Austempering is a hardening process based on the isothermal transformation of austenite to bainite. The austempering process is heating to above austenitizing temperature, cooling to just above Ms temperature (martensite start temperature), holding at that temperature until the transformation is complete and then cooling further to the room temperature. The phase transformation from austenite to bainite is 250–550°C and conventionally molten salt is used as quenching media.

Due to the environmental concern on molten salt heat treatment industry would like to pursue new austempering process to form bainite without using salt bath quenching. This project investigated how to form bainite without quenching in molten salt.

The processing routes needed to be identified to develop bainitic parts with comparable strength, ductility, and toughness to traditionally salt bath quenched bainitic parts. Through these experiments, austempering process parameters such as time, temperature, and cooling rate were optimized and controlled.