

■ **3D Printed Metal Racecar Condenser
Opens Future Possibilities in Racing**



SHINING 3D[®]

→ Machine

EP-M250



→ Material

Stainless Steel

→ Overview

HRT Racing Team from Harbin Institute of Technology adopted Shining3D's metal 3D printing technology to rebuild their cooling jacket.

→ Client

HIT Racing Team (HRT)

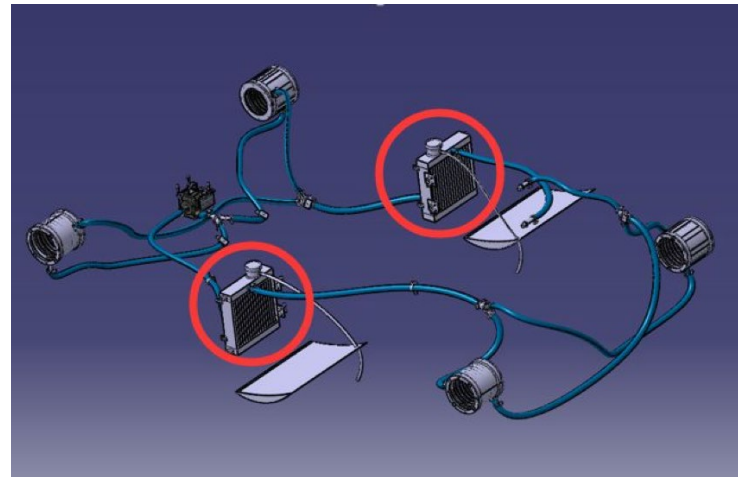
HIT Racing Team (HRT) is an international team from Harbin Institute of Technology (Weihai) that specialized and participates in global FSAE races. Since its establishment in November 2009, it has grown from a racing team of gasoline and diesel vehicles to a more mature organization specializing in gas, electric, off-road/Baja, and autonomous vehicles. They have made remarkable achievements in international races. They have participated in local and international races in cities such as Xiangyang, Shanghai, Shizuoka in Japan, as well as Hockenheim in Germany and , California in the US.

The HRT Racing Team from the Harbin Institute of Technology won 3rd place in the 2018 Student's Formula Electric China. As a sponsor, SHINING 3D worked closely with HRT Racing Team in the race, providing the racing team with not only metal 3D printing technology, but also expertise in automotive 3D printing, and making joint efforts in producing an electric racecar.



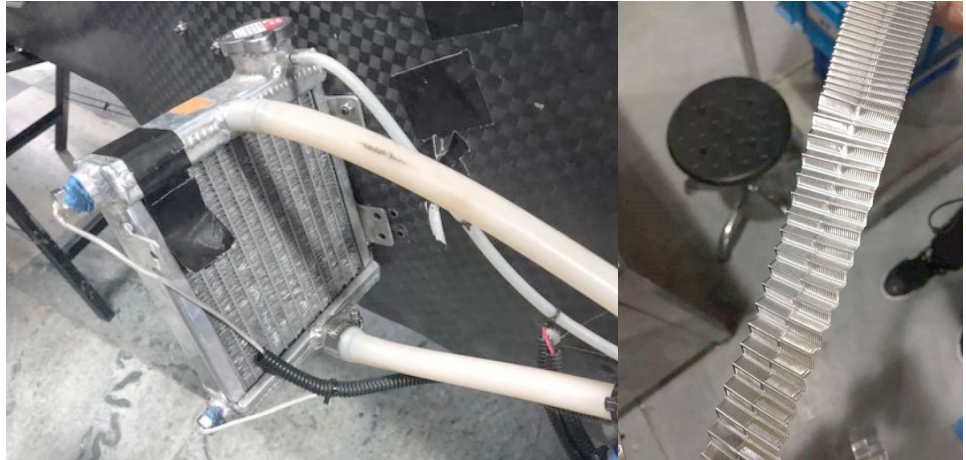
Racing car condenser

The racing car's motor cooling system is an important factor that impacts its performance. The modification of a racing car's condenser is very challenging. It took the racing team and engineers from E-Plus-3D a substantial amount of time to optimize and modify the prototype.

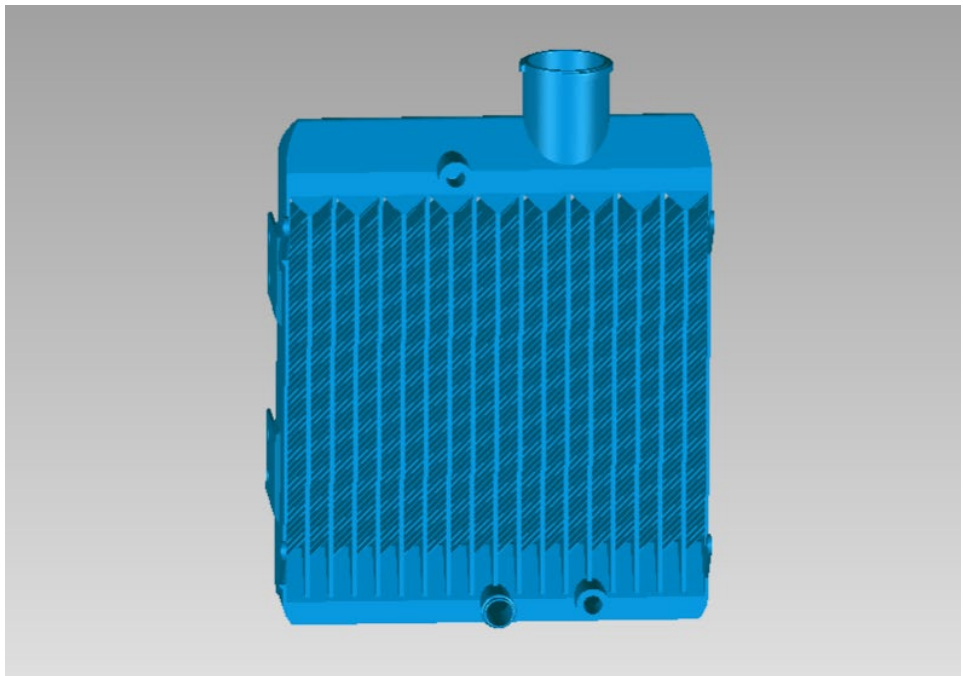


Racing car cooling system

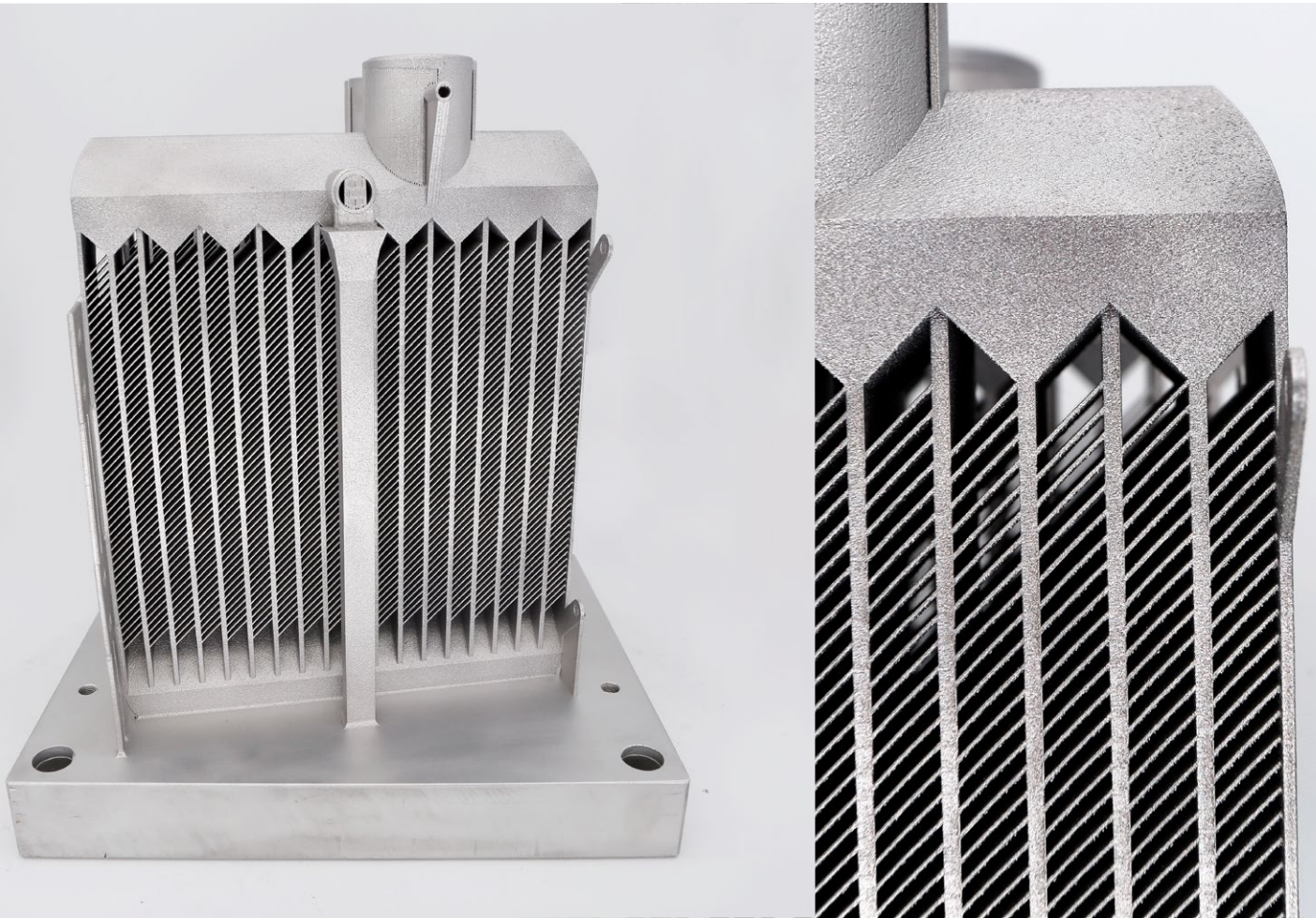
The original condenser was manufactured by conventional processing, which needed to weld several parts together. The process was not only tedious but can also caused coolant to leak. SHINING 3D recommended the application of metal 3D printing technology to create a condenser with an integrated design, in order to ensure no leakage.



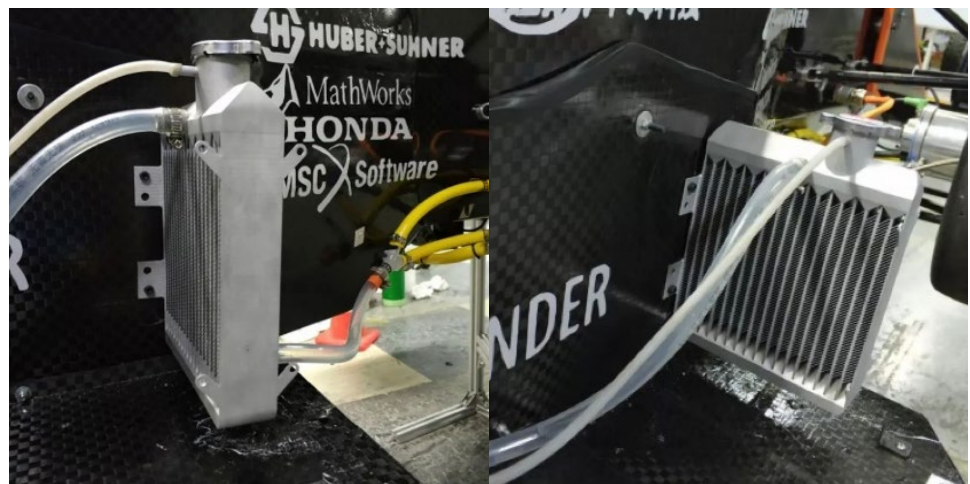
In structural design, the total heat dissipation power required for two condensers was 12 kW. According to test statistics, water temperature should be no more than around 48°C. Otherwise, electrical shutoff would be triggered by the motor controller at high temperatures (60°C) to protect it. By calculating the heat dissipated by the heatsink; influence exerted by reserved heat dissipation coefficient, water scale and oil pollution, the logarithmic mean temperature difference of the cooling medium, the heat transfer coefficient of the heatsink, and taking consideration of heat dissipation allowance, the actual heat dissipation area of the heatsink was 2.5 square meters. Based on these statistics, the racing team redesigned the current condenser.



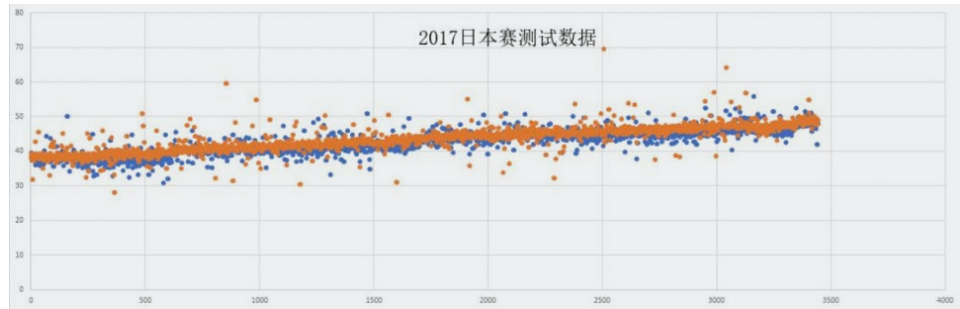
After completing the design, SHINING 3D used the metal 3D printer EP-M250 with a building volume of 250mm*250mm*300mm. Aluminum alloy material was applied for the print. After post-treatment (heat treatment and sand blasting), it was delivered to the racing team.



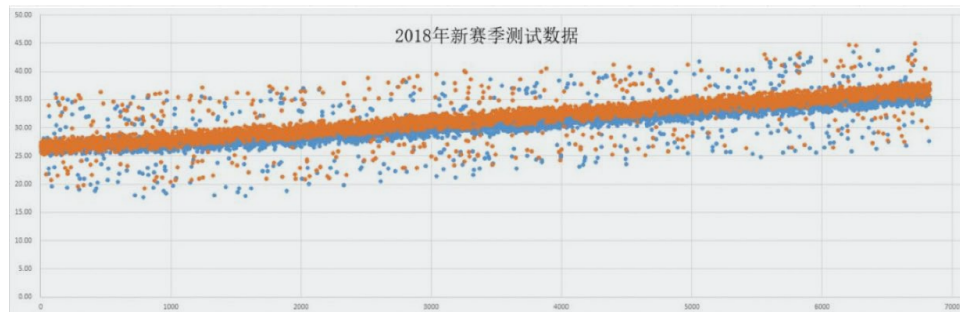
After the 3D printed condenser with the new optimized design was printed, it was installed on an electric racing car for testing.



Statistics show that the temperature of newly-designed condenser was reduced by about 10°C compared to the previous condenser used in previous races in Japan. Heat dissipation performance had been significantly improved.



· Test data in Japanese race in 2017



· Test data for new race season 2018

SHINING 3D successfully created motor cooling water jackets and condenser parts for the racing team, playing the advantages of metal 3D printing in product design and molding to the full. In the design and manufacturing of racing cars, metal 3D printing gives designers more flexibility and freedom to create. Not limited to manufacturing process, it realizes small and complex structure manufacturing together with sound stability and lightweight body, elevating the overall performance. Metal 3D printing will also greatly promote the development of traditional auto market with its low cost, high efficiency and high quality.





■ About SHINING 3D

SHINING 3D, founded in 2004, is pioneering independent research and the development of 3D digitizing and 3D printing technologies. SHINING 3D provides professional solutions covering “3D Digitizing – Intelligent Design – 3D Printing” for various industries including industrial manufacturing, healthcare & life sciences, product customization, and STEM education. SHINING 3D is well-positioned in the market and has the capacity to handle large sales volume, offer powerful 3D technologies, and provide strong support service. SHINING 3D’s mission is to enable flexible production of high performance, complex structural products, and make 3D imaging and manufacturing technologies accessible to all; from large multi-national corporations worldwide to at home hobbyist. As the leader among Chinese 3D printing companies, SHINING 3D has currently extended a strong international influence with customers in more than 70 different countries in Asia Pacific, Europe, North America, South America, Africa and the Middle East.

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