

Humphrey developed a special valve manifold assembly with nozzles spaced 0.120 inches apart for a customer who was building a system to separate recycled multi-colored glass particles by using jets of air.

- ① Manifold assembly with uniquely drilled airways.
- ② Air nozzles spaced 0.120 inches apart.
- ③ Humphrey HK5 valves stacked in four banks. Each valve feeds a separate nozzle.
- ④ The manifold is connected to the customer's computer system, sensors and proprietary software.

## Custom Valve Manifold

*For High Volume Recycled Glass Processing System*



**RECYCLING**  
**SIC:5093**

### THE CUSTOMER'S PRODUCT

- The customer designs and builds large scale, commercially viable recycled glass processing systems.
- The system uses optical detection and jets of air to remove contaminants and sort the different colors of crushed recycled glass as they cascade past the manifold.
- The new system processed recycled glass more quickly and is less expensive than existing systems or methods.

### THE REQUIREMENTS

- The customer's requirements evolved during the prototyping process to incorporate refinements.
- The final manifold has to be 3-feet long with air nozzles spaced 0.120 inches apart, and the manifold had to be adaptable for other size systems.
- The valve had to operate at a very high cycle rate and have a very fast response time.
- The valve must have zero leakage.

### THE HUMPHREY ENGINEERED SOLUTION

- Utilizing Humphrey HK5 valves, the Engineered Solutions team stacked them in four banks, two above and two below the nozzles.
- The HK5 valve was modified to achieve a very high cycle rate and faster response time.
- The interior airways of the manifold were milled to enable the stacked valves to feed the horizontal row of closely spaced nozzles.
- The manifold was produced in 6-inch sections that could be bolted together to create any length required.
- The resulting system met all the customer's requirements, including being able to process up to 24 tons of furnace-ready cullet per hour.

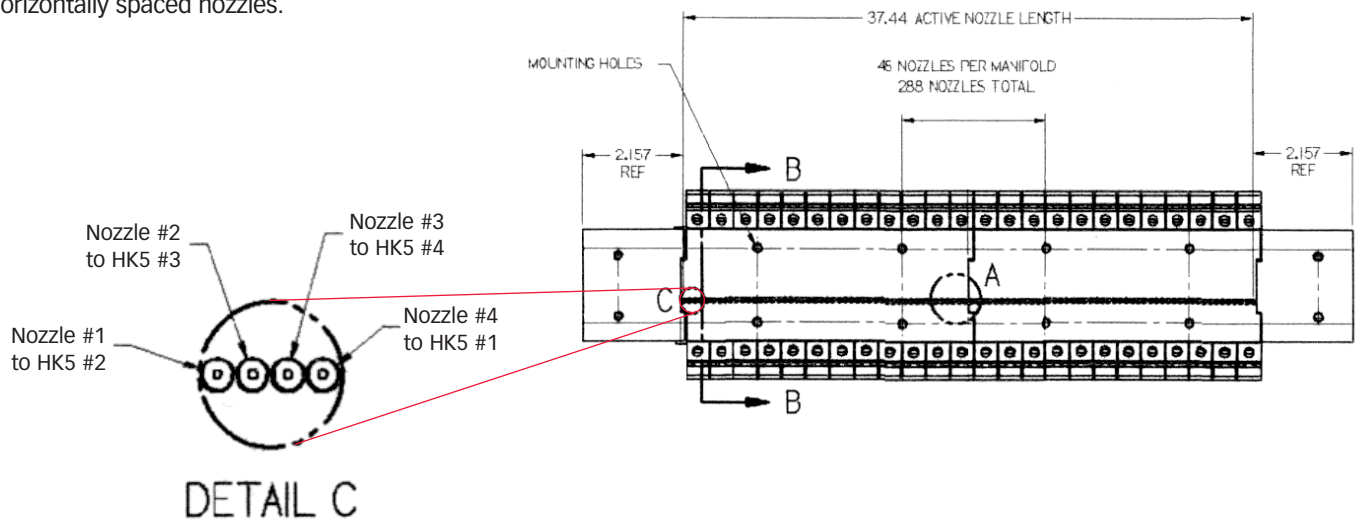
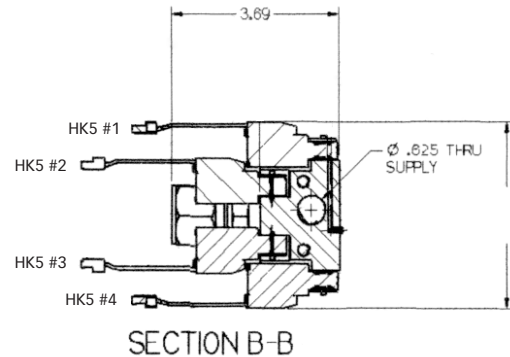
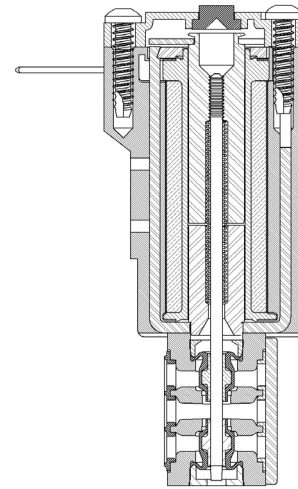
## THE SOLUTION

From the early design stage, the customer engaged Humphrey's Engineered Solutions team to help refine their design. Starting with Humphrey's HK5 valve, the Engineered Solutions team modified it to achieve a faster response rate and higher cycle rate. The HK5 valve is able to sustain the required high cycle rate because of its high life cycle expectancy. To prove its capability the HK5 valve was tested to 100 million cycles at 90 psig.

To meet the requirement for 0.120-inch nozzle spacing, Humphrey designed a unique modular manifold, with the HK5 valves stacked vertically in four banks, two above and two below the horizontal row of air nozzles. Special machining inside the manifold connected the offset valves to the nozzles. The manifold was made in 6-inch sections, which could be joined together to produce virtually any length manifold assembly required.

Working peer-to-peer with the customer's engineers, Humphrey's Engineered Solutions team developed, refined and tested numerous prototypes. Initially the customer specified nozzles spaced 1/2" apart. Then as the customer refined their optical detection software and the associated systems, they tried increasingly closer nozzle spacing. The final 0.120-inch spacing provided optimal sorting at speeds up to 24 tons of crushed glass (cullet) per hour.

Humphrey's Engineered Solutions team designed a unique nozzle to achieve the required pressure profile, and designed a unique manifold enabling groups of four vertically stacked valves to feed the individual four horizontally spaced nozzles.



*Humphrey*

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