GRADUATE STUDENT RESEARCH SEMINAR SERIES (2018)

SIMULATION OF LOCALIZED MOVING HEAT SOURCE IN HEAT ASSISTED SINGLE POINT INCREMENTAL FORMING (HASPIF) OF POLYMER SHEETS

SPEAKER: SHUBHAMKAR KULKARNI

Single Point Incremental forming is a process used for forming sheets without the use of dedicated tooling. The process is a low-cost alternative to thermoforming for small batch production. It has been shown that using localized convective heating, the formability of polymer sheets can be improved. This is achieved by integrating a hot air gun and a custom designed nozzle that creates a heated spot coaxial to the tool. Currently, most of the knowledge on this process is empirical, and the objective of the current research is to develop coupled thermo-mechanical simulation models to improve understanding of this process. A part of this involves simulating the moving heat source. A model is proposed for simulating the heat transfer encountered in the process. This model treats the heated region as a series of shifting concentric semicircles and semi-annuli, with a distribution of convective Heat Transfer Coefficient (HTC) values. This heated spot is moving synchronously with the tool, leading to transient heat transfer. The HTC values have been evaluated using a specially designed experimental protocol. Simulation runs have been carried out using this technique in ANSYS, and a localized, moving, temperature-differential has been observed, demonstrating the heated spot. Currently, validation using experimental studies is underway. Once validated, this will provide a method to simulate the heating effect produced by the moving convective heat source.

MONDAY, MARCH 26 3:15 PM

EIB 132