

## CASE STUDY: LEVER

### Topic

Analysis and optimization of an industrial machine component

### Market

INDUSTRIAL – AUTOMOTIVE – AEROSPACE

### Tags

WEIGHT REDUCTION – PART COUNTS REDUCTION – NO TOOL REQUIRED

### Summary

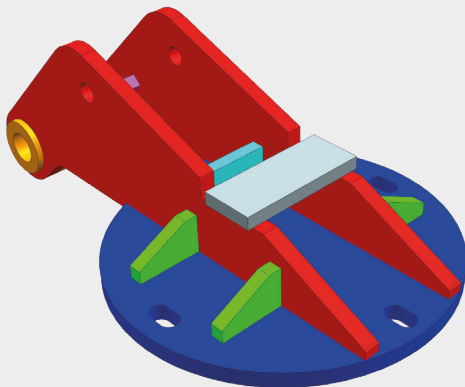
The case study follows the different steps implemented in AM Solutions in order to maximize the value of additive manufac-

turing in an industrial application, the component selected is a standard part (lever) used in industrial finishing machines.

### Original component

The original component is made in steel and it is composed by 11 different parts welded together, using a dedicated tool, post processed with a CNC operation to create

the correct alignment between the bushing hole and the bottom of the plate. The manufacturing lead time is around 4 weeks.



#### TRADITIONAL TECHNOLOGY

Delivery time:	4 weeks
Material:	AISI 304
Number of pieces:	11 welded pieces
Risk of error during the production:	High
Tool:	Yes

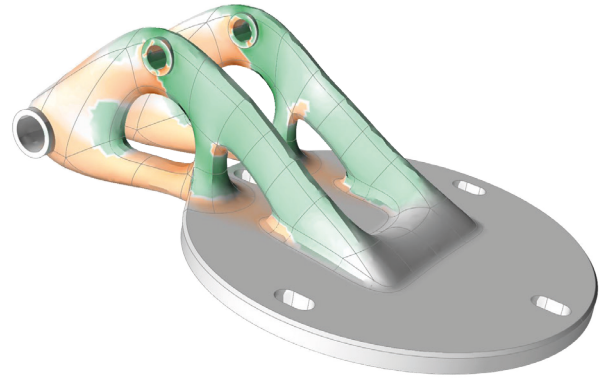
## Value analysis and feasibility study

A first analysis has been performed to identify potential advantages processing the component with additive manufacturing technologies, at a first look it was predictable that:

- Part could be built in a single component
- Weight reduction could stay in a range from 15% to 30%
- Lead time could drop to 1 week (no need for tooling)
- No cost variation if compared to traditional processing

## Engineering

Part has been redesigned to match with additive manufacturing production best practice (design for additive) to minimize supports and to facilitate the CNC rework. The AISI316L powder characteristics have been considered similar to the steel used for the traditional built, extra material has been added in specific areas taking in consideration the post processing. Through a simulation (FEM) process, made with ALTAIR suite, the different load and stress have been verified and after few interactions a topological optimization has been implemented to reach the final shape and minimize material and weight.



## Manufacturing & Post Process

The lever was manufactured internally in AM Solutions facility, printed on EOS 290 DMLS machine, CNC reworked

on DMU50 to guarantee the tolerances for the bushing areas and finished on the external surfaces.



### ADDITIVE MANUFACTURING

Delivery time:	few days
Material:	AISI 316L
Weight:	-20 %
Number of pieces:	1 piece
Risk of error during the production:	Low
Tooling:	No
Production cost:	-25 %