Project „Flexible Assembly Processes for the Car of the Third Millennium (MyCar)“

Problem Description

Flexible fixture for laser cutting

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TUNKERS
Erfindergeist serienmäßig.

CRF CENTRO RICERCHE FIAT

COMAU

Problem Description

The use of **Ultra High Strength Steels** (UHSS) in the vehicle structures in the last 10 years grew with an enormous rate.
This kind of materials let's the car manufacturer **improve the crash resistance** of car's structure, while saving weight, and thus improve the efficiency of the vehicles reducing the fuel consumption.

The high hardness of the UHSS, leaded to changes in the body in white production lean. In fact, using conventional methods (press die), the cutting of this pressed parts resulted not economical.

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How to cut this materials?

In the same time, the **3D laser cutting machines** were increasing their performance.
Since the laser cutting process is not sensible to material hardness, it was a consequence and an innovation to process the parts on 3D laser cutting machines.
The cutting speed was not comparable to the press die, but it was possible to successfully process reinforcement parts for the vehicle structures.

The result of this technological leap was the introduction of UHSS parts starting with cars of the D segment.

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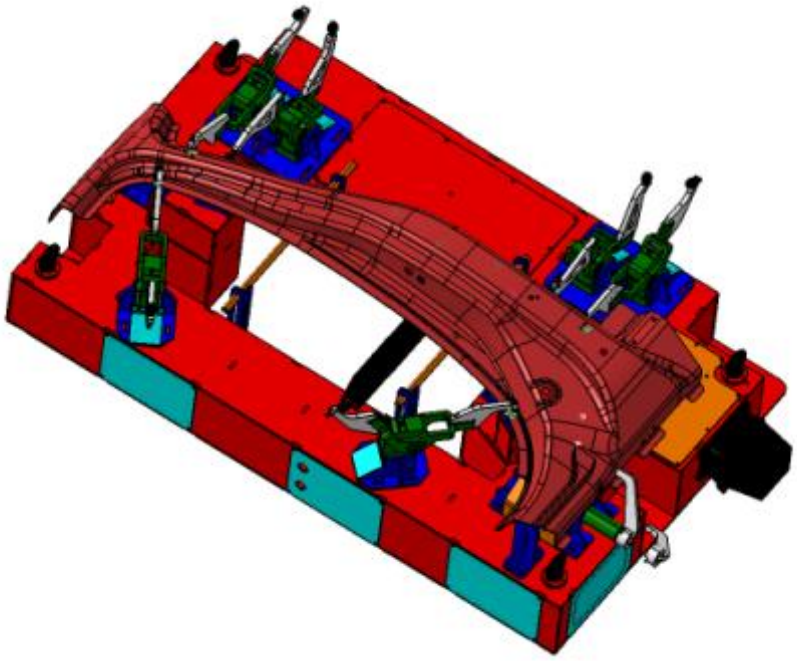
How to extend the technology to all car segments?

UHSS components can be **economically** processed only with 3D laser cutting machines with

Automatic Fixtures



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How flexibility is achieved today

Raising the number of parts and models, the flexibility in body in white production began to be an issue.

Despite the cutting time was decreasing in the years with higher 3D laser cutting machine's performances, the carmarkers achieved the needing of flexibility in different ways:

1. **Using suppliers with 3D laser cutting machines to make the parts**

2. **Using several machines, each of them dedicated to a single part**

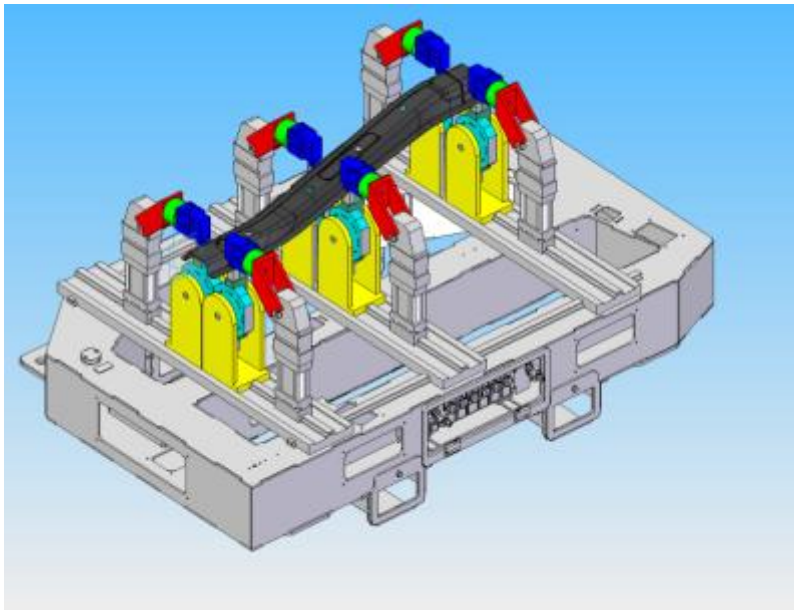
3. **Changing the production mix changing the fixtures on the machine**

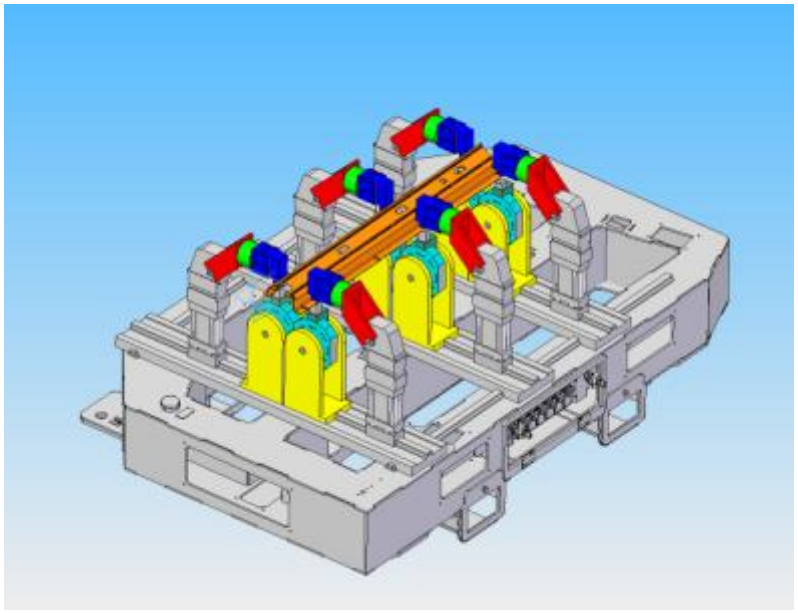
Problems coming from this approach

- **1) Flexibility is not achieved in the carmaker plant**
  - Logistics become an important issue
  - Production changes suffer because of the contracts with supplier
- **2) Plant footprint becomes an issue**
  - Each machine works only one piece (LH+RH)
  - Several machine needed
- **3) Fixtures stock and efficiency**
  - The machine is stopped while changing fixtures
  - Fixture's stock is bigger
  - Strong impact in new model launch

The New Approach

– From 1 fixture per part….





– …to a fixture for several “similar” parts

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Targets

Objective	Definition of metric	Baseline	Target	Measurements
Highly Reconfigurable Assembly Operations				
Customer Orientation Increase number of variants produced in an assembly line by 30%	number of variants available - cost effective	x	x-30%	Production cost per model [€]
Production flexibility Increase production flexibility, up to 8 models in the same body shop line	number of variants produced by same device	1	3	N. of models
Production flexibility Increase reconfigurability of assembly equipment	Time used to reconfigure the line with fixtures already available	30 min	1 Cycle time	time
	Time to reconfigure the line without fixtures available	10 week	6 week	time
Industry sustainability Decrease investment costs by 20%	Device cost versus existing (considering 4 different workpiece)	100.000	60.000	€
Industry sustainability Increase utilization at plant level by 10-15%	Fixtures needed for production of 4 different version	8	3	Number of fixtures

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