Large, aluminum door panels can be difficult pieces to clean. Used in many applications, including the construction of the United States Army's Hummer vehicle as a skin to be placed over the armor plate frame, these panels need to be cleaned quickly and efficiently. This article will serve as an example of how one manufacturer was able to replace an outdated and inefficient washing system with one that cleans more effectively and the steps that went along with the transformation.

The original washer had a load/unload stage of 5', a wash stage of 16', and a spray length of 12'. The overall dimensions of the machine measured out to 7' W x 8'H x 76'L. The machine had a 600-gallon washer tank, a 5,000,000 BTU/hr heater size and design, and a pump size of 481GPM running at 15 PSI. By decreasing some of these measurements and using a more efficient design, the overall design of the washer will be reduced and operating costs will be lowered, along with an increase in production and quality.

First, the loading and unloading stages of the machine will be increased from the original 5' to 8'. By adding three to these stages the operators will have the benefit of increased safety while maneuvering the larger panels. The wash stage will be reduced, from 16' to 12'. The smaller length will make it easier to clean the tanks, as well as keeping the gas burner immersion tube to a minimal dimension. Still, the 12' length will allow a 10' panel to drain before moving on to the next stage in the process. Once loaded, the parts will move through the system in one of two separate lanes, which are both driven by a single, common drive motor. The lanes will consist of flat wire belts on a roller bed, driven by the motor at approximately 8 feet per minute. Adjustable guide rails in the tall lane will allow the machine to handle 3 different widths of the panels.

Spray length will be reduced from 12' to 8'. By decreasing the pump size, from 500 gallons per minute to 300 gpm, but running at a higher PSI, 40 instead of 15, the spray length can be reduced without a drop in wash quality. Since the washer tank has been increased from 600 to 1000, the pump must be size appropriately. Tank volume cannot be less than 3 times the total pump volume or else you can possibly run the pump dry. In the previous configuration, the tank was 600 gallons and the pump was running at 481 GPM, which is not the correct ratio. A 1000-gallon tank and 300GPM pump is more appropriate. The increase in PSI makes up for the decrease in gallon per minute flow and spray bar impingement time. Also, by installing a larger tank, the time before the tank becomes saturated with soil and stamping lubricant is increased, thereby decreasing the amount of time that production must be stalled in order to clean the machine.

In terms of maintenance, the spray stages will also be easier. The pump will be a vertical barrel mount pump, which can be removed without draining the tank. The spray nozzles are quick change, for easy maintenance. The nozzles and headers are customized to optimize the coverage of parts as well.

After the wash stage but before the rinse stage, a blow off feature is installed that was not present on the previous machine. Using a stripping air knife system running at 25 horsepower and delivering up to 600 cfm of air, the parts will be stripped of excess or puddles of water before being sent to rinsing. This stage helps to prevent the cleaner from being carried over to the rinse tank from the wash tank, thereby making the rinsing stage more effective. There will always be wash water rinsed off into the rinse tank, but carrying the water on the part and dumping it into the rinse tank makes the rinse tank just another part of the wash tank and diminishes efficiency and efficacy.

After a rinse stage that removes any left over contaminant or cleaner, the parts will move along into the final blow off stage. High velocity regenerative blowers will be used to strip the excess water from the parts. The air manifolds, which utilize air knives with directional nozzles that create a curtain of air, will be mounted parallel to the spray headers. The blow off stage is further enhanced by the addition of a heated blow-off for 2 of the blowers. These heated blowers will be adjustable up to 200 degrees and enhance flash drying. With the increased PSI and more efficient air knives used in the blow off stage, the length will be decreased from 24' down to just 12'. By increasing the power of the blow off stage and effectively concentrating it, length is reduced in half and keeps the footprint of the machine small.

Additional monetary savings will be made when the heater used in the machine is replaced. In the old machine, a 5,000,000 BTU/hour heater was used. This was necessary in order to maintain a steady temperature using a 500 gallon per minute pump flow. In the new design, a 3,000,000 BTU/hour system is installed. This results in 2 million less BTUs expended per hour of use and decreases monthly energy costs.

Finally, by using two lanes for washing and speeding up the conveyor, the washer and therefore the heater only need to operate 8 hours per day. This is 2 ½ times less than the 20 hours the old machine was operating. Using the newest technology available, the burner operates at a higher efficiency rate as well, further reducing costs.

The overhaul of this particular wash process illustrates how new technology and an experienced vendor can help a manufacturer save money and increase productivity. With the advances made in washing technology and design, it is worthwhile for any company to investigate whether they could benefit from a change in process. In this example, the footprint of the machine was significantly reduced while efficiency was increased and operating costs were decreased.