Automated Ski Press Module

A press module is used in the manufacture of skis and snowboards to apply pressure and heat to tooling, as well as controlling the final shape (camber/baseline) of the skis or snowboards. At its simplest, a module consists of an array of height adjusters, a mechanism for heat delivery (typically silicon resistance heaters on either side of the module) and some manner of applying pressure to the ski toolset.

Our current modules require updates and additional features in order to simplify workflows, reduce set-up time, and produce consistent product. These updates and additional features constitute a ground-up redesign of our modules.

The new module needs to be retrofitable onto our existing presses. The first part of this project will be updating and modernizing the control schema of our modules. Our heating systems, pressure delivery system, and hydraulic actuators need an updated control interface – ideally on a computer or laptop. This interface should allow users to change set-points, display current measured values for heat zones and pressures as well as provide plots showing data over a specified time-frame. Finally, the interface should allow users to create and run ‘programs’ that cycle the press and module through a manufacturing cycle.

With this new interface and control schema, we’d like to automate camberline adjustment. Currently, we manually adjust an array of ramp adjusters. These adjusters have no built-in measurement system, and measuring the adjuster height is difficult (though manageable). Adjustments are made by turning a bolt that moves the upper half of the ramp adjuster relative to the lower portion. On a typical press setup, there are 34 adjusters (all adjusted independently) and it takes 2-5 setup rounds to achieve a desired camberline. It’s worth mentioning that each model, and each size within a model, gets a unique setup; a small reduction in set-up time will have a significant impact on manufacturing efficiencies.

Making an adjustment to the press is a time consuming process, typically about 30min per setup as each adjuster must be moved and measured manually. The updated module must be able to automatically measure and adjust each adjuster. Ideally, this functionality would be built into the updated user interface, and the module could take adjuster heights as user input.

This project will involve significant prototyping of both the physical module as well as the electronic interfaces.

Project Goals:

* Develop a user interface to control the press module
  + The interface should display current setpoints, current status and a time plot of values
  + The user interface must take input from user activated switches and sensors to control press opening and closing
* Develop a system to automatically measure and adjust height adjusters
  + This system should take input from the user interface to make adjustments. We should be able to adjust to a specific height, or make adjustments based on deltas from the existing setup.