Virginia Military Institute
Department of Mechanical Engineering
Cooperative Engineering Center 2001
Frame Flipping Process Redesign
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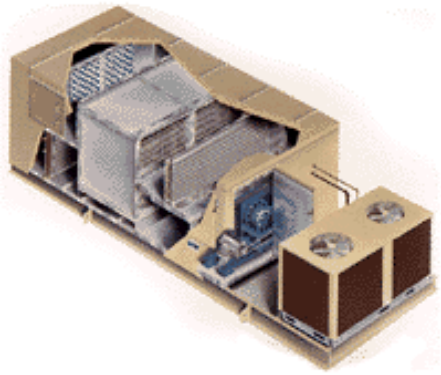
Client: Des Champs Laboratories Incorporated



Base Frame with Attached Air Handling Unit

The Cooperative Engineering Center team of Michael Christensen and Matthew Frye were assigned the project of redesigning the frame flipping procedure for Des Champs Laboratories Incorporated. The goal of the project was to formulate a new procedure that was safer and more efficient then the current method.

Des Champs Laboratories manufactures air-handling systems, energy recovering systems, and heating and cooling systems. These systems are mounted onto steel frames. These frames vary in size from 3' x 4' @400lb, to 12' x 50' @10,000lb with frame thickness ranging from 3" to 15". Before these systems can be mounted onto the frames, the frames must be flipped and insulated on the bottom with spray-on urethane foam. The current flipping process involves using a hoist and the aid of a forklift to elevate the frame into the air. Once the frame is vertical, the forklift pulls the bottom out and away from the hanging axis and sets it back down.

The frames are currently moved around the plant on four roller mechanisms. Through a redesign of the roller system, the lifting lugs attached to the frames will now be pinned/attached directly to the roller. A hoist is then attached to the midpoint of opposite side of the frame. As the hoist lifts this side of the frame, the other side is allowed to roll with the new roller system. The frame rotates to the vertical position, at which point it continues with the hoist lowering until the frame has been rotated 180°. This eliminates the need for the forklift and the hoist will only need to lift half as much weight.

The team has specified a new support system for the hoist that will remove this mechanism from the frame of the building and place it on a gantry crane system. Along with this, a new roller design, and new procedure, the frame flipping process at Des Champs will be much safer and more efficient than the current procedure.