Mixer Blade Removal Mechanism

Overview
SEKISUI-SPI is a leader in specialty thermoplastic sheet design and manufacturing. The Bloomsburg facility utilizes a Henschel style high intensity mixer to blend up to 25 custom PVC formulations. After each mixing process, an operator must remove both blades for cleaning, which both weigh over 70 pounds each. A Risk Analysis was performed to show that the actual weight of the blades exceeded the calculated weight limit of 35 pounds to show a high risk. The limited space in and around the mixer further complicates using standard lifting equipment to solve the problem.

Objectives
- Design and specify a system for mixer blade removal.
- System must be safe and operator friendly.

Approach
- Onsite visit to SEKISUI-SPI in Bloomsburg, PA.
- Initial approach and the environmental constraints were developed.
- Multiple concepts and designs were created for both the lifting and gripper mechanisms.
- Evaluated designs and their processes before selecting our final design to detail and analyze.
- Solid Works’ models were created for our final design and the layout of the mixer area.
- Proper Cost and Risk analysis’ were created to fit the final design

Outcome
- Fixed Stretch Arm mechanism and retractable track system were created.
- Hydraulic Gripper was designed to clamp and lift each blade.
- Design will eliminate operator back injuries from lifting the blades by 100% along with completing the objectives within given constraints.

Above: Hydraulic Gripper

Left: Layout of Mixer with Stretcher Arm and Retractable Track System