EDU468737

# Generative design helps students improve their careers prospects

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## Learning objectives

- **Describe** Robotic team background and challenges
- **Describe** best practices for efficiency and quality workflow from design to manufacturing
- **Describe** best practices for one Generative design process and factual profit
- **Showcase** the program influence on the robotic team and the robotic industry

## Description

The SCUT robotic team never stop seeking brand-new solutions for improved efficiency and quality workflow from design to manufacturing. **Zhen-Po led his team, the South China Tigers, to a first-place RoboMaster 2019 regional championship through the adoption of generative design tools in Autodesk® Fusion 360® software. Zhen-Po was hired by the RoboMaster's organizer, DJI, an electronics manufacturer in China after graduation.** Combining 27 parts to only 1 single part for the stabilizer mount achieved a final weight of 170 grams – a 42% weight reduction compared to the original CNC process. Reduce the material waste while enhancing the strength by generativity adding support, therefore reducing the mass of the robot while ensuring structural integrity. the mechanical team' s entire iterative cost was reduced by 80%, which would not have been possible before. Students from the team also gained the advanced vision on their career's prospects.

## Speaker

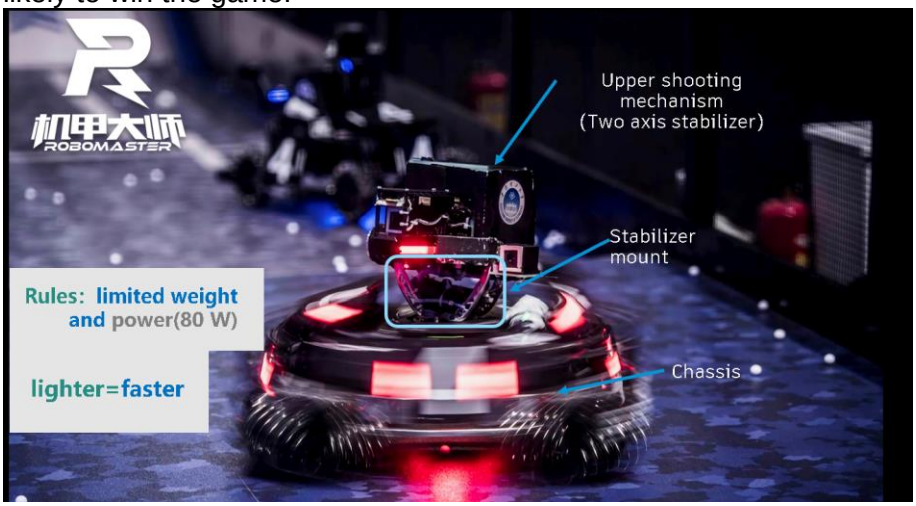
**Prof. Zhang Dong, Chair of Robotic Lab of South China University of Technology.**

Dr. Zhang Dong is a Thought Leader and strong industry influencer in South China University of

Technology. He is an expert on Robot Technology and Applications domain. He has applied for 358 national patents, including 29 invention patent s and 165 utility model patents which has hatched out 11 innovation companies.

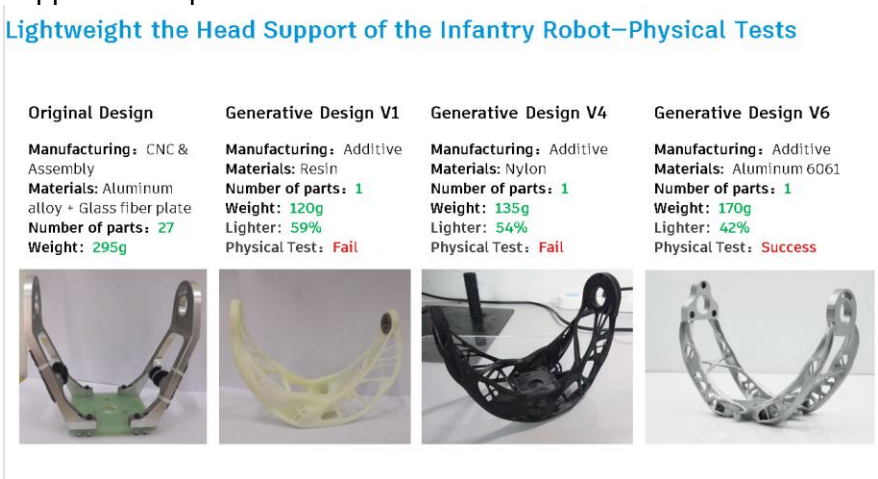
## Describe Robotic team background and challenges

the competition rules limit the power of the robot chassis, which is 80 watts. The lighter the robot is,  the faster it will response to the signal ,the nimbler the robot will be , and then we are more likely to win the game.



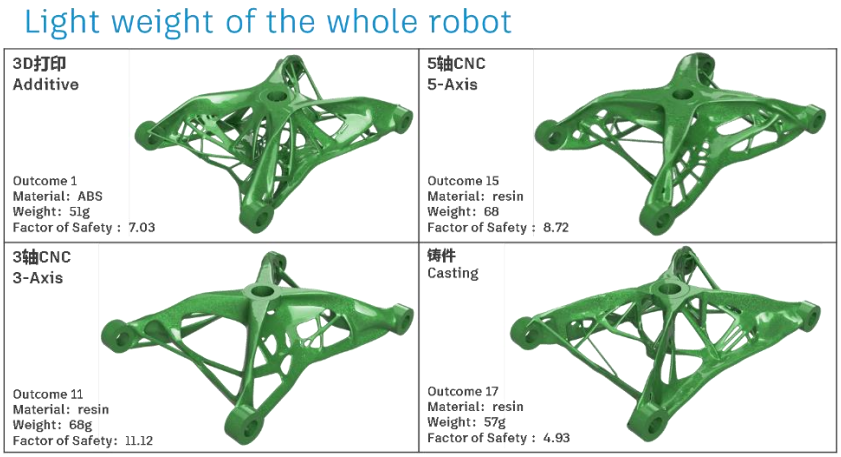

## Describe best practices for efficiency and quality workflow from design to manufacturing

Before the final version, we had many test version. The first version was made of resin, it's only 120 grams but it was broken by the shooting of golf ball bullets. The fourth version was made of nylon, it withstood all kinds of condition but after many times of testing, it probably got fatigue and broke as last. Eventually we choose aluminum as the material, and it successfully pass all the test, so that we are confident to use it to replace the original design in the game. The generative design was only one part and 42% lighter compared to the original design with 27 parts and nearly 300 grams. Although we can not completely trust the results before testing, because there are many factors that we cannot consider when designing, we can only find out in the test. I still have to say this is an amazing achievement which is impossible to make it happen in the past.



## Describe best practices for one Generative design process and factual profit

Although this is only a conceptual model of the whole robot lightweight program. But this is enough to make us look forward to the future. If the whole robot get optimized by generative design, we will reduce more than 30% weight, and creating the lightest robot weight is what every engineer dreams of. And I hope our dream can come true one day.




## Showcase the program influence on the robotic team and the robotic industry

In conclusion, generative design is a disruptive innovation. It has a scientific lightweight solution and can be made to reality easily through additive manufacturing while CNC cannot. It can be 30% lighter of the whole robot if each parts are generative design and 3d printed. What's more production in one single piece help enhancing the structural strength, reduces the material waste and entire iterative cost by 80%. In the traditional design, it may take several days to complete the design. Now the computer can give dozens of results in just a few hours, which really saves a lot of time and cost.
Look at these designs. I believe this is what the future mechanical design should look like.