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# world of tools

HORN´S CUSTOMER MAGAZINE



SUBJECT:

MEDICAL TECHNOLOGY:

**MILLING BONE RONGEURS OPTIMISED**

- Innovative production secures location
- DD drill bits on the road to success
- Successful premiere of the HORN Technology Days
- Innovations at the EMO

# MILLING BONE RONGEURS OPTIMISED

The four parts of the bone rongeur are machined in one clamping. In the middle, the two jaw sections, on the right and left the two branches (handles).

## New machining strategy safeguards production in Germany

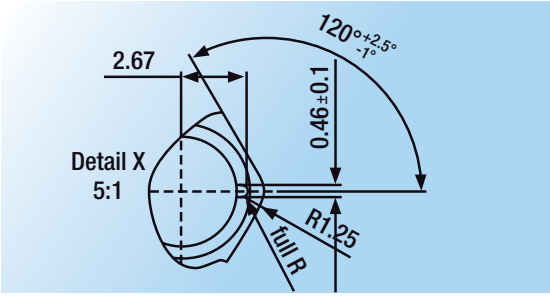
**Before a production relocation abroad, a manufacturer of medical equipment wanted to exploit all possibilities at the domestic location. In doing so, he found strong arguments for in-house production.**

Can our bone rongeurs (bone cutting forceps) continue to be produced competitively in Germany? This question had occupied Martin and Andreas Wenzler of the instrument manufacturer Raimund Wenzler GmbH in Balgheim for a long time as they – in contrast to the competition – were reluctant to relocate the products to a low-wage country. With this project, the philosophy of the company founder would be continued. More than 60 years ago the bone rongeurs were instrumental in establishing the excellent reputation of the Swabian company as a manufacturer of surgical instruments for neurosurgery, orthopaedics and fixation devices for implants.

The picture shows various forceps versions after the milling.

### Bone rongeurs with eventful history

Little has changed in the design of the instrument, which, among others, is used in the surgical treatment of spinal conditions such as slipped disc. On the other hand, the influences on the costs calculation and the quantities have changed significantly. At the beginning, bone rongeurs were manufactured manually on different machines using HSS tools. Later, carbide tools enabled significantly higher cutting values which, however, could not be completely used on account of the tendency for “smearing”.
As well as the effects on tool life, surface quality and also the delivery times, it was mainly the question of costs which demanded new production processes for the by now 12 variants made of stainless steel 1.4021. Andreas Wenzler also obtained ideas at exhibitions and from suppliers. In doing so, he also had




discussions with Horn Process Consultant, Gisbert Voß, who offered him a promising solution based on our slot mills.

## Groove milling of coupling parts

With these tools, an important step for the production optimisation of the bone rongeurs has been taken, particularly for the slot milling in the left and right version of jaw section and branch (handle). The approx. 14 mm (0.552") long, 3 mm (0.118") + 0.01 mm (0.00039") wide and 12 mm (0.472") deep slots for the guidance of the lever joints had to be milled in one pass from the solid metal with Ra ≤ 0.8 µm. For these important functional and cost decisive work operations, Gisbert Voß recommended the 332 and 636 circular interpolation slot mills which have been tested one after the other in different designs. In doing so, both the characteristic system feature – only one shank was needed for all inserts – as well as the chip forming of the slot miller 636 impressed the specialists from the instrument manufacturer. With a speed n = 1400 rpm and a feed rate vf = 200 m/min, it satisfied all requirements for milling by circular interpolation and in comparison with the previously used carbide millers, it achieved double the tool life.

## 5-axis programming under control

The production of the bone rongeurs starts with supplied forged parts. Starting with the CAD data of the different forceps shapes, the mechanical engineers at the programming stations create the CAM programs. For this task – 26 zero points have to be taken into account for the four parts of a bone rongeur – geometric processes are produced which also challenge the manufacturer of the machining centres. For example, the fastening hole for the two jaw sections must be programmed so that the finished product closes without "air" between the two gripping surfaces. Andreas Wenzler therefore uses the support of his machine supplier to match the geometries to be milled to the travel and tool change options of the machining centre.

## New strategy confirms location selection

The new machining strategy has been in use for about one year. It has proved highly successful, as Andreas Wenzler confirms: "Compared with the carbide millers, we are achieving a double tool life and we are impressed by the machining and repeat accuracy. In short, we can continue to produce competitively at the location". A review of the production of the bone rongeurs is also interesting. In the middle of the 1990s, a forceps was manually produced in 36 work steps – milling, drilling, reaming, countersinking, deburring – in two to three months. The four forceps parts today are produced in one clamping on a machining centre with zero point clamping system in 15 minutes.

**Picture, top:**
**The slots are milled in the two jaw sections with the slot miller 636.**

**Picture, top left: Certain details in the slots place high requirements on the slot miller.**

**Picture left:**
**Andreas Wenzler, Wenzler company (right), and our Application Technician Gisbert Voß are pleased with the good results of the jointly developed strategy.**

## Working ranges of the slot millers used

| Insert Type | 332 | 632 | 636 |
|---|---|---|---|
| Number of cutting edges | 3 | 6 | 6 |
| Cutting edge diameter mm (") | 31.7 (1.248) | 31.7 (1.248) | 35.7 (1.366) |
| Working range groove depth mm (") | 8.3 (10) (0.327/0.394) | 8.3 (10) (0.327/0.394) | 10.2 (12) (0.402/0.472) |
| Insert width mm<br>inch<br>mm<br>inch<br>mm<br>inch<br>mm<br>inch<br>mm<br>inch | 2 (1.5)<br>(0.079 (0.059))<br>2.5 (1.6)<br>(0.098 (0.063))<br>3 (2.0)<br>(0.118 (0.079))<br>4 (2.5)<br>(0.157 (0.098))<br>(3)<br>((0.118)) | (1.5 /1.6 /2.5 /3)<br>((0.059)/0.063/0.098/0.118))<br>2<br>(0.079)<br>2.5<br>(0.098)<br>3<br>(0.118)<br>4<br>(0.157) | (1.5 /2 /2.5)<br>((0.059/0.079/0.098))<br>1.5<br>(0.0591)<br>2<br>(0.079)<br>2.5<br>(0.098)<br>3<br>(0.118) |

Values in (): Miller with increased milling depth