Punch Cycle Tester

Sponsor: Mate Precision Tooling
Sponsor's General Business Statement: To be the world's leading supplier of precision tooling for CNC punch presses.
Sponsor's Advisor, Title, and Phone Number: Ron Windingstad, Project Manager, (763) 576-3482
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University of St. Thomas School of Engineering Academic Advisor: Dr. Kaye Smith
Team Member Names: Mike Bindert, Lindsey Hines, Thomas Knowles, Ann Majewicz, Jacalyn St. Dennis, Keenan Weise
Senior Design Clinic I-II (ENGR 480-1) Project Description: Design and develop an automated sheet metal punch cycle tester that simulates forces experienced by the punch during industrial use without using sheet metal.

Major Design Requirements:

1. Reenact forces punch experiences in normal use without using sheet metal
    a. impact/compression
    b. strip-force
    c. strip-miss
2. Be able to adjust compression force punch experiences
3. Be able to test a punch to 1 million cycles or to failure
4. Record forces and temperature during operation
5. Machine should run autonomously

Figure 1: L&J Astra Speed 30

Senior Design Project Summary:

The project proposal by Mate was to build an automated punch cycle tester to fill the need for a rigorous testing process accomplished without using expensive sheet metal. Originally the intention was to build the machine, but due to constraints, the project was changed to retrofitting an existing machine, an L&J Astra Speed 30. Systems designed by the UST team include the spring-pack, which allows adjustable compressive force given different displacements of the punch, and the strip-force simulation attachment. Strip-force and strip-miss are produced by paired pneumatic cylinders that resist punch return. Load cells and thermocouples read in testing data to a computer, which also controls the operation of the machine, allowing for fault detection and emergency stop. Success for the project was defined as cycling a B Station punch and recording force data. Testing preformed on a B Station punch at 4000lbs and 150cycles/min showed that major design requirements were met; currently strip-force testing is in progress.

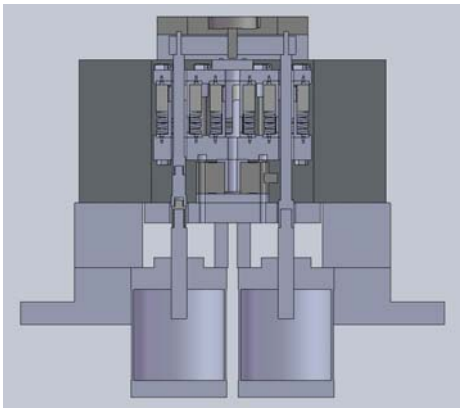

Figure 2: Cross-sectional view components added

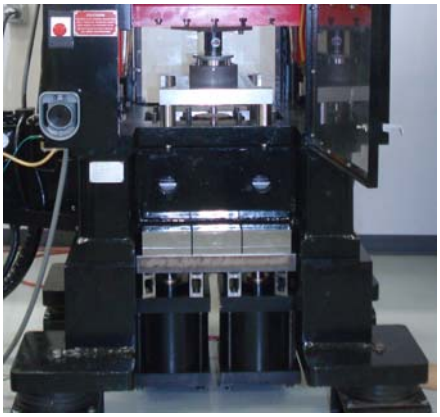

Figure 3: Components assembled in machine