Rába Automotive Components Ltd.
Member of the Rába Group

We engineer, you drive

Regulations of tool designing

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1. General regulations

Below regulations of tool designing belong to written tool orders and they are inseparable parts of them.

The tools have to match to the regulations of present valid standards and Health&Safety law.

During designing and production of tools have to observe all of the terms of records of meetings to start up the procedures.

We have meetings to check the tool maker's constructions and the constructions have to be approved by us.

Approval of RABA MÓR is necessary regarding all of the modifications or deviations. Approval can be valid only with the written signature of assigneed project leader of tool production.

2. Strip layout

Strip layout of tool maker has to be evaluated by RABA MÓR. We specify the press where tool will be used at the time of evaluation of strip layout. Strip layout has to be in pdf format.

Strip layout has to contain the following:

- Drawing nr of part, designation
- Top-view and side-view of it
- Designation of operation at step (eg. cutting, splitting, suppressioning of burr, pre-bending, bending, dragging, calibrating, pre-punching, shaving, punching, dissecting)
- Dimensions of width of strip, length of step
- Dimensions of smallest and relevant material bridge regarding strip transmission
- Calculation of cutting and formative power

Minimum 2 empty steps have to be designed into the tool.

3. Data communication

Data format:

- 3D: NX11 (stp), Catia V5-6R2018
- 2D: PDF, Autocad 2018 (dxf/dwg)

Tool design: (3D stp.)

Please prepare it in following breakdown: Bed – Bottom part – Strip –Swinging plate – Upper part

After the final construction of tool, at the time of tool taking over we ask you to give us the following:

Drawings of tool, parts, bill of material:

-DVD: 3D drawing of tool (stp), 2D drawings (pdf), bill of material (pdf).
In every case please mark the parts with position numbers.

-Printed drawings: in readable size.

-Bill of materials according to position number: raw materail of parts, designation, sizes. Directions of heat treatments, producer of normalien, type, order number.

Especially important that documentation has to be done based on last valid datas which contain all of modifications during production.

4. Tool designing

The round connection of parts has to be formed considering their easy exchange and refurbishment of quickly wasting parts (polishing, grinding).

If the strip can be unloosed circuitously from the tool, it has to be designed a manual cutting stamping unit, which ensures unloosing easily.

The bottom part of the tool has to be screwed from the top, the top is from the bottom.

Tools have to be designed in such a way as to fit to the press which mentioned with the acceptance of strip layout.

Designer has to attend to the stable but the most possible light weight of construction.

Tools have to be designed in such a way as to be able to propuce the planned quantity of project lifetime without any problem (the purchase order containes the planned quantity).

The tool maker accepts the cost of latent and later occurrent defects.

The fitting fringes (bolts) which help during the fitting of parts have to be used as standard factory part, with internal round.

Introductory spacer of steel coil has to be fixed by adapter fringe. Size of introductory spacer has to be the width of strip +0,3 mm.

The holes of bolt have to be fully holed- dead holes are not acceptable.

In the top part of the tool all of the bolts have to be protected from the dropping- out with lock or using flush-headed bolts.

In the top part of the tool the pushing down sheets have to be screwed to each other from the bottom part.

In the whole construction of the tool the fixing by bolt or round has to be done in such a way as wrong assembly will not be possible, so the marking of workpiece by itself is not enough.

The tools with the subalternation steps of process and the suitable coating have to ensure the least usage of oil during production of parts.

It has to be specified at the time of designing which parts of the tool will be coated. Production and heat treatment of them have to be done according to different specifications.

In the top part of the tools have to be placed extrusive bolts in the bending and cutting parts, next to the dragging and divestituring of the part.

Power of detruders have to be specified to ensure that steel strip stays at its place stably and that parts fall out from the tool securely.

After the bending operation adjustable calibration operation is necessary caused by the dispersion of raw material thickness!

At the time of final acceptance we ask tool maker to give us a list about spare parts with price offer about them.

If the marking of working piece is specified in the drawing, fix and exchangeable marking stamping unit have to be supplied by the tool maker during the whole lifetime of tool.

5. Tool leading

The possibility of wrong tool assembly has to be prevented:

- In case of columnal leading:
  in case of 4 pcs pushing out 1 position,
  in case of 2 pcs with the difference of diameter
- In case of block leading usage of block in different sizes, or offsetting the position.

In case of usage of sprung auxiliary insert, the leader column has to hang in minimum 1,5 x D depth to the leader sleeve, ensuring the suitable centralization.
During operation of the tool, step of leader parts in different directions is prohibited.

According to DIN/ISO standard leader column and sleeves have to be used as follows:

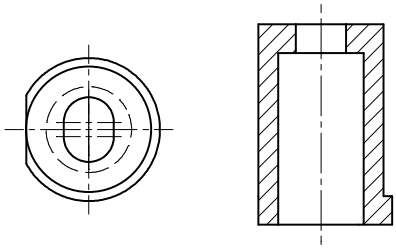
- Leader column DIN 9825 / ISO 9182-2 without flange
- Leader column DIN 9825 / ISO 9182-5 with flange
- Leader sleeve DIN 9834 / ISO 9448 with flange
- Leader sleeve DIN 9831 / ISO 9448-3

The leader apparatus with closed column has to be setted up with a plug-hole with minimum 10 mm diameter.
Workpiece lifter or strip lifter over 40 mm lifting height has to be led by columns or by other correct way.
In case of small blasting leak (eg. shaving) separated stabiliser lead has to be used to ensure the precise joint of cutting parts (eg. sheet leading).

6. Cutting elements

The thickness of cutting sheet of tool and cutting sleeve cannot be less, than 32 mm. Only standard parts can be used.
Standard sizes cannot be changed.

The hole sleeves placed in the longish holes and the applied hole sleeves in the polished profiles have to be fixed so that they can not turn away (by locater or ribbed pin). The fixing surface which forbides the turning away has to be formed in line with the fore and-aft side (see illustration).



In case of over 1 mm raw material thickness tympan- sheet has to be used under the hole sleeves.

The hole sleeves without flange have to be held by tympan-sheet as well.

If the presser sheet is multilayer, the sharpening has to be supported by filler. A re-forming of one height of layer has to be possible without the forming of other heights.

At the time of outside laser cutting of workpieces with spatial configuration, the cutting edges have to be formed without fuzee if applicable to have the possiblity of re-forming.

Then the trimming contours have to be opened outwards to have the possibility of suitable removal of rubbish.

The cutting and bending fillers have to be provided with pull-off screw thread.

The threads have to be placed in the holes of screw if possible.

The cutting fillers - where possible- have to be provided with extrusive tongue (not with rubber filler or ball- end with round).

If during the cutting shear slip to the side is possible (eg. in case of cutting of one line), the cutting-out elements have to fit with holder- supporter elements.

In case of reasonable issue the cutting power has to be lower by usage of cutting spike with different lenght.

Detruder has to be built in next to the dragging strike.

Over the cutting elements have to be used hardened thympan- sheet.

The cutting spikes which can not be fixed by screw caused by their size have to be fixed by spiles without inside round or bullet to forbid the drop-out. We do not accept upset heads.

7. Drift-pin

Only standard drift-pins can be used. Their lenght cannot be over 100mm.

All of the drift- pins should be provided with eject pins of scrap.

If the tool provided with different drift-pins, they have to have different axle diameter, to do not mix them.

If it is not possible in case of all of the holes, the diameter of drift-pin has to be mentioned on the holder sheet with the suitable number of hole.

The drift-pins have to be fixed on a minimum 35 mm thick holder sheet. The drift- pins can be exchanged so that the form of the head should not be reworked.

Over the drift- pins have to use hardened supporter sheets.

The constructions have to ensure that the exchange of drift-pins is not difficult caused by the round connections of tool parts. This can be ensured by supporter of different holder sheets and drift- pins.

8. CAM units

Side cutting parts can be standard only. Thickness and quality of manufactured raw material have to be consiedered when size and type of units are choosen.

On the side of cutting sheet only cutting ring can be used.

During designing differ from over specifications can be with only an approval from RÁBA MÓR.

9. Spring elements

The flexible leader elements, lifters, or other moving parts which controll the lifter height, have to be fixed by spacer tubes and underplates. We accept only exactly standard sizes. Usage of thick-set, screw driver is not allowed.

According to ISO 10243 compression coil springs have to be designed for long operating life and have to be provided with leader spile.

10. Gas pressure springs

Gas springs can be nitrogen charged only.

Their working stroke can not be higher than the 90% of maximum stroke.

Gas springs which work together have to be connected to each other, ensuring the easy checking and refilling of gas pressure.
If the gas pressure spring is placed in a pod or caliber, it has to be provided with through caliber, ensuring the oil and the grease can not stay in.
The gas pressure springs which are used in the tool housing have to have cylinder shape. External round or fixed flange is not allowed.

11. Tool distancees and disencumber elements of springs

The spacer elements have to be painted according to the RAL 3000 code.
We ask you to mainly use auxiliary gas spring as spacer, to protect srings of tool.
Where gas spring cannot be used, aluminium spacer can be used only. These can be easily removable, their storage have to be safe during production.

12. Fixing of tools, sizes

Our hydraulic fixing unit suits to fix 50 mm thick sheet.
During designing of width and thickness sizes the machine parameters are critical.

13. Pneumatics

The pneumatic cylinder and the accessories have to be purchased mainly from Festo.
Used parts have to be standard.
Internal diameter of PU air-tubes have to be minimum 6 mm, their colour have to be blue and black.

Blue	push in, close
Black	pull back, open

Air-tubes have to be fixed to the tool by suitable standard equipments. During operation friction, movement is not allowed.

14. Subtitling of tools

All of the parts of the tool have to be marked by a number according to the place of fitting.
The number has to be placed on a visible place to avoid any incorrect fitting. (place and position).

On the tools which are able to produce different versions of workpiece have to be visible information about the necessary modifications.

Attached has to be detailed fitting plan.

Place of rubbish of strip threading and its removal have to be marked prominently.

The rubbish has to be painted by red and fixed to the tool prominently.

All of producer equipments have to have an identification sheet.

Identification sheet of the tool has to contain the following informations:

Name of workpiece	
Drawing nr:	
Number of tool:	
Size: L x W x H	
Weight:	Forming power:
Lane:	Step:
Stroke:	
Owned by:	

Sheet has to be visible and has to be placed on the bottom part of the tool, on the side of the operator.

15. Removal of rubbish and forwarding of workpiece

Rubbish cannot go where the workpieces fall.

Falling out of rubbish has to be ensured by slide –100mm from the level of tool -, its bottom has to be on minimum 120mm from the board of press.

The sliders of rubbish have to look to the way of falling hole of the table.

All of the tubes have to be fixed by screw steady.

The tubes can not be welded up to the tools.

If required the possibility of easy elongation of the tubes have to be ensured.

The tubes have to be width enough that rubbish can fall out easily without any lock.

If the raw material is aluminium, rubbish has to be moved out from the tool by slide or conveyor. This has to be the part of the tool in every case.

If free movement of rubbish is not 100%, clogging of rubbish has to be prevented by built-in electric sensor.

16. Coating of active parts

All of the hardened active parts – e.g. bending and pulling stamps- have to be softened after the hard processing to ensure the reduction of internal voltage.

To avoid the bending of the part during the lay-on coating, the tempering temperature has to be minimum 520 °C.

The presser elements and the spines have to be hardened, the nitration is not allowed.

The coating has to be layed by CVD TIC/TIN procedure, the specification of others are decided during the construction meetings.

17. Requirements of hardness of raw material

Part	Raw material	Hardbess
Cutting spines	1.2379	58 + 2 HRC
Cutting spines	HSS	head 52 HRC leg 62 HRC
Cutting spines	K340 isodur	61+2 HRC
Perssing parts	1.2379	58 + 2 HRC
Pressing parts	REX M4	60 +2 HRC
Bending heads	1.2379	56 + 2 HRC
Pulling pressing forms	1.2382	56 + 2 HRC
Bending and pulling insert	AMPCO® 25	
Pulling down parts	1.2842	54 +2 HRC
Supporter sheets	1.2842	56 + 2 HRC
Character puncher spines	1.2436	58 + 2 HRC

Layer thickness ofinsert hardening: minimum 1 mm

18. Painting

The spacer elements have to be painted red (RAL 3000).

Place of lifting has to be prominently marked by „FORK” label on the tool.

If lifting by fork is strictly prohibited, it has to be marked by „NO FORK” label.
Other colours based on agreements.

19. Forwarding and weight of tools

All of the tool parts which are heavier than 15 kg have to have a lifting round (M12, M16, M20, M24, M30).
Along the over and bottom edge of the tool, lifting rounds have to be holed in to ensure the easy collecting of lifting scale.
If possible, total weight of the tool cannot be over than 5000 kg (facilitation of tool parts,legs, beams).
If total weight is heavier, it has to be negotiated by RÁBA MÓR during the stage of planning.
All of the tools have to have the possibility of lifting by forklift.

20. Transportation of the tools

Until the final acceptance the tool maker has to ensure the delivery of tool.
During transport all of the costs have to be covered by the tool maker.

21. Material usage of parts

Width tolerance of all steel coils used by Rába MÓR is +0; -0,5 mm.
The driving of strip has to be configured according to these tolerances (see in point 4).

During cutting of planar shapes can not be more rubbish than as follows.
T = material thickness.

5	x	T	until 0,8 mm material thickness
4	x	T	until 1,2 mm material thickness
2,5	x	T	until 2,0 mm material thickness
2	x	T	until 2,6 mm material thickness
1,5	x	T	until 3,5 mm material thickness

on the thinnest point.

22. Conditions of warranty

The tool maker:

- Accepts responsibility for operability during the lifetime and quantity as specified in the contract.
- In case of failure wúerror has to be solved in the shortest possible time, it cannot cause problem in production of RÁBA MÓR.
- Spare parts have to be supplied during the lifetime of the tool based on demand of RÁBA MÓR.
- Details of raw material, heating treatment of tool parts have to be supplied to RÁBA MÓR.

During designing the tool maker has to use suitable technical solutions according to the production quantity which is specified in the purchase order (eg. Using gas spring, special puncher, coating, etc.)

Final taking over of tool can be done if the tool fulills all requirements of drawing in 100%.

RÁBA MÓR gives the possibility of 2, 8-8 hours free trial of tool, which can be in an agreed appointment with the tool maker.

During trial of the tool, in case of any damages caused by the failure or malfunction of the tool, all of the extra costs debits the Supplier.

23. Other conditions

If special equipment is necessary for the operation, service of the tool**,** (e.g. clip, clamp, charging magnet, etc.) the tool maker has to deliver as an accessory of the tool and specify its usage in the operation instructions.

24. Electrical plugs, tool protection

Electric cables have to be protected by protecting tubes from the mechanical defects.

Cables cannot go on the side of the tool, only on the sheet of the tool.

Sensors have to be placed to ensure the connection of cables without any problem.

Sensor of step is necessary at the beginning of strip (to help the threading of strip) and at the end of strip (to sensore that strip is at its place).

Cracking sensor of step has to be implemented to ensure that strip can go back easily.

Sensor of part dragging out is necessary if dragging from the tool is not safety in every case.

Following equipments can be used:

Stift filler with 6 pole

Producer: AMPHENOL Type C146-10A006-0021

DISTRELEC order number: 111200

Stand house

Producer: AMPHEMOL Type C146-10F006-5001

DISTRELEC order number: 111204

Gland screw

Producer: AMPHENOL Type 0900.000.5014 PG16

DISTRELEC order number: 114032

Mikroswitch

Producer: MARQUARDT Type 1005.1001

DISTRELEC order number: 230529

or:

Producer: OMRON Type V-16-1C5

16A 1/2HP 125 250VAC

0,6A 125VDC 0,3A 250VDC