Product Information

TruPunch 2020

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Table of Contents

1.	TruPunch 2020: compact flexibility6
2.	New dimensions in punching8
3.	Technical Data10
	Layout12
4.	Main assemblies13
	Machine frame 13
	Coordinate guide14
	Punching head15
	Drives 17
	Table system 17
	Workpiece removal 18
	Automation unit
5.	Tools
	Tooling system23
	TRUMPF MultiTools (optional)
	5-station MultiTool26
	10-station MultiTool27
6.	Control technology 28
7.	Shopfloor programming: ToPs 2000
8.	Options
9.	TRUMPF Services



1. TruPunch 2020: compact flexibility

Machine Concept The TruPunch 2020 is a machine for punching, nibbling and forming flat sheets at high speed. In addition to its large working range, it is also characterized by a large linear magazine, compact dimensions and an intelligent, open control system. The automation unit ensures that raw sheets are loaded quickly and reliably and makes it possible to unload microjoint finished parts automatically. The TruPunch 2020 combines innovative punching technology with an attractive price-performance ratio.

With the TruPunch 2020, you can produce individual workpieces just as economically as small and medium-sized series. And you can do this with fast machining time and reduced non-productive time, as for example necessary for chassis manufacturing.



TruPunch 2020, overview

Fig. 47247



Typical workpiece



Thickness: 1.5 mm

Fig 17983

2. New dimensions in punching...

The TruPunch 2020 represents a new concept in punching machines. It rounds off our line of punching machines and combines typical TRUMPF standards with new ideas.

High speed The high stroke rate translates into high productivity:

- 900 hits/min.
- 108 m/min simultaneous positioning speed.
- High-speed marking at approx. 2200 strokes.
- Rapid forming: The speed is almost identical to that of normal punching.
- Short toolchange times.
- Fast C axis rotation: 3 revolutions/s.
- Use of light RTC (Rapid Tool Change) cartridges possible.

Superior precision A high degree of accuracy is achieved through various measures which complement each other:

- Short throat depth for excellent rigidity of the frame.
- Less thermal influence.
- Since the drives are located outside the machine body, a major source of heat is eliminated.
- Tighter rotation play in the C axes allows a vary narrow die clearance.
 The C axis is extremely accurate as there is absolutely no play in the ram (new hydrostatic bearing). Even the thinnest of sheets which require narrow die clearances are fabricated to highest precision.
- Many toolsThe linear magazine can be equipped with 19 single tools. By using
MultiTools, up to 190 tools are possible.
- **Large working range** The large working range of 2500 mm x 1250 mm (X x Y) means it is possible to machine midsize sheets without repositioning.
- Automated loading and With the automation unit, raw sheets can be loaded easily, and microjoint parts can be unloaded in the waste grid.

User friendly

- As an option, a second stop pin is available which allows small sheets to be loaded with ease.
 - Finished parts measuring up to 200 x 200 mm are sorted into 2 containers, thereby eliminating time-consuming manual sorting.



Machining without scratches and pressure marks	Scratch-free processing is an important factor, especially when working with stainless steel.	
	• Ball roller tables reduce scratches on the underside of the sheet. In addition to this, the use of TRUMPF adhesive pads on the punching tools is recommended.	
	• Finished parts can be retrieved manually from the sorter. This eliminates the possibility of scratches when parts fall on top of each other in the container.	
	• The programmable presser foot force adapts itself to different material characteristics (sheet steel, aluminum). The work-pieces are extremely even and free of pressure marks.	
New controller concept: open, simple, modern	The machine is equipped with an open control system to facilitate operation:	
	• Main focus is on ease of operation, activity orientation and communication.	
	• On-line help and diagnostic functions provide context-sensitive answers to your questions.	
	Easy networking with Windows standards	
	Clearly structured NC program management.	
	• Know-How is included: Technology data is provided in the form of tables.	
	Teleservice: Allows direct contact with TRUMPF Service via a modem.	
Easy to program	• Punching operations and formed sections can be positioned in the entire working range, independent of the tool position in the linear magazine.	
	• Every tool can be placed in any position of the linear magazine.	
Safety	• The TruPunch 2020 is equipped with a dual-beam light barrier as standard to keep the working area around the machine safe.	
	• Quick shutdown of the hydraulic system: the hydraulic system is switched off automatically if an irregularity occurs in the	

system.

3. Technical Data

Working range (X x Y): Max. sheet format	2500 x 1250 mm (10' x 5')
Capacities: Max. sheet thickness Max. punching capacity Max. workpiece weight Max. workpiece weight - automation unit Max. stack height - automation unit Max. headroom Programmable presser foot force	6.4 mm (0.25") 180 kN (20 tons) 150 kg (330 lbs) 2720 kg (6000 lbs) 130 mm (5") 38 mm (1.5") 4000 - 17000 N
Speeds: X axis Y axis Simultaneous (X and Y) Stroke rate - punching Increment: 1 mm (0.0394") Increment: 25 mm (0.9845") Stroke rate - marking C axis	90 m/min (2400 ipm) 60 m/min (3600 ipm) 108 m/min (4300 ipm) 900 strokes/min 420 strokes/min 2200 strokes/min 3 rotations/s
Linear magazine: Number of tools Number of tools when using MultiTool (2 clamps) Rotation of all tools Tool change time (ca.): Single tool MultiTool Max. punch diameter: Single stroke Standard MultiCut	19 19 to 190 360° 3.5 s 0.9 s 76 mm (3") 200 mm (8")
Programmable parts chute: Max. part size	200 x 200 mm (8" x 8"), sortable into 2 containers
Accuracy ¹ : Positioning accuracy Mean positioning variation	###0.1 mm (0.004") ###0.03 mm (0.0012")
TRUMPF CNC control: Main memory Color monitor Hard disk memory Disk drive Platform Workshop programming	Basis: Bosch Type 3 64 MB 10.4" 300 MB for NC programs 3.5" PC Pentium with Windows NT ToPs 2000

In accordance with VDI/DGQ 3441, measured over a length of 1 m. The attainable accuracy in the workpiece depends, amongst other things, on the type of workpiece, its pretreatment, sheet size and its position in the work area.



Safety: Safety light barrier system	Dual-beam light barrier
Consumption values Electrical connection Electrical energy Pneumatic connection Compressed air	18 kVA ca. 9 kW 7+7 bar (100 psi) 3 Nm3/h
Dimensions and weights (ca.): Space requirements (inc. light barriers) Height Weight	6710 x 7310 mm (22' x 24') 2438 mm (86.42") 11500 kg (25353 lbs)

Tab. 1









4. Main assemblies

Machine frame



Stability	The FEM-computed, C-shaped machine frame consists of a stable weldment in one piece which is highly resistant to torsional forces. This rigidity directly influences workpiece precision.
Good accessibility	The machine is accessible from 3 sides:
	 Facilitates sheet loading and unloading.
	Facilitates tool setup.
	Short routes, easy access for maintenance.
Easy installation	The machine normally rests on 4 wedge mounts (standard).

Coordinate guide



Coordinate guide

Fig. 27026

The coordinate guide is located axially parallel to the machine table. It travels in Y axis together with the machine table.

The linear magazine is integrated in the coordinate guide. The linear magazine, with the sheet clamped in it, travels in X axis along the guideway. The sheet is positioned beneath the machining station through appropriate X and Y axis travel.

By locating the coordinate guide at the forward end of the machine, ergonomic operation, coupled with optimum material flow, has been realized. Moreover, it allows the operator to survey the work process at one glance.

Fast, easy tool setup The linear magazine has stations for 19 tools and 2 clamps along the X axis. The magazine stations can be loaded with different types of tool.

- Quick and easy set up in productive time using tool cartridges.
- Tools and clamps can be placed at any position.
- Tool cartridges and clamps are quickly inserted in the linear magazine.
- Good overview of the tools.
- Automatic verification of tool and clamp positions before the program begins.
- Tool sets are quickly loaded into the tool adapter.



Punching head



Hydraulic punching head



900 strokes/minute

Precise and maintenance-free

The electro-hydraulic ram drive, with closed loop control, permits a stroke rate of 900 hits per minute. Stroke path and punching capacity are variable. Both are optimized for the tool and material in question:

- Starting with the very first stroke, the necessary punching force is adjusted automatically for the sheet thickness and tool being used.
- The ram has a dedicated NC-controlled axis which automatically adapts the start and reversal points of ram motion to the current sheet thickness. The punch regrind length is compensated by the tool length compensation feature.
- Long hydraulic ram guidance guarantees superior accuracy.
- No wear on the drive, which is clutch-free.

• The ram guide allows off-center strain, without wear.

Autoindexation Rotation of the tool adapter allows autoindexation of all tools by 360°, so that all tools can be used at any desired angle.

Advantage:

- Minimizes the number of tools, thereby reducing the setup work involved.
- Minimizes the tool change frequency, hence higher processing speeds.

The tool adapter always rotates the shortest distance to the new position. The rotary axis, at the same time, provides the drive for tapping tools and MultiTools.

The fast C axis makes it possible to produce different threads economically.

Rapid tool change Short tool change times are a distinguishing feature of the TruPunch 2020. The tool change is monitored by sensors.

- **Spray tool lubrication** The tools are lubricated automatically; the lubrication intervals are programmable. The tool life is significantly lengthened by lubricating.
 - Active presser foot The presser foot can be programmed to either rest on the workpiece (active) or at a distance from it (passive). This allows processing not only of parts which must meet stringent requirements with respect to evenness but also permits forming operations close to holes and cutouts.



Drives

All machine drives consist of digital, three-phase servo motors from Bosch. Advantages of digital drives:

- Long service life, even under thermal stress.
- No maintenance required due to permanent magnet regulation.
- **Gantry drive** The Y axis is moved with 2 mechanically-independent motors which are synchronized and controlled by the control system.
- **High positioning speed** The compact design and the low moment of inertia of the rotor enable high dynamic acceleration.

Table system

- **Ball rollers** To reduce scratching, high-quality ball rollers are imbedded as standard into the tables along which the workpiece slides during machining.
- **High accuracy** As the workpiece rests on the machine table, it is fully supported throughout the machining operation; vibration during sheet positioning is hence reduced.
- Loading small workpieces Manual loading and unloading of the machine is a critical time factor. The TruPunch 2020 is additionally equipped with a second index pin (optional) so that smaller sheets can also be loaded easily.



Workpiece removal

Finished workpieces are either pushed out onto the hinged sorter and from there conveyed to a parts box via the left or right parts chute, or else they are unloaded as microjoint parts in the waste grid by the automation unit.



Removing a part through the left chute

Fig. 27037

Manual removal To facilitate the removal of finished parts (approx. 200 x 200 mm) lying close to the clamps, the tables pull back so that the part can be easily retrieved from the sorter. Manual removal from the sorter is particularly important when it is necessary to avoid scratches to the parts which could happen as they fall on top of each other in the parts box.



Removal of microjoint finished parts





The unloading grippers of the automation unit grip the microjoint sheet and place it onto the unloading pallet of the automation unit.



Automation unit

With the compact automation unit, raw sheets can be loaded automatically, and microjoint parts can be unloaded in the waste grid.



Sub-assemblies



Loading



In the loading operation, the suction frame removes a raw sheet from the raw sheet pallet. The double sheet detector makes sure that only one sheet is removed. The suction frame travels upwards with the sheet into the start position. The machine table moves under the suction frame. The suction frame transfers the sheet to the clamps of the basic machine, which are equipped with sensors to ensure safe transfer. There, the sheet is aligned with the aid of the index pin. The machine table moves back again. Machining can now commence. The suction frame immediately goes to collect the next sheet and returns to the start position.

Unloading



Fig. 47128

The basic machine completes the punching operation and carries the processed sheet to the unloading position above the unloading pallet of the automation unit. The unloading grippers grip the sheet while the clamps of the basic machine open. The machine table moves back. The sheet is thereby deposited on the unloading pallet. The automation unit, which has already prepared a new sheet, moves into the start position, and the loading procedure can begin again. When the maximum stack height has been reached on the unloading pallet, this can be completely removed and replaced with an empty pallet.



5. Tools

Tooling system

Fast punch machining together with a wide range of tools are the distinctive features of the TruPunch 2020.

The complete tool set is pre-assembled in a tool cartridge away Simple setup from the machine. All the operator then has to do is insert the cartridge in the linear magazine. A tool set always consists of a punch, alignment ring, die and stripper. The stripper is also termed presser foot since it also fulfills a press-down function - when activated.



Tool

Fig. 26198

During the punching stroke, the presser foot or stripper holds the Active presser foot sheet down, preventing deformation of the material.

Extensive range of tools

TRUMPF offers a wide range of standard and special tools:

Punching tools for cutting standard contours, e.g. round, square, rectangular or oblong.

- Multitools; these are multiple tools holding 5 or 10 punches each. Tool change within the MultiTool takes only 0.9 seconds.
- Slitting tools for cutting out programmed contours; these include MultiCut and Banana tools.
- Forming tools for shaping the material, e.g. beading, extrusions, threads, louvers or hinges.
- Special tools for scratch-free processing.
- Special tools for embossing and marking.
- Pushout tools.

The right punch for every application

Punches are made of high-speed steel (HSS) and can be subjected to extremely high loads. Punches come in several versions:

- Solid or multi-part: The multi-part punch consists of a punching needle and a punch chuck. The needle is simply replaced when worn.
- Flat or with shear cutting edge: Tools with a shear cutting edge are referred to as Whispertools. Noise reduction of about 50% is attained by using Whispertools.
- Uncoated or coated: TICN-coated punches are recommended especially for working aluminum and stainless steel in order to prevent cold welding and premature wear to the punch.

Longer punches

• The TruPunch 2020 can be equipped with new, longer punches. Flat punches (needle punches as well) are 3.5 mm longer than previously. "Old" punches can also be used on the TruPunch 2020.



Tool length

Fig. 19499

Regrind length compensation

The cartridge is fitted with a magnetic plate on which the actual tool length can be marked with a wipe-off felt pen. If the punch with alignment ring is temporarily removed from the cartridge, the magnetic plate can also be affixed to the alignment ring. The information about the tool length thus remains "stored" with the tool.

TRUMPF MultiTools (optional)

New MultiTools were developed for the TruPunch 2020 which:

- Can process sheet thicknesses of up to 4.5 mm.
- Contain more single tools.
- Are characterized by improved regrindability: punches can be reground by 0.5 mm, dies by 1 mm.

These new MultiTools may only be used on the TruPunch 2020, the TC 2000 R, the TruPunch 5000 and the TruMatic 6000.

Max. sheet thickness

- Steel: 4.5 mm.
- VA: 3.0 mm.

Max. regrind length

- Punch: 0.5 mm.
- Die and die plate: 1 mm.

5-station MultiTool



5-station MultiTool

Fig. 17986

Max. punch diameter

D = 16.0 mm

Die 5 individual inserts

Stripper St

Standard stripper: 5 holes of diameter 17 mm Contour stripper: 5 cutouts corresponding to the punch geometries + 0.5 mm on circumference.



10-station MultiTool



10-station MultiTool

Fig. 17985

- Max. punch diameter D = 10.5 mm.
 - **Die** 10-station cutting plate.
 - **Stripper** Standard stripper: 10 holes of diameter 11.5 mm. Contour stripper: 10 cutouts corresponding to the punch geometries + 0.5 mm on circumference.



6. Control technology

Open control system	With the Bosch Type 3, the TruPunch 2020 has a modern, open
	control system. The user interface is a TRUMPF development
designed with the operator's needs in mind.	

New operating concept The operator should be able to enjoy his work at the machine in a stress-free environment. Based on these considerations, suitable operator prompting and workplace concepts have been implemented.

The user interface is totally activity-oriented, independent of the functional structure of the control. In every area of operation, menuguided functions are offered for executing the desired functions. The graphic interface conforms to Windows standards.

Just a few keystrokes are needed to activate all user functions required in day-to-day operation. Production can be up and running in no time at all as the operating personnel does not need lengthy training periods or knowledge of the entire functional capabilities of the controller.

Wherever necessary, the control offers functions from another area of operations without interrupting the current cycle (e.g. tool setup during production). It is no longer necessary to jump back and forth between different "classical" control operation modes.

Integrated on-line help can be consulted for context-sensitive information and explanations whenever required.

Workplace ergonomics The ergonomically designed control panel ensures that the workstation is also visually appealing.

The radiation-free TFT (Thin Film Transistor) color display is the visual interface to the control and provides a sharp, high-contrast picture from any angle.

The operating keys are arranged according to ergonomic and functional considerations. Protected by a drawer, a complete ASCII keyboard is available for data input.

Enhanced diagnostics The open control makes possible a new diagnostic concept. Errors in the operational sequence are detected by sensors and can be called up for viewing at the screen by pressing the Diagnostic button. The error location is displayed in graphic form; the measures needed to eliminate the fault are described in clear text.





Fast data access The new open control system also offers new possibilities for data exchange. The TruPunch 2020 has a 3.5" disk drive as standard. On-line data transmission between programming system and machine via network is another option for data exchange.

- Easy handling.
- Fast data transmission.
- Low-cost solution using standard Windows networking components.
- Different network drives can be accessed from the machine.
- **Teleservice** Our warranty services include Teleservice. During the warranty period, the modem and software is placed at your disposal free of charge by TRUMPF.

7. Shopfloor programming: ToPs 2000

	ToPs 2000 is the workshop edition of TruTops Punch and is part of the standard delivery extent. The basic concept here is: One system for both shopfloor and office.
	TruTops Punch is used for programming in the office. It is supplemented by ToPs 2000, the "scaled down" workshop edition. ToPs 2000 is designed for the programming of simple parts.
Key features	Program a simple part quickly in the shop.
	• Nest parts on sheets or remainder material directly at the machine.
	• The same data is used throughout (office - workshop).
	It goes without saying that TruTops:
	Can be programmed parallel to production.
	Offers simple, clear user guidance.
	• Operation is effected with the mouse integrated in the control.
	The aim is to keep ToPs 2000 simple. The following functions are supported only by TruTops Punch: all types of nesting, common slitting cuts, some types of forming, various sheet layout and processing strategies, CAD import.
Scope of functions	The functionality of ToPs 2000 is tailored to the needs of program- ming on the shopfloor:
	• Start ToPs 2000 via softkey Tops at the control.
	Automatic generation of single part processing.
	Sheet layout (simple multi-copies).
	Generate the NC program, with automatic optimization.

- Ready the data (TRANSFER).
- Call up the NC program and produce the parts.



Automatic single part processing



ToPs 2000: Single part processing of simple parts

Sheet layout



ToPs 2000: Simple multi-copy machining

31



8. Options

	Description
MultiTool	MultiTool with 5 or 10 single tools.
Thread former	Thread forming without cutting in mild steel, stainless steel and aluminum. Like all tools, this tool is inserted into the tool adapter. Thread forming is possible from M2.5 to M8. Lubrication occurs automatically.
Marking, quick beading	Quick, paint-resistant marking of e.g. letters or numbers using the marking tool. Beading can be carried out at a higher speed using the beading tool.
Start pedestal	The start pedestal with the 2nd start button enables a time-optimized start release for the machining of blanks.
2nd index pin	The 2nd index pin makes it easier to insert blanks manually.
Third clamp	For the secure fastening of large and heavy sheets.
Chip conveyor with container	For the removal of punching slugs and chips.
Auto-shutdown in connection with automation	Shuts down the system when the drives have not been moved for a while. Energy conservation function.
QuickMove	The QuickMove helps keep the workplace well organized and facilitates the transportation of tools.

Tab. 2



9. **TRUMPF Services**

Teleservice The open control system of the TruPunch 2020 makes it possible to connect to a telephone modem, via which an online connection between the machine control system and a service employee at TRUMPF can be established. This access to almost all functions of the control panel enables the TRUMPF service engineer to not only locate faults quickly but also to correct them directly.

Advantages and capabilities:

- Reduces machine downtime by speeding up response times.
- No expensive field service at the customer's needed to correct minor problems.
- Software updates can be made.
- Data and program files can be transmitted.
- Teleconfiguration (machine parameters, network).
- **Field service** A service engineer arrives at short notice if a service job becomes necessary at the customer's.

Service by phone Help available via telephone from the TRUMPF Service department, free of charge. Qualified personnel are available for all questions concerning the TruPunch 2020, or in the case of machine shutdown or complications. Personal advisors are appointed when the machine is delivered.

Training TRUMPF offers a comprehensive training program:

- Basic training courses.
- Technology courses.
- Maintenance courses.
- Programming courses (ToPs 2000).



