

## Product Information

### Automatic Testing of Plastics: X-linear with notch milling machine



Pic 1: Complete view of the X-linear-system with notch milling machine

#### Testing tasks

An important part of the preparation of plastic specimen for a test in an automatic or manual pendulum impact tester is the notching of the specimen. It is possible to perform a v-notch on one side or on both sides of the specimen. The most important characteristics of the prepared sample are the correct radius of the notch base and the remaining width after the milling process.

Zwick developed a fully-automatic notch milling machine to make a notch for Charpy specimen according to DIN EN ISO 179 and Izod specimen DIN EN ISO 180. The notch is made according to the ISO 2818 Standard.

To cover the individual customers' requirements, the automatic notch milling machine was designed in a flexible modular system that can be put together in various ways.

#### Functional units of the system

##### Milling unit

The automatic notch milling machine mills every specimen of a series separately. The manual machine mills a series at a time. During this operation the specimen lay side by side in a specimen holder or a machine vice and the rotary grinder cuts the notch into all specimen in one step.

A diamond rotary grinder is used. The grinder itself is fixed in an exchangeable tool and together they build the rotary grinder head. By the adjustment unit the operator can align the rotary grinder head within a range of  $\pm 0.02$  mm.

#### Changing of the rotary grinder unit

For different kinds of material or different notch base radius the rotary grinder unit can be manually exchanged within one minute. Once the head is adjusted to a certain notch depth and the head is changed and put in again, the depth as well as the centric positioning is reached again very reliable.

#### Position of the notch

The operator can decide in the control program of the automatic notch milling machine if he wants to have a notch on the striking side or on the back side of the Charpy respectively Izod specimen. For a notch on both sides, the specimen will be machined again after the first notch. The notch will be milled in one smooth move in a  $90^\circ$  angle to the main axis of the specimen with a adjustable distance of  $\pm 3$  mm to the centre of the specimen. According to the standard, the distance of the notch to the end should be the half specimen length.

#### Adjustable parameters

Notch:	Frontside / Backside
Feeding Speed:	5 to 30 mm/min
Cutting Speed :	500 m/min to 800 m/min
Optional :	remaining width $b_N$ at the notch base : 2.5 to 11 mm

#### Sample gripping during milling process

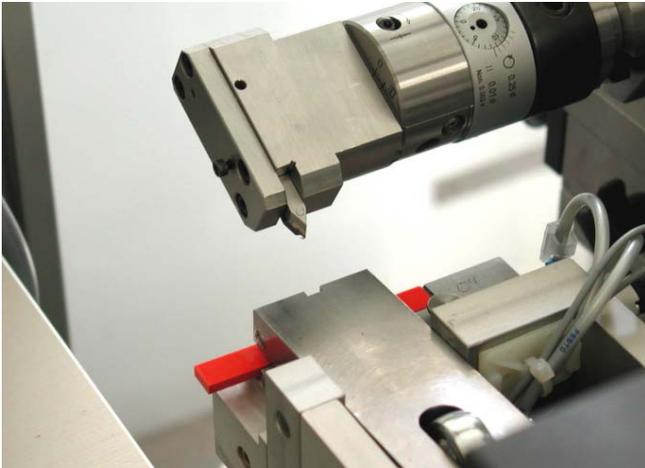
The specimen is fixed from all directions during the milling process. A vibration of the specimen therefore is avoided.

When milling smooth material a bur is avoided by using of a small plastic plate made of Makrolon or PMMA at the lower gripping tool. The plate supports this side of the specimen during the milling process. After changing the remaining width at the notch base the small plate has to be changed too. The change of the plate is quick and easy to do.

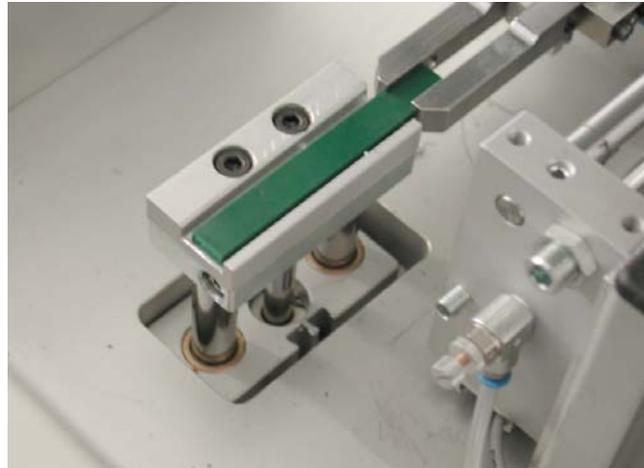
A support plate is not necessary is if you have hard plastic material.

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Pic. 2: Milling head at milling of the plastic specimen



Pic. 3: Feeding of the specimen

#### Lifespan of the diamond grinder.

The lifespan of the diamond grinder depends of the characteristics and the notch sensibility of the material. The lifespan of the grinder with glas-fibre reinforced material is approximately 100.000 specimen. With non-reinforced material the lifespan is dependent on the notch sensitivity and is between 5.000 and 50.000 specimen.

#### Automatic Specimen Feeding Unit Magazine

The magazine of the automatic notching mill has a capacity of up to 1.600 samples. The insets and the single specimen carriers can be removed from the magezine for the filling of the magazine. The specimen carrier are compatible with those used in the automatical pendulum impact tester of Zwick.

#### Specimen feeding system

The specimen feeding system has direct access to all specimen carriers at any time. It takes the specimen out of the specimen carrier and takes them over to the notch milling machine. The handling-system recognizes by a sensor, if there are further specimen in the specimen carrier. After the milling process the specimen of one series are put into the same specimen carrier in the same order.

#### Dirt removal

The filings are hoovered during the rotary-grind and collected in a box.

#### Programme for Automation

The automated notch milling machine is controlled by Zwick Software testXpert with the automation modul autoEdition. All system parameters are adjustable by input dialoges of testXpert. As operating system Windows 2000, NT 4.0 or Windows 98 can be used. The system works in two different modi: Modus 1 refers to a database where the parameters of each specimen or series of a milling order is stored. So every sample can be treated different. In Modus 2 all specimen series are rotary-grinded with the same default parameters. In this case the user enters no milling orders in the database. The default parameters are adjustable and can be saved within testXpert.

#### Safety shield

The complete system is protected with a safety shield corresponding with the CE-regulation. The sample magazine can be refilled during operation without any danger.

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