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SICATEC
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S C T - CARBON

Recommendations for tooling and using

Sicatec : reliable, efficient; a truly partner of the glass manufacturer

Machining:**Coolant:**

The cutting fluids or coolant used for the processing of metals or other materials, must not be used for S C T - CARBON. No cooling is required.

Sucking up of carbon dust:

Please make sure that the carbon dust occurring during all machining steps is carefully sucked off because this dust hinders the operating process and endangers the bearings.

Clamping:

Due to the ceramic properties of S C T - CARBON, only slight cutting force is permitted. The clamping of S C T - CARBON must be handled lightly and carefully.

Holes must be drilled with the help of collet chucks or expanding rings. The use of three-jaw-chucks is permitted only for a minimum wall thickness of 8 mm, respectively a substance of 0.1d. For the machining of the outer lining, we recommend placing on a mandril.

Sawing:

The use of hard metals armed jig saws (3 teeth per inch) is recommendable. Cutting speed: ca. 100 - 300 m/min.

Boring:

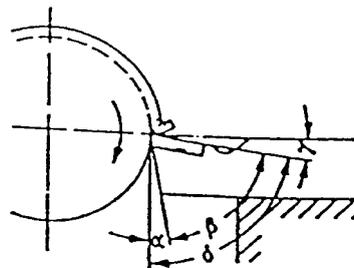
To avoid break outs, the cutting force when boring should be compensated either by a suitable tool design (slit edge angle to plane of section 30°) or by a suitable side rest at the end of the borehole.

Selection of tools:

For cutting-work we recommend to use carbide-tipped cutters of the K01 or K05 qualities. Cutting ceramics as well as diamond-charged cutters are also suitable.

Turning:

Special attention must be paid to the flawless condition of the cutting edges of the tools in order to be sure of constant cutting force. Breaking can be avoided by reducing the feed at the end of the planes being machined to a minimum.



- clearance angle α = 8 to 15°
- lip angle β = 72 to 84°
- side-rake angle γ = -2 to 3°
- setting angle = 45°

Machining data for using carbide-tipped cuttings.

Cutting conditions	rough down	Plane sizing	Fine machining
Cutting speed (m/min)	100 to 200	100 to 300	200 to 400
Feed (mm/u)	9.2 to 0.8	0.1 to 0.25	0.05 to 0.15
Depth of cut (mm)	< 10	< 1.0	< 0.3

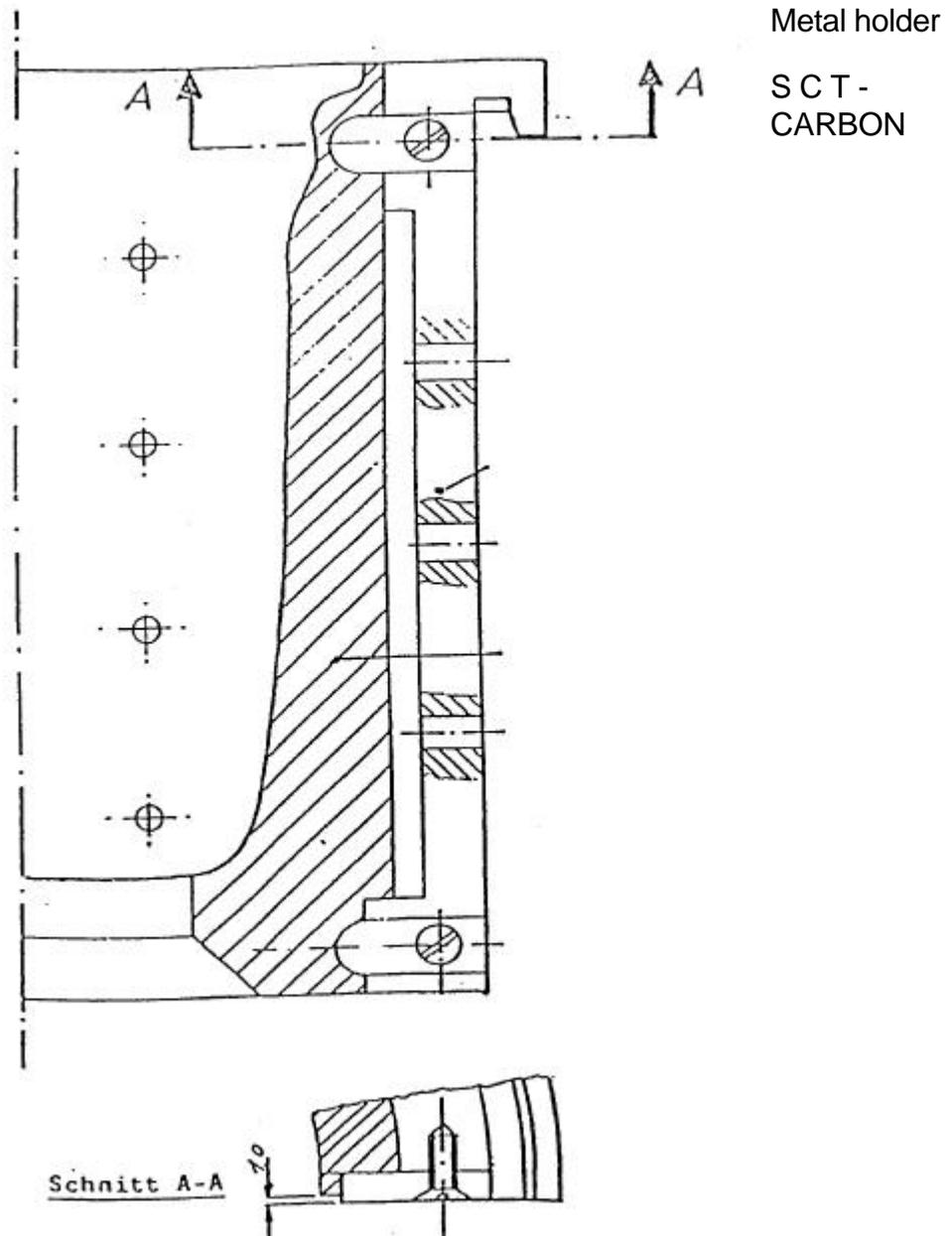
Grinding:

The structure density of the grinder wheels should be between 6 and 9 by ISO Standard. For grinding we recommend peripheral speed between 20 and 35 m/sec. with SiC grinder wheels with a granulation of 20 - 46 and a hardness between F and K.

For super-finish grinding, grinder wheels with a granulation of 80 to 120 and a hardness of H to N should be used.

Polishing:

Exact preparatory work by super-finish machining is necessary in order to get flawlessly polished surfaces. For polishing use emery paper in the following order:
Granulation 330, 600, 900.



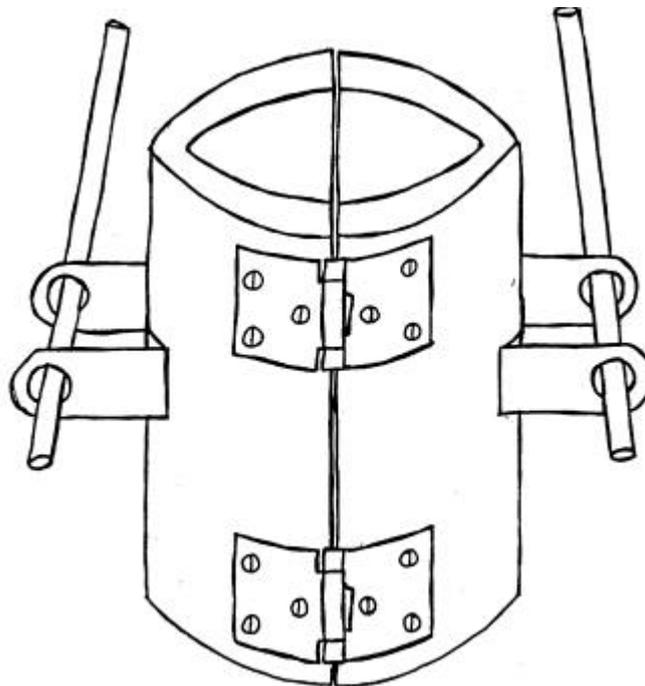
S C T - CARBON - fastening possibility in a metal holding

Gluing:

The possibility of gluing of S C T - CARBON is available. If necessary S C T - CARBON let stick together by a two components epoxy resin glue. Please take account the recommendations of usage by the manufacturer.

Assembly:

- I.) Due to the strength of S C T - CARBON the handles and hinges can be screwed directly
- II.) at the mould. Before screwing please bore a smaller borehole than the screw.
- III.) To protect the mould against rough the mould can be surrounded by a metal carrier or frame made of stainless steel.

Sketch of a S C T - CARBON - mould with hinges and holder

The mould is ready to use. Both parts of the mould are fixed together with stainless steel hinges. The hinges itself are fixed with screws.

The mould can be opened and closed easily with handy stainless steel pipes (Ø: 10mm, length: about: 300mm; depends of the size of the mould) which are holded in sheet steel elements. The elements are also fixed to the mould with screws.

*Use of **S C T - CARBON** as soaked hollow glass moulds in hand production and machine production.*

Hollow glass moulds

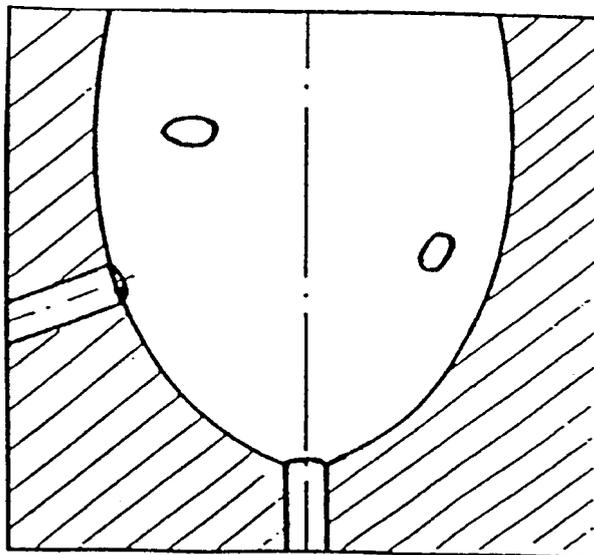
Behind the mechanical working (Turning on a lathe, sawing) the S C T - CARBON - mould is ready for using in production.

The following tooling steps are recommendable:

- I.) - Mechanical machining
- II.) - Cleaning the mould by compressed air
- III.) - Dipping in ultrasonic or cleaning with a brush under water.

With the last action the closed pores from the dust and residues caused by the machining operation are opened.

The greater the glass weight of the blown item, the more vapour is produced.. To avoid to much steam pressure in the mould, vent holes (\emptyset 5mm) should be drilled into the mould. These holes are drilling from inside to the outside of the mould.



It is better to fix the borings towards the bottom for the flowing remaining water (picture).

Subsequently the borders of the holes are smoothing by emery.

The production condition determines the requirement of the holes.

To protect the mould against rough use we recommend that it should be surrounded by a metal carrier, for example, one made of stainless steel. In such an instance the holding system should assure that the surplus vapour can vent easily.

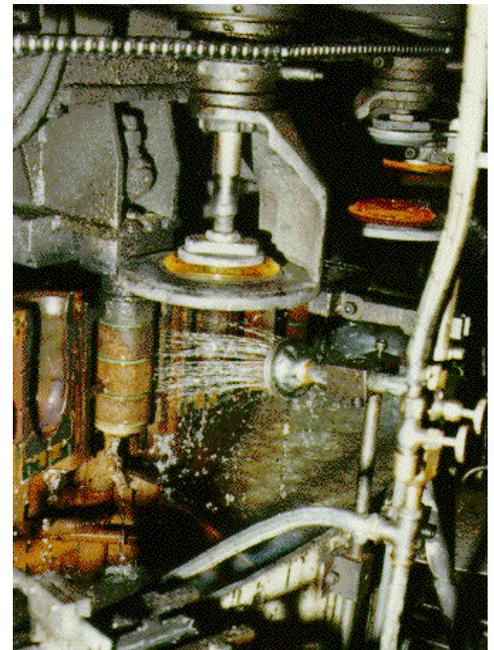
Depending on local water hardness, sometimes, after longer periods of use, thin layers of lime or other deposits close the pores at the surface of the mould. Thereby the special adjectives of S C T - CARBON are restricted.

Possible kinds of cleaning:

- Acetic or formic acid (10 - 20%)
- hydrofluoric acid (0.5%)
- standard decalcifier.



S C T - CARBON mould:
insert in metal carrier for machining
production



Example of spraying system

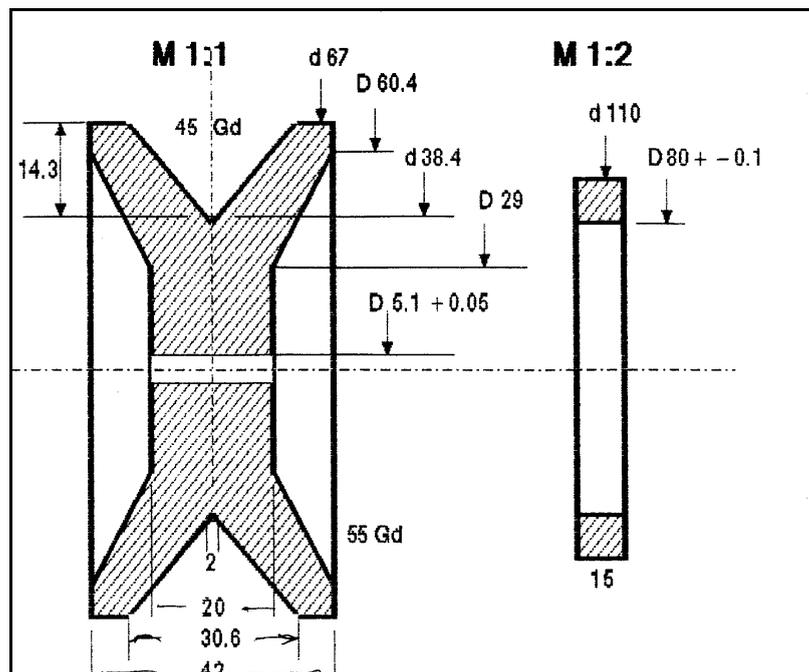
Recommendations for cleaning

1.) Removal of chalk depositions:

The manufacturing of drinking glasses in water soaked S C T - CARBON turning blown moulds is easy and without any problems. After longer periods of use, by using hard water, thin layers of deposits can close the pores at the surface of the mould and disturb the porosity. If this deposits is lime, they let remove by acetic or formic acid (10 - 20%) successful. The so soiled moulds were dipped in the prepared solution at room temperature for 3 hours. If the cleaning solution is warmed the cleaning process is accelerating. Afterwards the cleaned moulds became rinsed in water and are ready for using.

2.) Removal of SiO₂ deposits

Sometimes the deposits cannot remove by acetic or formic acid. It was find out, that SiO₂ from Glass melting is deposit at the surface of the S C T - CARBON mould. This SiO₂ layers can remo-ve with hydrofluoric acid (HF).



S C T - CARBON:
Possible size for application in tubing production.