

# Project Info 15

- Task:
- Machining of battery housing parts for high-voltage batteries in electric cars, consisting of a frame and a floor plate
  - Design and manufacture of the hydraulic clamping device
  - Selection of the tools
  - Producing of the CNC-programs
  - Planning of feeding and discharge of the workpieces, as well as loading and unloading of the machines by robots

## Workpiece 1: Frame for the floor plate

Type of machine: Travelling column machining centre VSC 3 - 1760

Material: Extruded aluminium profiles, welded together to a frame

Solution: Hydraulic clamping device for the workpiece with **three** clamping circuits mounted on a bridge between the rotary table and the counter bearing.

1. Circuit: **Vices** with two pressure stages (alignment and clamping of the workpieces in X/Y-direction)
2. Circuit: **Hold-down clamps** (clamping of the workpieces in Z-direction)
3. Circuit: **Floating vices** (clamping of the workpieces in X/Y-direction with simultaneous adaptation to the workpiece position)

Special characteristics: The machining of the top and bottom side of the frame takes place in one clamping. Furthermore, all existing openings in the workpiece are covered by the movable clamping elements. In this case no chips are able to fall into the profiles during machining.

### Technical data:

X-traverse range:	1760 mm
Y-traverse range:	1100 mm
Z-traverse range:	950 mm
Main spindle drive (with 40% DC):	40 kW
Torque (with 40% DC):	191 Nm
Speed range:	up to 12000 rpm
Tool changing system:	Pick-up station with 8 tool pockets for HSK A63
NC-rotary table:	AXA RTA 3-630 (face plate 630 mm) Swivel range +200° up to -10°
Counter bearing:	Rotary table AXA RT 2



## Workpiece 2: Floor plate for the battery housing

Type of machine: Travelling column machining centre VHC 3 - 1760 XTS

Material: Extruded aluminium profiles, joined by friction stir welding

Solution: Hydraulic clamping device for the workpiece with **four** clamping circuits, consisting of a **clamping plate with eight hydraulic stamps**, which clamps the workpiece onto the support plate of the rotary table by a hydraulically driven **extension arm**. The workpiece is positioned against the **stop bolts** and is held by the **swivel clamps** during the lifting and lowering movement of the extension arm. As soon as the workpiece is clamped by the eight hydraulic stamps, the stop bolts and the additional swivel clamps move back and enable the machining of the requested area. The clamping plate is mounted rotatable in the extension arm which enables the workpiece to be positioned by the rotary table during machining.

1. Circuit: **Stop bolts** (alignment of the workpieces in X/Y-direction)
2. Circuit: **Extension arm** (lifting and lowering of the clamping plate for loading and unloading or for clamping of the workpieces)
3. Circuit: **Swivel clamps** (Additional clamping during positioning, lifting or lowering, of the clamping plate)
4. Circuit: **8 x Stamps** (clamping of the workpieces in Z-direction)

Special characteristics: The whole machining of the four sides by vertical and horizontal spindle position takes place in one clamping due to the special clamping device.

### Technical data:

X-traverse range:	1760 mm
Y-traverse range:	1100 mm
Z-traverse range:	950 mm
Main spindle drive (with 40% DC):	40 kW
Torque (with 40% DC):	191 Nm
Speed range:	up to 12000 rpm
Tilting spindle head:	Hydraulically clamped during machining Tilting range +/- 90° in angular increments of 0,001°
Tool changing system:	XTS tool magazine with 16 tool pockets for HSK A63
NC-rotary table:	Torque motor driven rotary table AXA RTA 4TF-1000 (face plate 1000 mm)

