

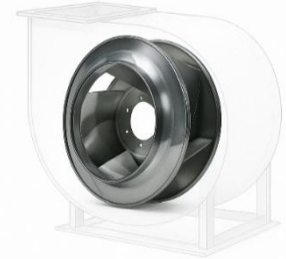
CASE STUDY

Making CFD-Optimized HVAC Fan Blades Manufacturable with Aluminum Additive Manufacturing

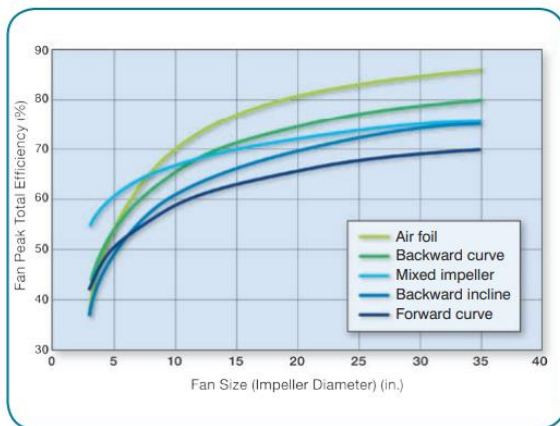
A real-world example of ValCUN partnering with a customer on the development of a high performant fan for cooling of datacentres and other high asset infrastructure.

CUSTOMER PROFILE

The customer is a recognized technology leader in air movement and fan systems, and the leading supplier of air movement, control, and conditioning equipment for commercial, institutional, and industrial buildings. Their solutions are integral to HVAC systems worldwide, supporting performance, energy efficiency, and regulatory compliance across critical infrastructure.



CHALLENGE



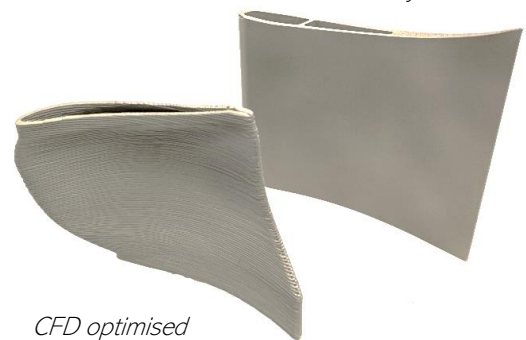
Radial fans, commonly used in air movement systems, have their efficiency largely governed by established physical principles. Key performance factors such as impeller size and blade geometry have long been optimized using traditional materials and methods, including flat sheet metal, curved sheet metal, and extruded airfoil profiles. While advancements in computational fluid dynamics (CFD) now allow for the design of more aerodynamically efficient blade geometries, the challenge lies in production. These optimized designs often require complex shapes that are difficult or costly to manufacture using conventional techniques. The core issue is how to produce these

advanced geometries in a scalable, cost-effective manner, and how to seamlessly integrate the new production methods into existing fan assembly lines and workflows without disrupting operational efficiency.

SOLUTION

By adopting 3D printed aluminum blades, the customer can implement CFD-optimized geometries that are not feasible with conventional manufacturing methods. The blades are produced in standard, weldable aluminum alloys, allowing seamless integration into the existing assembly and welding processes. This enables improved aerodynamic performance without requiring changes to the current production workflow. These parts are made possible exclusively through ValCUN's patented Molten Metal Deposition (MMD) technology—currently the only solution capable of printing such geometries in aluminum in a production-compatible and cost-effective way.

Current blades by extrusion



CFD optimised geometry by ValCUN's proprietary 3D technology

RESULT

1. 10% increase in fan efficiency
2. For data center applications, up to €500,000 in annual energy savings
3. Seamless fit into the existing production workflow, no changes require
4. High-mix, agile production enabled by the ability to produce unique blade geometries per unit or small series