ON QUALITY CONTROL OF THE FRONT HOOD MARK

PhD.Lecturer **Monica BÂLDEA**, The National University of Science and Technology POLITEHNICA Bucharest, Pitești University Center , Faculty of Mechanics and Technology,Târgu din Vale Street,no.1,Pitești,ROMANIA, monica.baldea@upb.ro
PhD.Lecturer Mihaela **ISTRATE**, The National University of Science and Technology POLITEHNICA Bucharest, Pitești University Centre , Faculty of Mechanics and Technology,Târgu din Vale Street,no.1,Pitești,ROMANIA, maria.istrate0107@upb.ro
Ph. D. Lecturer **Ancuța BĂLTEANU**, The National University of Science and Technology POLITEHNICA Bucharest, Pitești University Center , Faculty of Mechanics and Technology,Târgu din Vale Street,no.1,Pitești,ROMANIA, ancuta.balteanu@upb.ro

Abstract: *The object of the study is the, Front Hood Panel a component of the car body. The quality checks on the Front Hood Panel are of two types: visual checks and geometry checks. Solutions are proposed to eliminate defects and improve the quality of the part*

Keywords*:* quality, hood, control, automobile

1.INTRODUCTION

The object of this study is the Front Hood Panel, an element of the car body. The aim is to obtain some geometrical and aerodynamic characteristics of the surfaces and especially to obtain some mechanical resistance characteristics, the bonnet being realized in such a way that it assimilates as much as possible of the impact shock in case of a possible collision.

In fig. 1 is shown the reference of the Front Hood Panel in Catia - Catpart format. The bonnet is made of 0.65 mm thick steel-HX220BD.

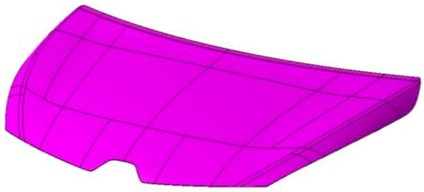


Fig.1. 3D numerization

The Hood Retainer is made of 0.65 mm thick steel-HX220BD.

The part drawing is realized in the machine assembly (e.g. contact areas with other parts), fig.2.:

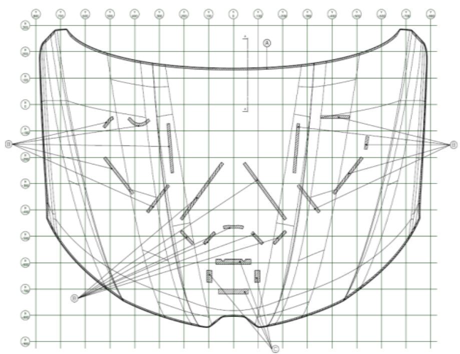


Fig.2. The part drawing in the machine assembly

2. TYPES OF DEFECTS ENCOUNTERED DURING THE TECHNOLOGICAL MANUFACTURING PROCESS OF THE FRONT HOOD PANEL

There are two types of quality checks on the Front Bonnet Panel:

- visual checks
- geometry checks

Following the visual inspection of the headlamp, defects in appearance are noted. The benchmark is placed on a support in front of a lighted panel, where, in the resulting slit of light, the problem areas on the surface of the bonnet panel are detected. These appearance defects can also be identified by palpating or brushing the part.

A. Visual defects

- Slippage

This defect can be observed in particular in the area of the character lines of the landmark which represents the first contact between the mold and the blank in the forming operation.

Slip, fig 3. , can be identified with the naked eye on the surface of the parts in the form of scratches

Fig. 3. Sliding

- Scratches, scratches

These defects, fig.4, appear on the part as small scratches when the material slips in the mold and due to insufficient polishing of the blank.

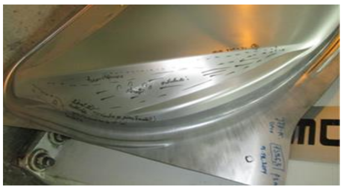


Fig.4. Scratches

- Impurities

Impurities cause visible defects as in fig. 5 to appear on the part due to the board not being cleaned before the embossing operation.

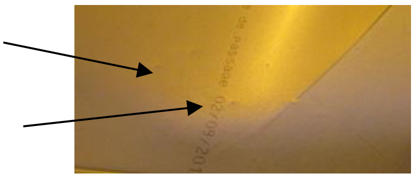


Fig. 5. Appearance of the bonnet after contamination

Breaks

Breaks occur due to excessive pulling of the material, i.e. thinning in certain areas. fig. 6 shows a broken blank in the rear area of the hood:

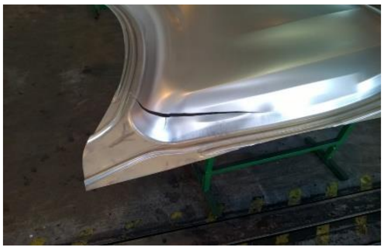
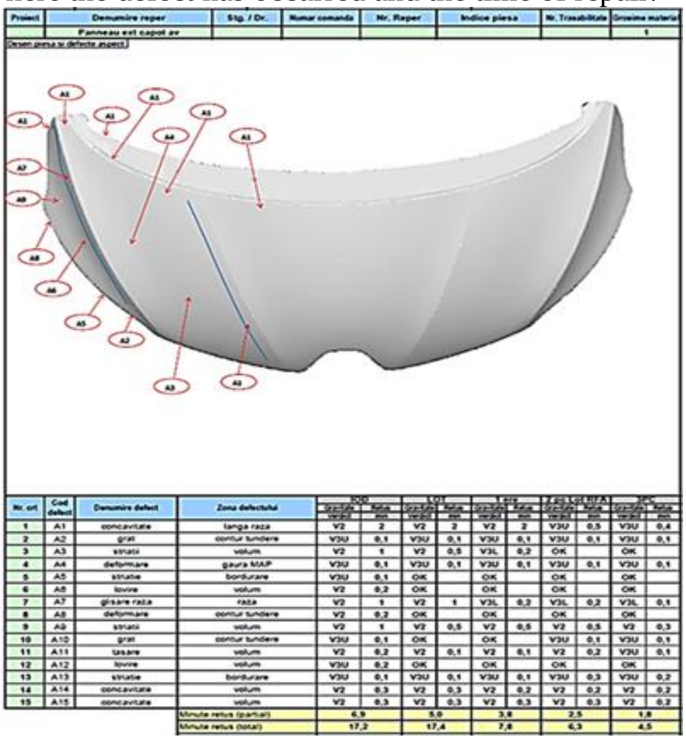


Fig.6. Semi-finished product breaks

Following visual inspection of the part, the defects are listed in an External Appearance Defect Report , fig. 7. They are numbered and named in the table, indicating also the severity of the defect, the area where the defect has occurred and the time of repair.



Proiect	Denumire reper	Stg. / Dr.	Numar comanda	Nr. Reper	Indice piesa	Nr. Trasabilitate	Grosime material
	Panneau ext capot av						1

Desen piesa si defecte aspect

Nr. crt	Cod defect	Denumire defect	Zona defectului	[illegible]		LOT		[illegible]		[illegible]		[illegible]	
				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	A1	concavitate	langa raza	V2	2	V2	2	V2	2	V3U	0,5	V3U	0,4
2	A2	grat	contur tundere	V3U	0,1	V3U	0,1	V3U	0,1	V3U	0,1	V3U	0,1
3	A3	striatii	volum	V2	1	V2	0,5	V3L	0,2	OK		OK	
4	A4	deformare	gaura MAP	V3U	0,1	V3U	0,1	V3U	0,1	V3U	0,1	V3U	0,1
5	A5	striatie	bordurare	V3U	0,1	OK		OK		OK		OK	
6	A6	lovire	volum	V2	0,2	OK		OK		OK		OK	
7	A7	glisare raza	raza	V2	1	V2	1	V3L	0,2	V3L	0,2	V3L	0,1
8	A8	deformare	contur tundere	V2	0,2	OK		OK		OK		OK	
9	A9	striatii	volum	V2	1	V2	0,5	V2	0,5	V2	0,5	V2	0,3
10	A10	grat	contur tundere	V3U	0,1	OK		OK		V3U	0,1	V3U	0,1
11	A11	tasare	volum	V2	0,2	V2	0,1	V2	0,1	V2	0,2	V3U	0,1
12	A12	lovire	volum	V3U	0,2	OK		OK		OK		OK	
13	A13	striatie	bordurare	V3U	0,1	V3U	0,1	V3U	0,1	V3U	0,3	V3U	0,2
14	A14	concavitate	volum	V2	0,3	V2	0,3	V2	0,2	V2	0,2	V2	0,2
15	A15	concavitate	volum	V2	0,3	V2	0,3	V2	0,3	V2	0,3	V2	0,2
			Minute retus (partial)	6,9		5,0		3,8		2,5		1,8	
			Minute retus (total)	17,2		17,4		7,8		6,3		4,5	

Fig. 7. External appearance defect Report

B. Geometry Defects

Geometry analysis looks for deviation of dimensions from the nominal dimension. Three types of measurements are performed to identify dimensional accuracy defects:

-of dimensional deviations,

-material thinning,

-of radii

b.1. Measurements of dimensional deviations

These measurements were carried out on three-dimensional measuring machines (fig. 8), which compare the digitized (3D) surface with the measured surface.

It is necessary that the landmarks are placed on special layouts in order to be measured.

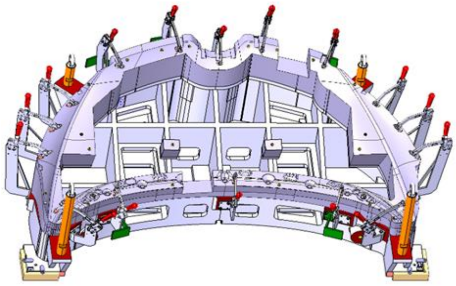


Fig.8.Control layout

Fig. 9. The marker placed on the control layout

The aim is to measure the areas where important defects occur, for example areas where the part is to be crimped. The measured points are put into a report and compared with those received from the customer in the TG plane. In fig. 10 shows the values obtained from the measurements made on the crimping volume area of the front hood panel.

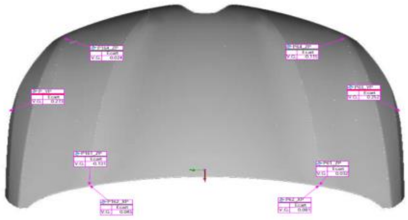


Fig. 10. Values obtained from measurements in zone A

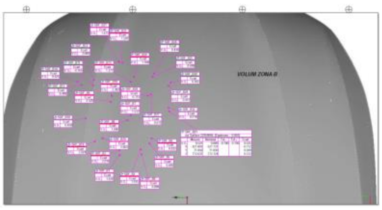


Fig.11. Values obtained from measurements in zone B

b.2. Measurements of material thinness

The verification is carried out by actually measuring the workpiece in areas where there are risks with a special ultrasonic thickness gauge , fig. 13. A special conductive liquid based on glycerine is used, which is applied to the tip of the transducer and the data is obtained. The areas most at risk for thinning are highlighted in the program in yellow, fig. 12.

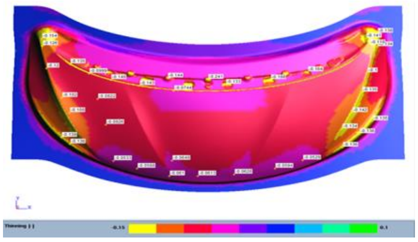


Fig. 12. Material thinning simulation

Fig. 13. Ultrasonic measuring device

b.3. Beam measurements

Beam measurements are made with the aid of beam meters , fig 14 used in the white light of white-light flashlights. If the beam of light leaks between the beam beam beam and the part, then that beam must be corrected.

Fig. 14. Rayers measuring rays

In order to make it easier to compare the obtained measurements against the nominal, the collected data have been entered in a report.

3. PROPOSED SOLUTIONS TO ELIMINATE DEFECTS AND IMPROVE THE QUALITY OF THE FRONT COWL PANEL

In order to prevent breakage of the semi-finished product), either the size of the joints or the radii (the smaller the radii, the greater the risk of material breakage) are changed. Also, the shape of the beams , fig. 15, placed on the pre-bed has been modified for a uniform pull of the material.

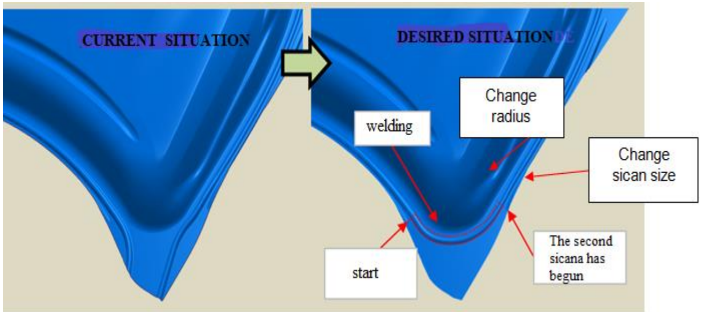


Fig. 15. Modifying junctions

In order to correct the marks that appeared on the hood at the front, the cause of their appearance was traced. Thus it was found that the visual defects highlighted in fig. 17 were caused by the incorrect attachment of the counterframe to the calliper ,fig. 16.:

Fig. 16. Countercam

Fig. 17. Visual defect removed-

It was observed from the simulation that the surface of the ambutised part did not correspond to the 3D numerization received from the customer. So a request was made to the CAD designers in the Fabrication Sheet department to redo the surface of the habillage in that area, fig.18., fig.19.-

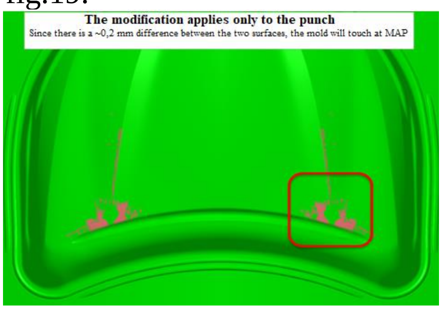


Fig. 18. Overlapping surfaces

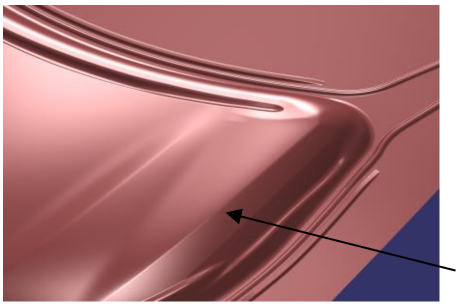


Fig. 19. 3D manufacturing sheet

Lunula is used as a centering post in the mold. It holds the flank so that the flank does not move during the ambuting process. Flank breakage was observed in the area of a lunula, fig. 20, and as a result of this observation the position of the lunula was changed. The fact that the piece was not well centered on the calapod could also be observed by the varying spacing of the beating markers, fig. 21.

Fig. 20. Sheet metal breaking

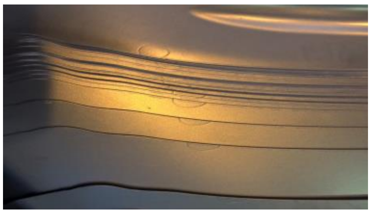


Fig. 21. Knock indicators (buttons)

Fig. 22 shows the red line marking the edge of the table in the area of the lunulae to emphasize how far it has gone over the allowable limit. Immediate action was taken to address this defect and it was concluded that the position of the lunulae was out of position , fig. 23.:

Fig. 22. Initial positioning lunule

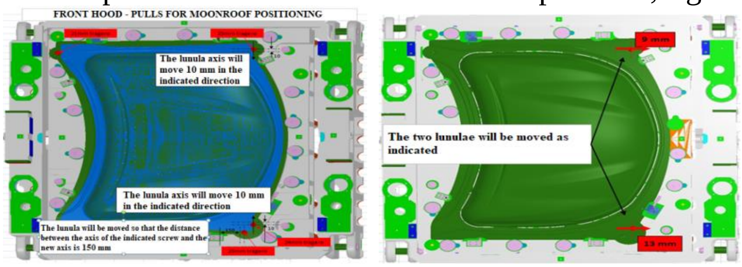


Fig. 23. Changing the position of the lunula

After correcting the position of the lunulae, the current situation is much better, as can also be seen in fig.24.

Fig.24. Current lunula area

Fig. 25. Final control

4. CONCLUSIONS

The improvement measures were taken based on the analysis ofcontrol reports. This analysis followed 2 important aspects: appearance defects and geometry defects. All the operations necessary for the production of the part were carried out and changes were made that led to the improvement of the manufacturing process of the studied part.

5. REFERENCES

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