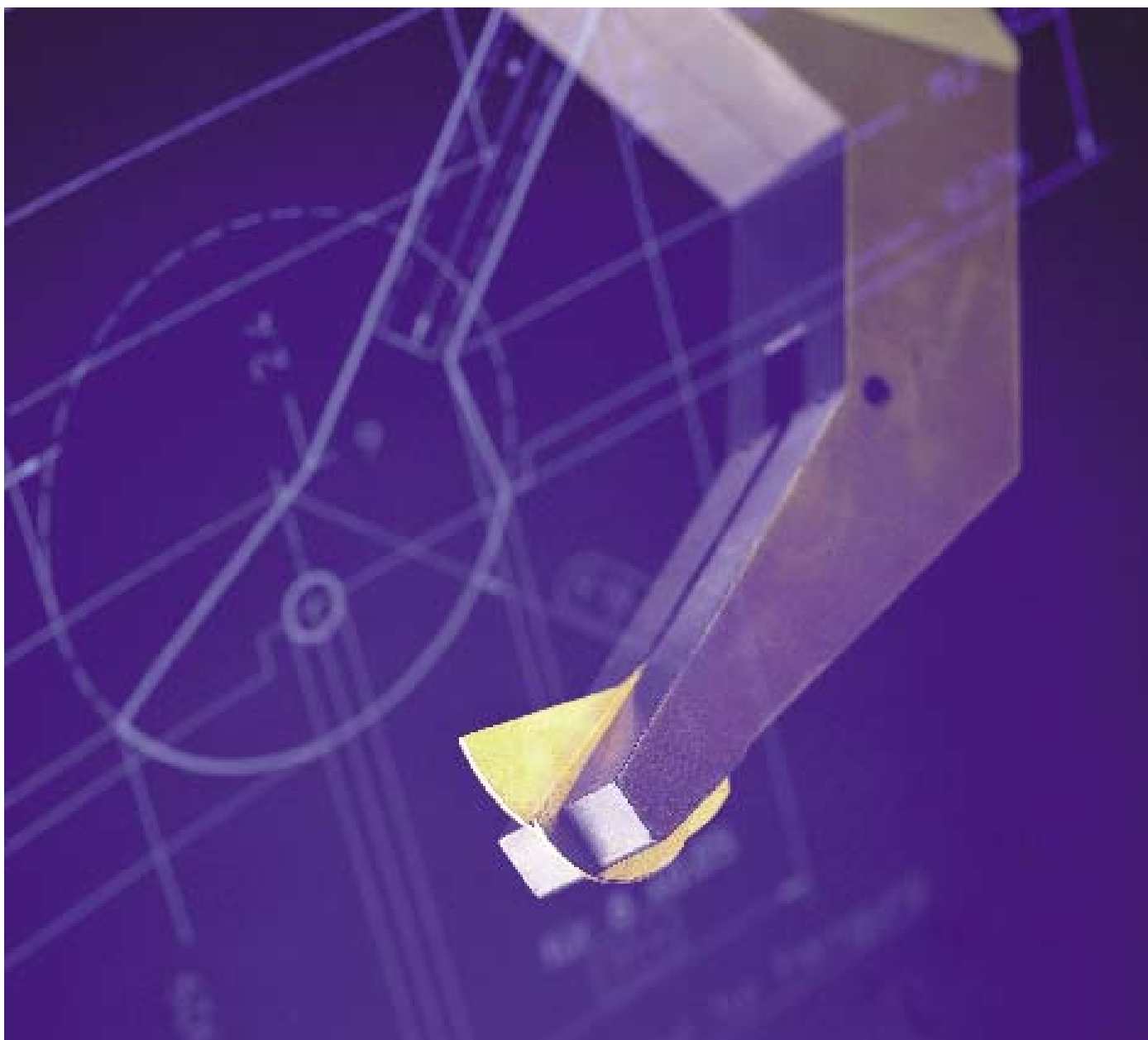


Bending Angle Sensor



TrumaBend V-Series:
Measure and regulate bending angles

Angle Sensor ACB

TRUMPF



The Idea: In-Process Angle Measurement and Regulation

A

Automatically

Our experience tells us that the same material with the same thickness can produce different results in air-bending. Material tensile strength, thickness, hardness and rolling direction determine the spring-back resilience which is usually compensated through trial and error. But the demands are increasing. Customers expect precision bend angles and flexible response to small and large lot sizes and to constantly changing materials.

C

Controlled

The key to efficient bending consists of a bending angle sensor which – beyond measuring – automatically regulates the angle to the desired nominal values.

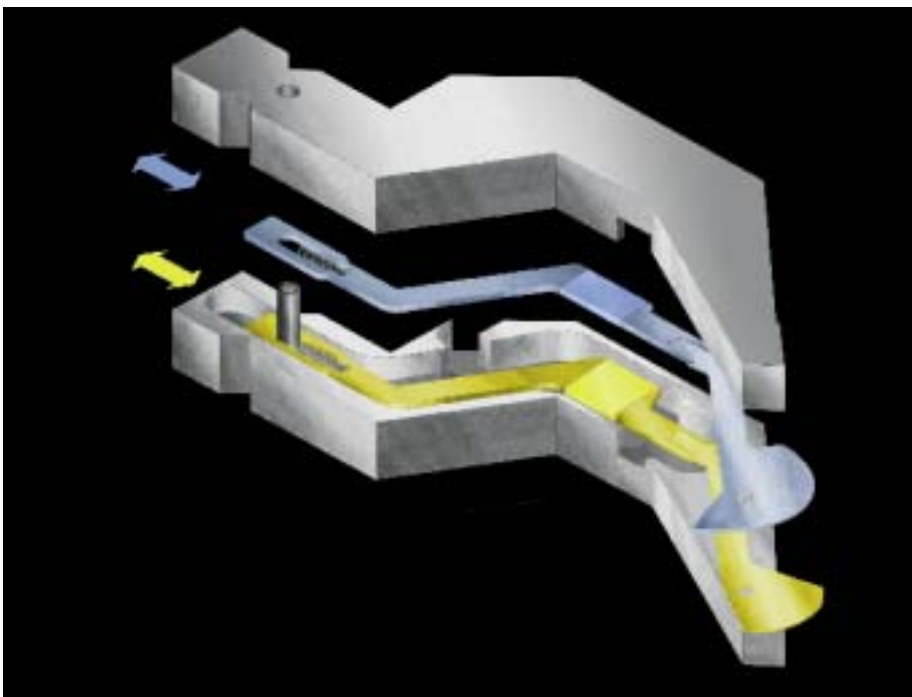
The angle sensor ACB developed by TRUMPF can do both: measuring and regulating during the bending process. Each angle is correct right from the start, eliminating costly set-up time and scrapped parts. The system automatically compensates for the varying springback angles in different materials and material characteristics.

B

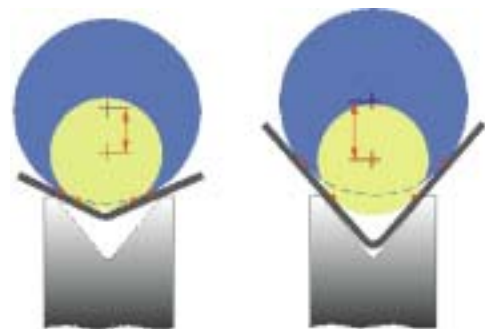
Bending

The principle:

- Two sensor disks with different diameters are integrated in the upper tool.
- The two sensors contact 4 separate points on the inside angle of the bend during the bending process. The system calculates the actual angle from the distance between the disk centers.
- The system recognizes the relaxing point and calculates the spring-back angle.
- The electronic feedback module gives an impulse to the control which automatically finish bends until the desired angle has been reached.
- The workpiece stays fixed in the machine during the entire process.



Sensor Tool



4-Point Measurement with Sensor Disks:
Different angles produce different distances between center points

Realization: TrumaBend V-Series with Angle Sensor ACB



Sensor Tool in Use

Tools with integrated sensor

Their digital fittings and two robust sensor disks are features which set sensor tools apart from conventional tools.

- The sensor disks measure the angle where bending actually takes place.
- An encoder measures the sensor points and passes the data on to the control.
- General and sensor-related data are stored in an internal memory chip.

Sensor tools are loaded in the work station just like other tools. Bending work is not be affected by interference contours. Even very short flange lengths can be processed.

Clear Display

An electronic feedback module evaluates the information from the sensor tools. A clearly visible display provides information on the bending angle, spring-back angle, tilting angle and much more at any time. It can attached – magnetically – anywhere on the beam.



Electronic feedback module

Practical Application: Accurate Angles right from the Start

Easy Handling

During the first bend, the angle sensor ACB determines with which parameters the bend will be made. With this data, quick “regulated” bending is automatically initiated for subsequent bends. The angle sensor only monitors the accuracy and automatically intervenes, if necessary.

Once the programmed bending angle has been achieved, the press beam ascends and you can remove the angle-accurate workpiece from the machine.

Use the Angle Sensor ACB

- Increase your angle qualities. Automatic measurement and regulation always deliver a highly accurate bending angle.
- Start with less delay: expensive test procedures are eliminated.
- React with flexibility: the angle sensor ACB measures and regulates the angle – independent of material variations.
- Decrease your material consumption: whether the parts come from “nested” sheets or residual sheets, it does not have any impact anymore on the subsequent bending.
- Avoid rejects: parts which have been produced with the angle sensor ACB have precise angles.
- Shorten your output times: the TrumaBend delivers angle-accurate work pieces which do not need to be reworked or re-measured for quality control.



Working with Angle sensor ACB

Fast and Accurate: Up to 3 sensors active simultaneously

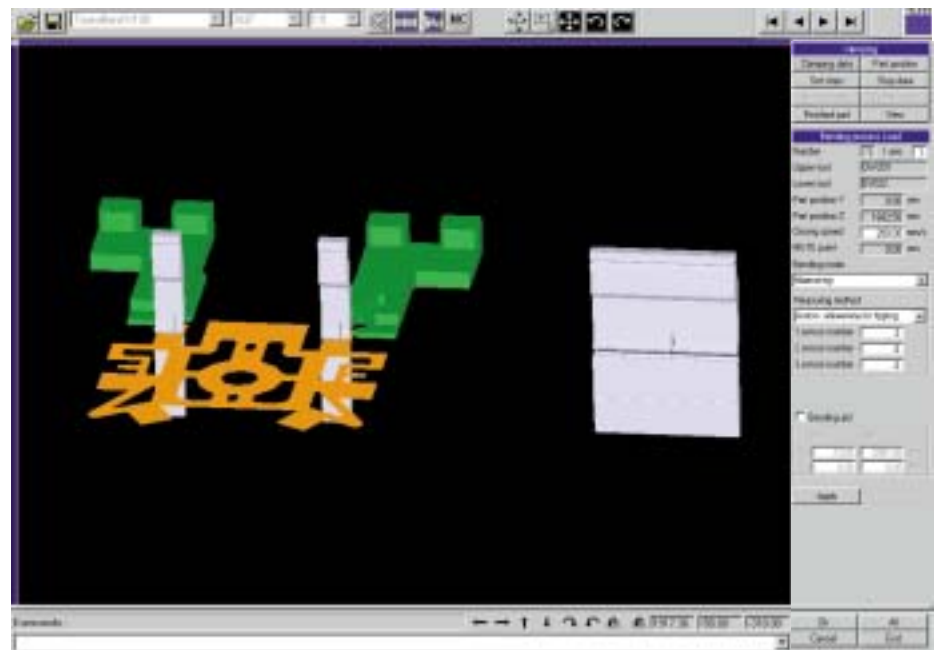
Easy handling of the sensor tools and electronic feedback module provides for utmost flexibility at the press brake. Simultaneous bending with 3 sensors ensures superior angle precision, especially in long bends. The two outer sensors regulate angle accuracy and parallelism while the center sensor regulates the crowning.



Bending with 3 sensors

Process Reliability: Programming system ToPs 600

The TRUMPF bending software ToPs 600 provides optimum support for using the ACB angle sensor on TrumaBend press brakes. ToPs 600 calculates the bend sequences and creates the necessary setup plans. ToPs 600, of course, also determines the ideal position of the sensor tool. This considerably facilitates and speeds up setup work on press brakes.



Programming system ToPs 600 for bending

Technical Data

Sensor Tools

All conventional tool types (with 1 mm punch radius)

Tool width

25 mm

Number of tools per electronic feedback module

2

Number of electronic feedback modules per machine

2

Angle accuracy

typically $\pm 0.3^\circ$

Measuring range*

45°-135°

Sheet thickness range*

1-10 mm

Prerequisites

DA 69 controls on Windows CE

TrumaBend prepared for angle sensor ACB.

* dependent on material and sensor disks

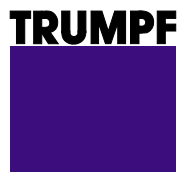
Delivery Scope

System Kit with

- Sensor tool
- Electronic feedback module
- Calibration die
- Sensor disks in different sizes
- Operator's manual

International patents

TRUMPF is certified in accordance with DIN EN ISO 9001 and VDA 6.4



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