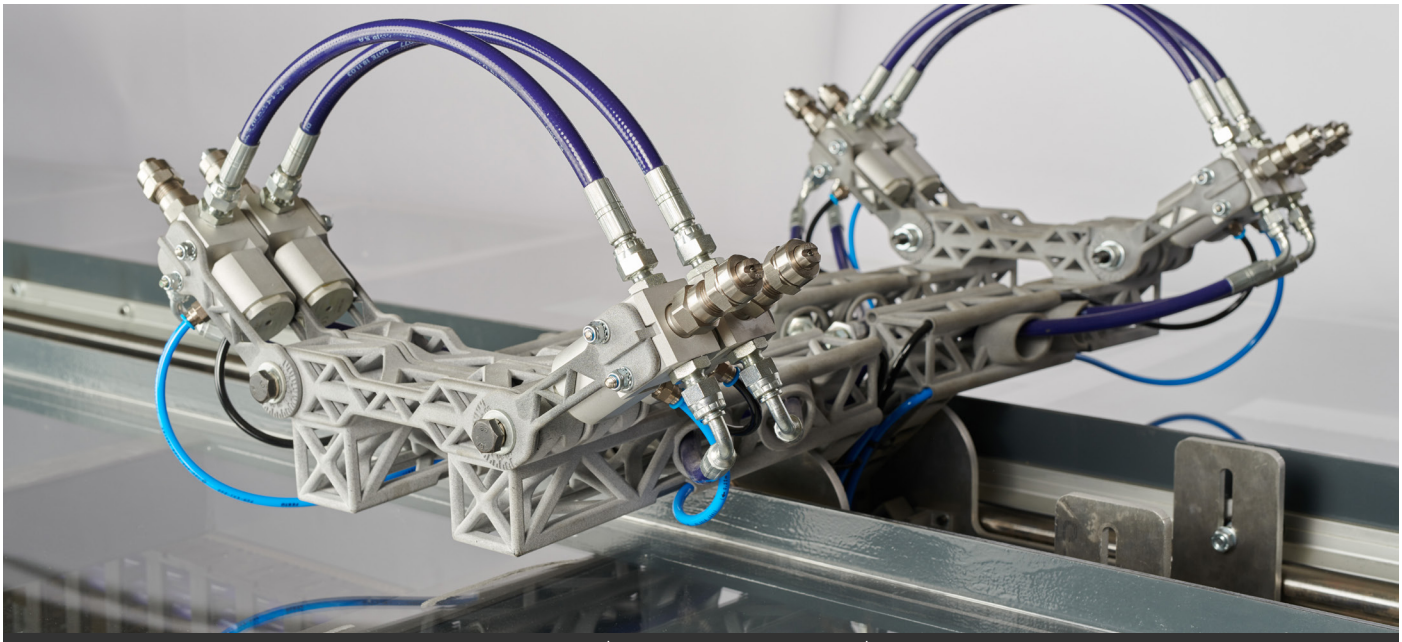
daVINCI painting robot



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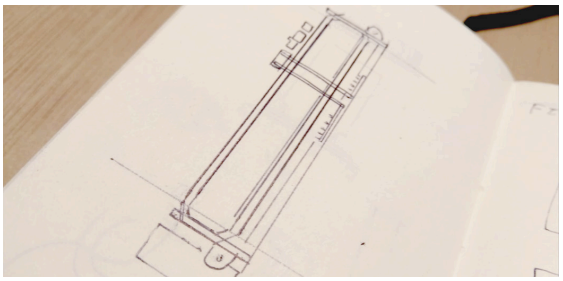
Sector: Consumer goods

Challenge: HP intended to make a new painting robot that is more accurate and sustainable than those that already exist on the market.

Solution: To make a painting machine with the best functionalities and compact systems requires designing parts that are smaller, lighter and with more complex shapes, made possible by additive manufacturing.

CHALLENGE

Surface painting machines already on the market are outdated and can be improved in several ways. These machines are inaccurate, waste a large amount of material (paint) and generate high energy costs. For FICEP S3, the challenge consisted in making a machine that would improve all the functionalities offered on the market and also compact as many systems as possible into a much smaller area. This also involved not sacrificing any of the functions or shapes of the parts that made up the machine. Therefore, the challenge was to make the new systems of the machine more compact by reducing the number of parts and drastically reducing the weight. The systems would also have to be perfected to improve accuracy.



SOLUTION

The only solution capable of making more compact parts with lighter innovative systems was additive manufacturing, since machining is very expensive and the solution provided by that method did not adapt to our needs exactly.

Thanks to HP's MultiJet Fusion technology, we have been able to make a much more functional machine that makes much better use of available space. While current machines are equipped with two painting arms driven by systems that measure as much as 2700 mm, additive manufacturing technology has provided the daVINCI with up to 4 arms that run independently and are driven by complete systems that occupy 350 mm. The daVINCI robot consists of two modules and its own air management system. Each system is equipped with its own subsystems and more than 40% of the entire machine is manufactured with additive printing technology.

ADVANTAGES

The result is a painting robot consisting of two modules: one upper module and one lower module. Each module has two independent painting arms, for a total of four painting arms that work independently. This system is capable of painting several fine coats of paint with an intermediate dyeing process that achieves firm top coats instead of a single thick coat, at speeds of up to 5 m per minute. In addition, the position and height of the part is determined in real time by the machine itself before the machine enters the painting booth; thus, it only uses the necessary amount of paint by detecting the part requiring painting and leaving the rest unpainted. This results in savings of 30% in paint compared to traditional machines. Each arm can be equipped with up to 4 airless spray guns, provided with 2 different paint circuits. The 10-metre drying tunnel module, which can be expanded to 20 metres, has been created with its own air management system. During the heating phase, it can supply up to 10,000 m3 of air per hour at temperatures between 88ºC and 167ºC, with energy consumption at 54A. During the continuous working phase, air supply is 6,000 m3 at temperatures between 55ºC and 80ºC, with a consumption of between 19A and 25A. This is achieved by not using fossil fuels or heating components, freeing the facility from risk of explosion or presence of carbon monoxide in the plant, as well as the humidity associated with burning natural gas. The entire ventilation system is integrated in the structure of the drying tunnel, thereby preserving the energy in standby mode by using the thick metal structure as a heat sink. The drying tunnel provides energy savings of up to 76% compared to traditional machine currently on the market.