Target Summary

The targets for our project establish numerical values for what our project must accomplish in order to be deemed successful. These targets were derived from the customer needs and functional decomposition, as well as through ongoing feedback from the sponsors. The customer needs express what the project sponsor desires for the final project to accomplish. Each function established in the functional decomposition lays out the tasks the device must perform in order to achieve its purpose. Using these needs and functions the team then met with the project sponsor in order to gather exact numbers and units that need to be reached by the team's various systems.

Critical Targets

The critical targets, shown in *Table 1*, are what will be used in order to determine if the project is successful and meets the customer's needs. These metrics and their corresponding targets are the project's most important values to attain. The success of this project is dictated by the device's ability to accomplish these targets and metrics.

Table 1: Critical Targets

Systems	Functions	Metric	Target
Stabilization	Limit Movement	Max Distance (in)	0.588
		Top Area (in^2)	297.36

Compatibility	Integrate with Current Conveyor	Bottom Volume (in^3)	43.18 (x4)
Compatibility	Fits Return System	Return Height Limit (in)	6
Compatibility	Limit Manual Labor	Interactions per One Pallet Cycle (people)	1
Support	Withstand Load	Weight Capacity (lbs)	8

Validation and Discussion of Measurement

The stabilization system refers to the overall stabilization of the short part ceramics while the device is being used. The critical target in this system is the maximum amount of space that the ceramic will be able to move while using the stabilizer. This function will be validated by placing the smallest ceramic part produced by corning on the chucks and utilizing a caliper to measure the distance between the face of the ceramic and the surface of the stabilizer.

The system of compatibility refers to the design being capable of being placed in the current manufacturing environment and not causing any disturbances with the conveyor. One critical target for this system includes the maximum amount of area on the top side of the pallet, meaning if the design has any overhang, it would interfere with the conveyor system. Another critical target includes the volume allowed for the device along the bottom side of the pallet. The underside of the pallet needs a cross-shaped free space to allow for the stopping mechanism to stop the pallet as needed. This only leaves the team with the four corners of the underside of the pallet for available space if fasteners are needed. Subsequently, the device on the pallet needs to fit the return system of the conveyor. The biggest concern of the pallet feedback system is the height constraint. The device itself needs to be a maximum of 6 inches when going through the feedback system. All three of these functions will be virtually validated using Solidworks to

check for the correct dimensions. These functions will further be tested in real-world applications by taking careful measurements and sending the prototypes through space-constrained testing scenarios. To limit manual labor, a test scenario will be utilized to see if the design will be capable of completing the necessary functions without needing assistance. To succeed the device will need to have a maximum of 1 interaction.

The stabilizer will need to be capable of withstanding impacts from ceramic movement. The stabilizer will also need to be capable of supporting the relative weight of the ceramic. The support will need to withstand a capacity of 8 pounds. This will be tested by applying a load against the stabilizer until failure.

Arriving at Targets and Metrics

To arrive at these targets and metrics, background research was conducted on each function. To define the target for limit movement, the team investigated the current design being used by Corning. Currently, Corning is using plexiglass T-shaped stabilizers. Corning reports that no damage occurs to the ceramics using the current design. Using Corning's shortest ceramic and the plexiglass T, the maximum distance of movement between the ceramic and glass was able to be measured. With this measurement, the team knows in order to keep the ceramic stable the project's design must have a maximum range of movement that is the same as the current design.

The second key system is compatibility. The first function of this system is for the device to integrate with the current conveyor. The surface area of the top of the pallets was measured by subtracting the area of the holes and slot design. The final product has to fit within the surface area so the design does not overly extend and interfere with the conveyor. The pallet also includes open space on the bottom side. However, a portion of this area is needed for the

stopping mechanisms. The team took a volumetric measurement of the four corners of available space on the underside of the pallet. For the design to be successful, any fasteners the design may utilize will need to fit in one of these four locations while not exceeding the volumetric limit that could impact the rollers or stopping mechanism. Limiting the manual labor needed to operate the device is another critical function of the system. Due to the placement and size of the current design, two employees are needed for the placement and removal of the T's at specified locations along the conveyor. For the team's device to be successful at reducing manual labor costs the number of these interactions will need to be reduced.

The critical target of the support system is the amount of weight the device will be capable of supporting while a ceramic impacts or rests against it. The current short-part ceramics weigh approximately 7-13 lbs depending on the dimensions of the part. In a worst-case scenario a ceramic would tip, not return to an upright position, and continue resting against the stabilization design. The design must have enough support in itself to brace the relative weight of the ceramic resting against it. With the majority of the ceramic's weight still resting on the chucks of the pallet, the design will still need to support some of this weight and be strong enough to withstand the impact force.

Targets Beyond Functions

Along with these targets and metrics, we also have a number of other values that fall outside the categories of systems and functions. Targets outside the main functions of the project can be found in the full table of targets in Appendix C. These characteristics do not necessarily determine the success or failure of the project but are included to ensure the project is as beneficial to the sponsors as it possibly can be.

One of these targets includes the overall weight of the design. Ideally, the design should not have to be interacted with frequently, although when the manufacturing plant is switching to longer ceramics it may need to be removed from the pallet. Due to the plant using as many as 15-20 pallets in circulation the team would like to keep the weight of the design relatively low to maximize maneuverability.

The second is assembly time. The manufacturing plant can take about 1-2 hours while calibrating the manufacturing line for a different-sized ceramic. While this is being done a worker stands on the line adjusting the V chuck's slot positioning. The change takes roughly 30 seconds because of the quick-release pin and the smooth-fitted slots. To benefit Corning and the employees, the team would like the device to integrate with the system and take no longer than the current adjustment time.

The third target that goes beyond the functions is the recyclability of the device. To be more environmentally friendly the team would like the majority of the design to be made from recyclable or biodegradable materials.

Summary

The targets and metrics for each of the functions of our three systems along with those that fall outside of the device's functions clearly lay out numerical specifications for our project to reach. These values were obtained through numerous meetings with Corning as well as benchmarking our project with the similar method currently in use on their conveyor line. These values illustrate what the team and sponsors desire from the device in order for the project to be successful. Various procedures will be used during early prototyping to validate the team's design and ensure that the targets of the project are met.