

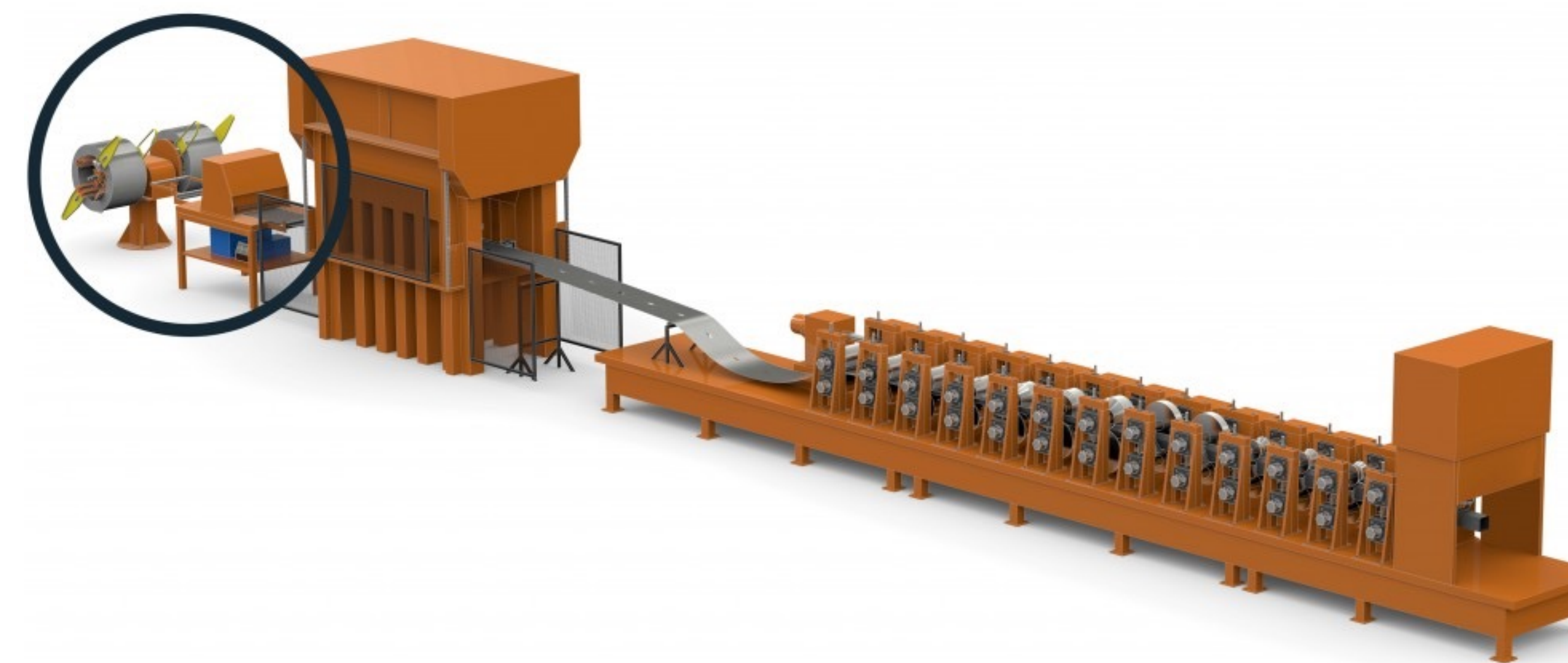
Automated Sheet Measurement Device



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Problem Statement

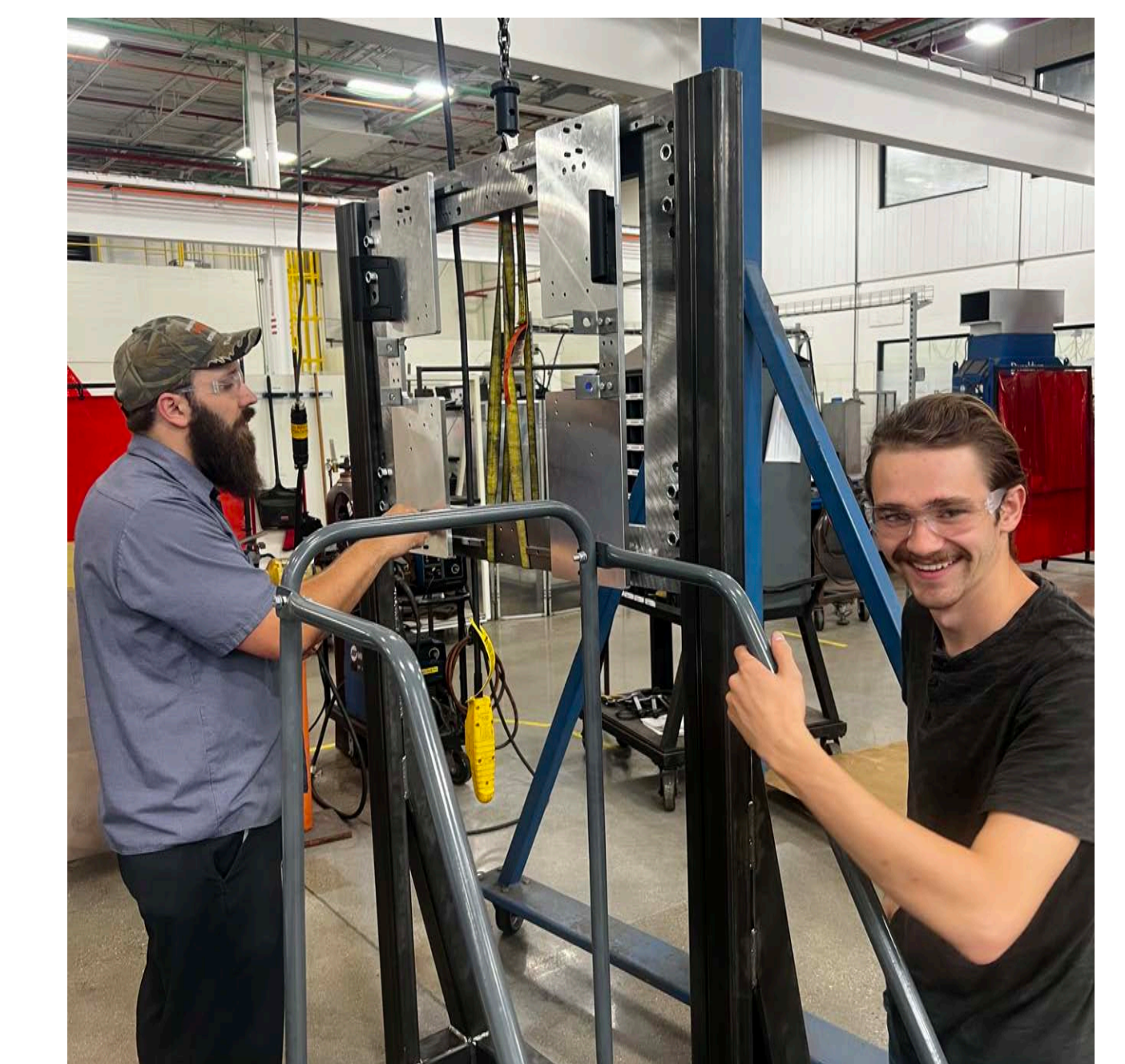
Shape Corporation wishes to reduce the amount of scrap produced by their current roll forming processes by creating a system that monitors the dimensions of the input material. The current roll forming process takes a flat sheet of steel and uses a series of rollers to form the steel sheet into a desired shape. After the parts are completed, they are tested to determine if they are within specification. If a part is determined to be out of specification, the parts that have been produced from the roll of steel are scrapped and adjustments are made to the process. Our device aims to prevent this issue by measuring the dimensions of the stock before the component is produced.



Requirements / Specifications

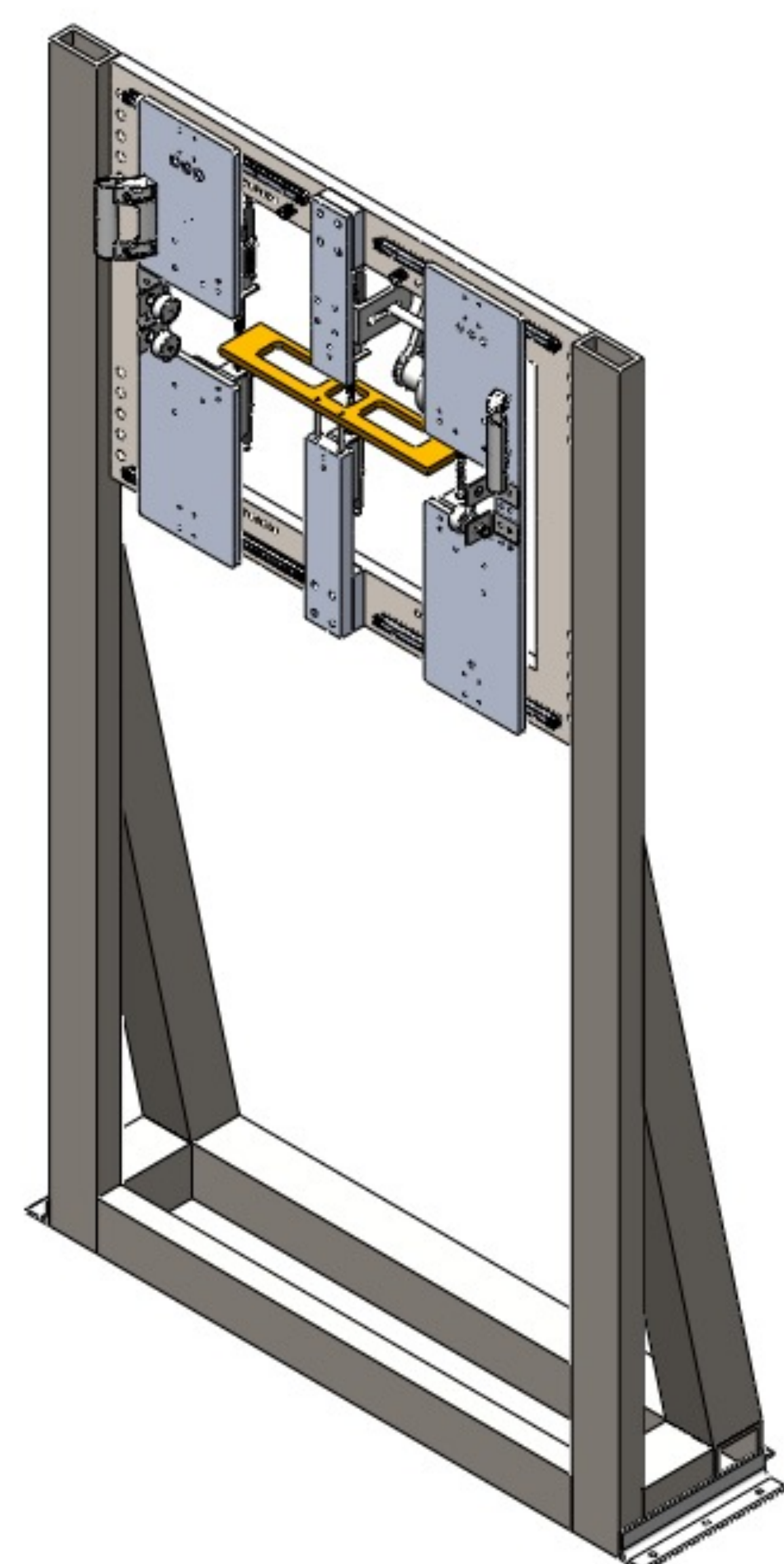
The device is required to measure the following dimensions to accuracies listed below:

Width: 0.025 mm
Thickness: 0.016 mm
Crown: 0.016 mm
Length: 0.0142 mm



Design

The device is designed to measure multiple sheet thicknesses and widths to provide versatility for use in multiple lines. The device is located between the leveler and welder towards the beginning of the roll forming line, which confined the device to a 5" deep space. To address this, the frame was constructed of 2"x4" steel tubing, and the main plate is seated between the uprights to allow for a thin profile. The sheet thickness and crown is measured using opposing contact sensors in three different locations, the width using two non-contact beam-break sensors, and the length using a wheel encoder. The measurement plates are adjusted using a rail system that is moved manually. A human machine interface (HMI) is used to control the device and its settings.



Results:

The device properly measures, records, and displays the dimensions of the sheet metal as intended.