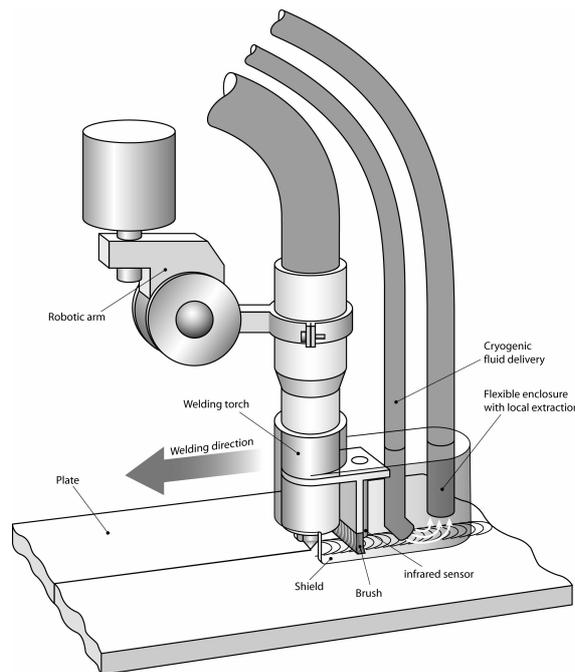


MALCO

Creating Opportunities for the Manufacture of Lightweight Components

- End user: TKT, Bentley, Komatsu



In today's manufacturing environment the welding of sheet metal is highly problematic primarily because distortion of thin sheets is common. Current practice to correct for this involves reworking (expensive and wasteful) and the addition of stiffeners (increased weight and therefore greater fuel consumption in transportation). The application of local cooling near a weld during the welding process is known to reduce these distortions. This technique is known as the 'low stress no distortion' (LSND) process. However, the physical mechanisms have not been sufficiently understood for this welding process to be established in industry.

In this project the applications of advanced weld modelling and simulation techniques to predict cooling gas flow near the weld has been used to establish weld process conditions for low distortion welding in sheet metal (<6 mm thick). A laboratory prototype system was developed to carry out LSND welding trials. Initially, bead on plate welds were made to provide data for modelling. Trials were then carried out on simplified components representative of the three end user applications. These components were a joggle joint, a top hat section with lap welds and a box section with fillet welds. Trials were carried out both with and without cooling to assess the reduction in distortion which could be achieved. The trials showed that distortion could be reduced by 50% in some cases.