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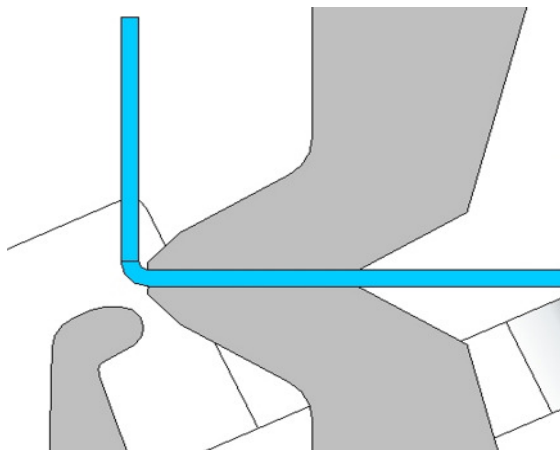
## Folding center for small parts: RAS MiniBendCenter

Speed doubled! Cycle times halved.



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When RAS presented the prototype machine visitors were surprised about how the MiniBendCenter automatically folded small and complex parts. Many experts certified that RAS has hit the bull's eye with this system. Now, as the system is ready for the market the MiniBendCenter has cut cycles times in halves.



In the past these workpieces most often have been produced on press brakes automated with a robot. RAS selected a completely new approach. While folding machines are designed for different applications therefore may differ in speeds, flexibility and capacity, they all bend in the same manner: A manipulator or sheet gauging system positions the blank to the bend line. The upper and lower beam

clamp the part. The folding beam sweeps upward or downward to form the desired angle of the bend. As the clamped flange stays in the horizontal and only the folded flange moves up, folding is ideal to be automated. The Mini-BendCenter demonstrated that this bending method is suited not only for classical folding applications like large size parts, but also offers distinguished services when it comes to small, complex components.

### Various applications

RAS has broad experience in folding outside covers and cassettes, which are often produced on folding centers. Introducing the Mini-BendCenter RAS now enters the market for small parts inside automats, cabinets, scales, white goods or medical components. The MiniBendCenter is able to produce these parts fully automatically. It can handle blanks up to 600 x 600 mm and is designed for 3 mm mild steel applications. All axes are servo motor and digital regulator driven. This allows to move them with maximum accuracy and repeatability.





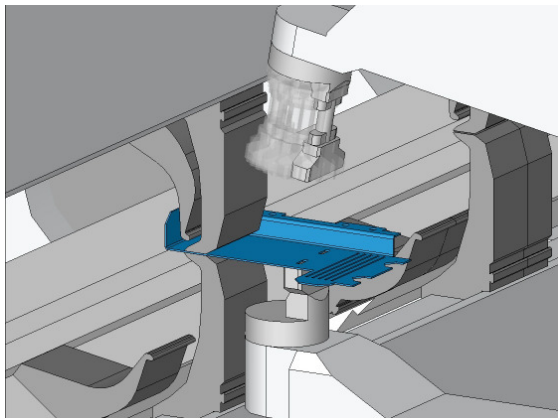
The pallet can be brought to the MiniBendCenter either by forklift or can be fed into a pallet buffer. The shifting table in the pallet loading station centers the pallet automatically, so that the pallets do not need to be placed very accurately. A suction cup system picks the top blank from the stack and feeds it to the transfer table where a manipulator takes over the blank. In the first step the manipulator moves the workpiece along an optical measuring station.



Here, the MiniBendCenter uses the optical scanning technology well proven on other RAS folding centers. After three points of the blank are scanned, the system knows exactly how the manipulator has gripped the blank. On the way to the first folding station all deviations to the theoretical manipulator position will be corrected automatically.

### Horizontal part handling

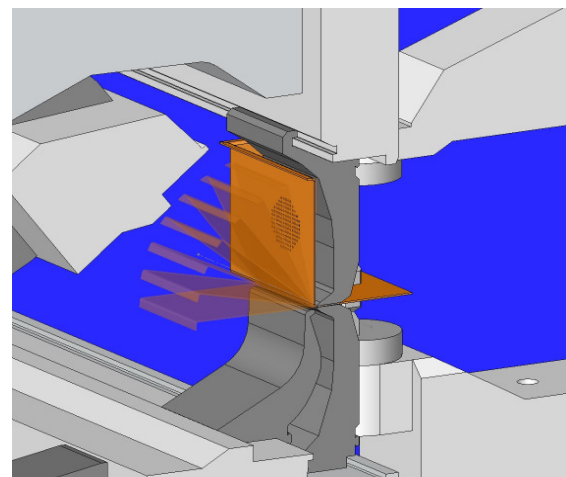
With the part manipulator RAS uses another proven folding center component. Differently than with other automated systems the manipulator does not hold the blank with suction cups – as they will easily reach their limits – and also does not clamp the outside edges of the part with grippers – as this requires multiple re-grip sequences connected with less productivity and accuracy.



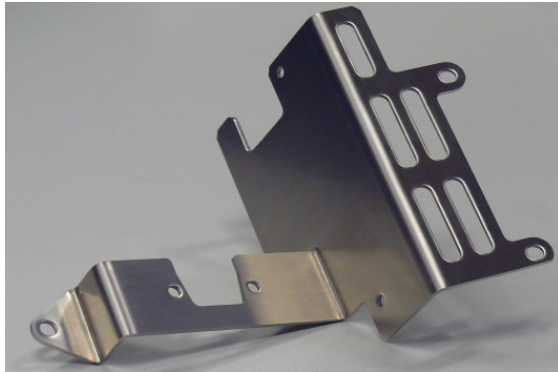
RAS in fact uses a manipulator design with an upper and lower foot, clamping the "center" of the part. A re-grip sequence therefore occurs only in rare situations. As the part stays in the horizontal there is no need for the manipulator to swivel or move up with the part. Related to the bend result this means: high precision, quick folding sequences and short cycle times.



If the part requires a re-grip sequence the manipulator is able to rotate its upper and lower clamping foot independently. Different from folding centers for large parts the manipulator can move the small blank through the machine without the need of a support table. Thus the manipulator has all degrees of freedom. Apart from the rotation from side to side, the manipulator can move the workpiece the bend line, move from tool station to tools station and can even lift the part. All these movements are implemented by axes moving only linear. The MiniBendCenter does implement not know hinge axes, as they are used on robots. Therefore the manipulator can move to any position with highest levels of accuracy – and RAS was able to transfer another folding center feature to the MiniBendCenter design: fast folding without positioning stops.



The upper and lower tools clamp the workpiece, as soon as it has reached the bend line. Both tools are shaped the same and offer vertical free space for flanges facing up or down of 127 mm. An upper or lower folding beam move to the clamped part and folds it with adjustable bend radius.

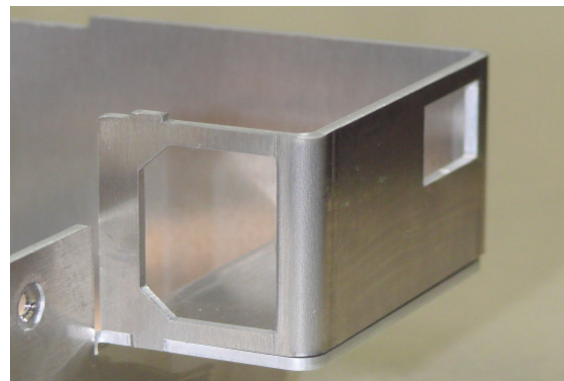


The tool rolls away in a 3D movement on the material surface, so that the folding procedure allows scratch-free forming and in the long run tools are not subject to wear.

The workpiece can project 480 mm beyond the clamping point into the machine. After all bends are completed – which can take place on multiple tool stations along the machine – the manipulator moves the finished part to the unload station. There it can be either delivered into a bulk container, be removed over a conveyor or unloaded by a robot.

### Automatic tool change

Before folding starts, a tool changer sets up the tool stations automatically. The RASCAM sends the information about the tool length to the machine controller. Also the tool shape is handed over via the interface. The CNC calculates the required tool segments for each station. Even more useful: the control also calculated the fastest change-over sequence before the tool changer starts repositioning the tools.



This may even require that the tool changer may clean some tools out of the way, before new tools can be placed.

### Halved cycle times

Does the question remain, how RAS was able to cut cycle times in halves? RAS did not set on higher axes speeds. The solution is in axes running all at the same time. On each folding cycle seven axes move under continuous-path control and synchronized to a programmed position. They all reach their target at the same time. All these movements are supported by an extremely fast field bus.



Summarized the MiniBendCenter is an automatic and high productive manufacturing center for small and smallest parts starting from a 50 mm blank length. RAS proves: the fact that folding is only suitable for large parts is no longer true and adds a new chapter to the history of folding.