



## Best-In-Class Cast Components: 2009

Earning top recognition from the eighth annual Casting Contest, these components clearly illustrate the benefits the casting process offers to the design and engineering community.

PIAD's partnership with Matrx by Midmark resulted in the development of a chill-cast main housing for the finest dental suction pump on the market today, The Classic Series CVR.

Matrx by Midmark had established very tough goals for this design project. Their objective was to optimize pump performance, while keeping cost down through use of design, alloy selection, weight reduction, and consolidation of parts. Working together through the earliest design stages allowed the customer to take full advantage of PIAD's unique chill casting process and application engineering skills.

PIAD's non-ferrous permanent mold castings provided the customer with near-net shaped configurations that include cast to size holes, internal ports and passages, and much of the external geometry.

Some internal passages and overflow ports could not be formed by the simple extraction of steel cores, and required the development and use of two expendable sand cores.

The resin in sand cores generates gas, which is not easily evacuated from the metallic mold. This gas may become trapped during the pouring process and reappear later during the machining process as voids in the casting. To prevent this from happening, PIAD developed sand cores with a specially formulated mixture with regards to grain size, resin, and catalyst content. The objective was to achieve a delayed gas generation. This delay allows the molten metal adjacent to the sand core to solidify before gas develops.

Where finishing was required, PIAD added a minimal amount of machining stock (approx. 0.30"), and the excellent repeatability of PIAD's chill castings prevented fixture issues.

For this project, Matrx by Midmark selected PIAD alloy A020, a high strength nickel-aluminum bronze with excellent mechanical properties and wear resistance. The high tensile and yield strengths of A020 allowed PIAD to cast the housing with minimal wall thicknesses, keeping part weight and

material costs down. Wear resistance was also an important mechanical property, because in operation, the housing is continually subjected to highly abrasive materials.

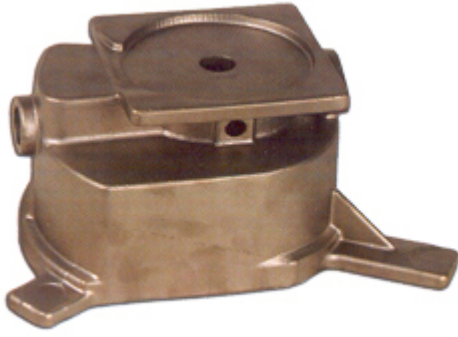
By selecting A020, the customer was able to consolidate a mounting base plate and the housing into a single casting. The alternative would have been to purchase the base plate as a separately cast and machined item. By incorporating three mounting "feet" into the housing, the customer was able to re-design the base plate as a simple piece of laser-cut steel, resulting in a significant overall cost reduction.

Matrx by Midmark continues to expand its markets for Classic Series CVR, which requires only 20% of the daily water usage of competing systems. PIAD's chill casting process contributed to the success of this design. PIAD helped the customer achieve their goal of producing a superior dental pump with reduced water consumption at a competitive cost.

### Classic Series CVR Dental Pump

PIAD Precision Casting Corporation  
Greensburg, Pennsylvania

- Material:** A020 aluminum bronze.
- Process:** Semi-permanent mold.
- Weight:** 15.4 lbs.
- Dimensions:** 10x10x4.5in.
- Application:** Dental suction pump.



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