

WENDELL WA AUGUST

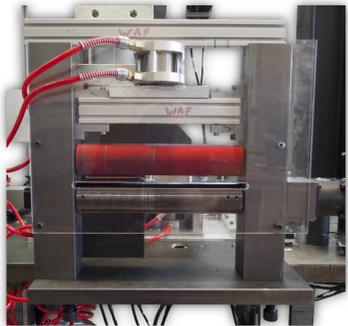
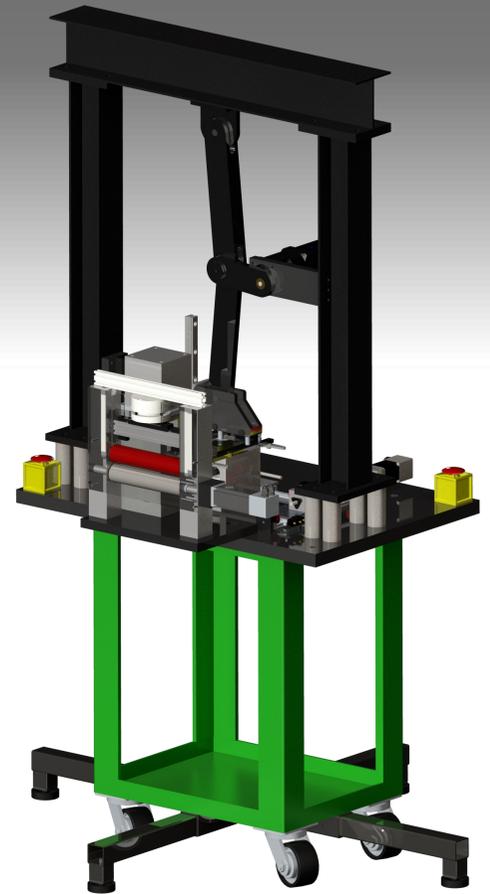
MECHANICAL ENGINEERING

SENIOR DESIGN PROJECT



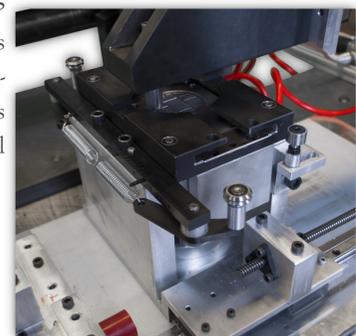
Abstract:

Wendell August Forge, est. 1923, is one of America's oldest and finest metalcrafters. One of their most beloved products is their hand-designed annual Christmas ornament. With the popularity of this product, Wendell August desired to produce a higher volume of these ornaments and charged senior Grove City College mechanical engineers with designing an automated hammering prototype to be used as the basis for a future production machine. Building off of the single-ornament hammering unit created by the previous year, the second-year team solved additional automation challenges by developing four key systems: the feeding, punching, clamping, and linkage systems.



Feeding

Aluminum stock (thickness: 0.090") is roll-fed into the machine via a nip roller system. The bottom roller is made of precision-ground steel and driven by an Aerotech servomotor. A pneumatic cylinder moves the upper, urethane roller vertically to engage or disengage the system depending on the state of the other operations. When engaged, the system precisely feeds stock into the machine.



Clamping

The clamping system holds the sheet firmly to the die as each ornament is hammered. It is actuated by a pneumatic cylinder that engages the clamp after the feeding system releases the sheet. This permits the alignment table to move the material to the correct locations for hammering and stamping.



Punching

Indexing each hammered ornament is crucial to locating the ornament in subsequent operations. A 4 1/2" pneumatic cylinder actuates a punch that creates a 1/4" index hole for each ornament as the stock feeds through. These index holes align with pins on the die and will also be used for blanking operations in the future.



Linkage

The linkage system is a further development of the prior year's work. The two uppermost links were combined and remachined to improve rigidity in the system. The hammer block was redesigned to include an offset stamp for impressing the Wendell August Forge logo into the back of each ornament.



Dedicated to the Science of Motion

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