

PRECISION AIR QUENCH

Benefits

- Distortion control and dimensional stability
- Ability to process thinner walled aluminum castings and stampings
- Improved mechanical properties; ultimate tensile strength, yield strength, and percentage elongation
- Increased toughness and bendability
- Reduced internal residual stresses
- Uniform quenching without a vapor layer

Process

Processing aluminum parts through the precision air quench involves a 3-step process:

Stage 1 - Heating

Parts are heated to solution temperatures of 887°F to 896°F depending on the aluminum alloy being processed.

Stage 2 - Quenching

The parts are then transferred very quickly to the precision air quench chamber, within 18 seconds. The air quench system utilizes controlled temperatures and high air velocities generating a large amount of CFM. Parts uniformly cool at rates of 35°F to 59°F per second, depending on the part mass and configuration. The quenching system has some adjustability for the cooling rates by adjusting the air flow generated. All aspects of the process are controlled and documented throughout the processing, including air flow monitoring through pressure readings from calibrated magnehelic gauges.

Stage 3 - Aging

In the final processing step, product is artificially aged at temperatures ranging from 320°F to 476°F for 1 to 10 hours depending on the aluminum alloy, age temperature, and the properties being sought. The age precipitation process increases both hardness and mechanical properties.

Materials

Precision air quench processing is well suited for 6000 series and some 7000 series of aluminum alloy components, as well as aluminum 319 alloy castings.

Applications

- Aluminum parts requiring a high degree of dimensional stability
- Aluminum engine blocks
- Aluminum brackets or components requiring ultimate tensile strength and yield strength while maintaining toughness and bendability