
 <p><b>P&amp;C SYSTEM</b> INNOVATION GROUP</p>	<b>GENERAL SPECIFICATION SHEET</b> <b>PROGRESSIVE DIES – TRANSFER DIES – BLANK</b> <b>CUTTING DIES</b>		
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# GENERAL SPECIFICATION SHEET

## PROGRESSIVE DIES TRANSFER DIES BLANK CUTTING DIES

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## 1 OBJECTIVE

This document defines the specifications which must be complied in the offers for tools and the manufacture of new tools for P&C Automotive srl - hereinafter referred to as P&C Automotive srl with by the respective contractor - hereinafter referred to as the contractor.

The aim of these specifications is to standardise the design, manufacture and approval of all tools at P&C Automotive srl.


The manufacture of a tool is defined as follows: method planning, design, manufacture, induction under series conditions (strip- / blank-dimensions, stroke rate, transfer) until approval at P&C Automotive srl.

## 2 EXTENT

2.1. The specifications in this document are supplemented by the specifications for the respective tool stated in the tool procurement contract.

2.2. In case of possible contradictions, the respective specifications of the tool according to the tool procurement contract shall take precedence over the general specifications.

2.3. In the event of doubt, the contractor must contact the technical center of P&C Automotive srl. If necessary, P&C Automotive srl will provide written approval.

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2.4. This specification is the property of P&C Automotive srl and will be updated in the case of changes. As proof of receipt of the specifications, the signed acknowledgement of receipt must be returned to P&C Automotive srl.

2.5. The specifications may only be copied, reproduced or passed on to third parties with the consent of P&C Automotive srl. Reproduction, in whole or in part, without permission is forbidden.

### 3 TOOL REQUIREMENTS

3.1. The tool design is always created in 3D, preferably in CATIA V5 ( the release will be communicated from technical center everytime ).


3.2. Also the tool design can be supplied in the following format:

- IGES
- STEP ( with a protocol of 203 ISO )

3.3. Below there's a list with all documents that must be enclosed with the tool when it is delivered:

- Bills of material ( manufactured and commercial )
  - CAD/CAM datas
- 2D drawings used for the construction

3.4. Each solid model must have a file name with tool number and corresponding position number.

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3.5. The defined position number is also the drawing number and part list number. The tool components are positioned continuously. The position number needs to be unique within the die.

3.6. Every CAM, lifter and blankholder must be represented in the working position and in the resting position to avoid mistakes.

3.7. All components of a tool must be designed so that inadvertent errors are prevented, and incorrect assembly is not possible (e.g. asymmetrical screw-, or pin-patterns, different diameters, asymmetrical shape).

3.8. Screws should be provided for the transport ( each components must have a correct thread to guarantee a safe handling ).


3.9. Tool components must be labelled with the following information:

- Tool number
- Part number
- Kind of material

Hardness If the component is too small only tool number and part number must be labelled.

3.10. To ensure that everyone read files correctly, the coloring of the various parts must be respected as per the table below:


<b>PROCESSING TYPE</b>	<b>DESCRIPTION</b>	<b>CATIA V5 RGB VALUE (red, green, blue)</b>
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method plan-dependent areas	All machining operations that are not carried out according to a solid model, but according to a separate data record.	Olive green	175,255,175
finishing	fine machining (see drawing for additional information)	Pink	255, 175,175
roughing	rough machining	Reddish brown	095,000,000
fitting hole H11	also special milling machining	Blue	095,095,175
fitting hole H8	also special milling machining	Purple	095,000,095
fitting hole H7	also special milling machining	Blue	000,000,255
fitting hole H6	<i>Anche lavorazione di fresatura speciali</i>	Dark Blu scur	000,000,095
thread	metric fine thread (right-hand thread) according to DIN/ISO	Yellow	255,255,000
fine thread	metric fine thread (right-hand thread) according to DIN/ISO	Orange	255,175,000
Spiralock/special threads	all other special threads	Orange	255,095,000
special bore / stepped bore	complex bores, combinations of bores	Magenta	255,000,255
boring / simple drilling	hrough holes etc., other countersinks	Cyan	000,175,175
change areas	sphere or solid with transparency 192	Light Blue	000,127,255
assembly drill holes	assembly-features	White	255,255,255

3.11. In the same way die components have different color depending on the function.


<b>DIE COMPONENTS</b>	<b>COLOR</b>
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Die	Specific RAL ( different between clients )
Blockstop	Red RAL 3000
Lifters	Yellow RAL 1021
Carter	Red

## 4 DIE STRUCTURE

- 4.1. The tool must be usable on the series press, as well as on an alternative press specified in the tool design procurement contract.
- 4.2. In order to shorten the set-up time in PCM.de, all tools or common superstructures for are centred on the press table.
- 4.3. For the same reason, the clamping surfaces are  $70 \pm 0.5$  mm high and are always machined.
- 4.4. For each tool at least 4 stopper blocks are to be provided.
- 4.5. Spring relief pieces must be made of Nylon and fastened firmly to the tool with chain / rope. Pockets are to be provided as parking positions for the spring relief pieces and marked yellow.
- 4.6. Gages position is specified in the method.  
If this information is not present gages have to be positioned at the edges of the blank parallel or perpendicular to the direction of feed. They must be cut

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out in the opposite part of the tool to avoid collisions, even if the gages are in the furthestmost positions.

Gages must be bought from:

- OMCR
- CF Torino
- PROJECT INTERNATIONAL

4.7. Gas springs must be firmly fixed into the tool.

The solution with the flange must be preferred instead of the use of bottom threads.

The mounting holes for gas springs must be sufficiently large (to avoid overheating) and provided with an oil drain hole. The installation instructions of the supplier must be observed. The maximum working speed specified by the supplier of the gas springs must not be exceeded for the number of strokes specified in the tool procurement contract. In addition, 10% stroke reserve must be provided (i.e. if the max. stroke of the spring is 30 mm, the spring may only be used for a stroke up to max. 27 mm).

4.8. In the main drawing operation all gas springs should be connected with a specific circuit and a control panel. A warning label must be attached near the control panel. The adjusted working pressure must also be indicated on the label.


Gas springs must be bought from:

- SPECIAL SPRINGS
- AZOL GAS

4.9. In the upper part all blankholders and lifters must have a double series of screws, work and safety.

Screws will be the same, the different between two series is only the height of the



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hole ( the safety serie has the hole with 5mm plus ).

Screws must be bought from:

- OMCR ( C13.24 series )
- CF Torino
- PROJECT INTERNATIONAL

4.10. For transfer and progressive dies, the guide pillars must be mounted in the upper part.

All pillar systems must be secured against twisted mounting; e.g. staggered pillars, brackets or block guides with different widths.

For all forming tools, block guides are used. Additional guide pillars must be installed for forming tools in which cutting operations are also carried out.

Areas in the lower part of the tool which are located underneath the block guides must be designed with n angle in order to prevent that objects be taken in the guide area.


Always use guide bushes with solid lubricant and retaining clamps.

## 4.1 MATERIAL

In the tool design there always be two different bills of material, one for manufactured components and one for commercial components.

### 4.1.1 MANUFACTURED COMPONENTS

In the following table there are all information about manufactured components and their specifics:


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PART	MATERIAL	HEAT TREATMENT
Lower and upper part of die	CASTING: EN-JL1040 IRON: Fe360 or Fe420	/
Lower and upper part – steel	1.1730	
Drawing punch, blank holder, upper part drawing tool	1.2379	HARDENED HRC 58-60
Forming punch and die	1.2379	HARDENED HRC 58-60
Cutting punch and die	1.2379	HARDENED HRC 58-60
Pressure and adjusting plate	1.2842	ONLY SUPERFICIAL HRC 54-56
Holder plate	1.1730	/
Strip guide	1.2842	ONLY SUPERFICIAL HRC 54-56
Scrap chute	Pattern rolled steel sheet	

#### 4.1.2 COMMERCIAL COMPONENTS


In the following table there are all information about commercial components and their specifics:

PART	CUSTOMER
Die component	OMCR, SYNDAL, CF TORINO, PROJCT INTERNATIONAL
Gas Springs	SPECIAL SPRINGS, AZOL GAS
CAM unit	SANKYO, OMCR, PROJECT INTERNATIONAL
Punch and die	DAYTON

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## 4.2 DRAWING AND FORMING

- 4.2.1. In all drawing and forming matrix will be holes for air / oil vent, diameters dimension should be between 4 mm and 6 mm.
- 4.2.2. Shaped blades resume support surfaces after heat treatment with grinding / grinding and check on the surface.
- 4.2.3. Blades no larger than 400 mm in length (maximum workable size on grinding) Pressing blades must always be opposed by commercial keys and must be split in such a way as to shoulder each other
- 4.2.4. Air / clearance between blade and blade +/- 0.00 +0.02
- 4.2.5. Lower blankholder: in case of die overturning, it must be guaranteed with safety screws.
- 4.2.6. Pumps on the upper part: to be made / foreseen in case of complicated pieces (where it is necessary to make the through hole)
- 4.2.7. Blade shoulder: if the element material exceeds 1 mm. the blades must be shouldered directly with the structure of the die or with keys.
- 4.2.8. Distances must be installed between the blank holder and the matrix.
- 4.2.9. For simple bending operations it must be ensured that it is possible to overbend for compensating the spring back from the normal forming direction. The bending punches must be designed with “impact radiuses” if required.

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4.2.10. Dimensionally relevant areas are to be designed to be adjustable.

4.2.11. For RPS surfaces and closely tolerated contact surfaces, hardened steel inserts with shims must be used.

### 4.3 CUTTING AND PIERCING

4.3.1. After heat treatment blade should be reworked with grinding / grinding and check on the surface.

4.3.2. Check the displacement of the cutting wall, lower blade. ensure perpendicularity for at least 12 mm. the remainder must be discharged approx. 1.5 °.

4.3.3. The gap between blades and blank holder should be min. 0.3 max. 0.5 mm.


4.3.4. Penetration of upper blades and punches should be approx. 8/10 mm., blades on L. 200 mm. 3 mm. of shearing, punches inclined cutting angle.

4.3.5. Suspended cams / dinghies: guarantee the unloading of the line by inserting balancing cones between the pressure and the fixed part

4.3.6. Shear clearance: consider thickness and type of material for common steels 5% of the sheet thickness and stainless steel 8%.

4.3.7. Drilling punches: they must carry the scrap stripped tip.

4.3.8. For difficult fragile contours on punches and dies, inserts must be provided which can be changed in the press.

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4.3.9. The punch and matrix heights are to be kept as low as possible, e.g. height levelling, cutting punch with intermediate plate, etc

4.3.10. All cutting or piercing punches must be equipped with ejectors. If this is not possible, alternative slug controls must be provided in the cutting bushes.

4.3.11. If possible, all cutting punches and bushes should be replaceable in the press. If necessary, the blank holder should be equipped with appropriate blank holder inserts. The design must be coordinated with the project management.


#### 4.4 CUTTING AND PIERCING WITH CAM

4.4.1. Cam impact at the start of work: the columns must have penetrated at least 30% into the guide bushings and the impact of the cam with the drive wedge must be approx. 2/3 before the work phase.

4.4.2. Cam units must be equipped with a positive return follower to prevent tool breakage. The positive return follower must be sufficiently dimensioned. Existing positive return follower must not be permanently disabled during production.

#### 4.5 SCRAP CHUTES

4.5.1. Fixed chutes made of pattern rolled steel sheet are to be used. The available slope is decisive. If the angle of inclination is less than 30°.

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4.5.2. Accessibility to the chute fastening and vibrating units as well as interchangeability must be ensured.

4.5.3. The sides of the chutes must be designed in such a way that there is no risk of skipping or falling of scrap between chutes and tool parts.