



# SMARTBENCH V1.1

## Safety Instructions

# SMARTBENCH V1.1



## Short description

The machine includes the complete mechanics for three-dimensional movement. The linear carriage-movement takes place either via rack and pinion or ball screw and are powered by stepper motors. Two motors are used on both the x and y axis with a single motor for the z axis. The activation of the stepper motors, in order to operate every single axis, is done by stepper drivers located in both the lower x beam and the Z Head. To cut the work piece SmartBench uses either a 800W 110V or 1050W 230V single phase spindle.

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## 2 General

This instruction provides guidelines which enable a safe and efficient handling of SmartBench. The manual is an integral part of the machine and must be kept in the immediate vicinity of the machine and accessible at any time for the personnel.





Before starting all tasks, personnel must carefully read and understand these instructions.




Adherence to all the specified safety instructions and instructions for actions in this operating manual is a fundamental requirement for working safely. Furthermore, the local accident prevention regulations and general safety conditions for the application of the machine are also applicable.

Illustrations in this manual are intended to facilitate basic understanding and may differ from the actual design. Further guidelines regarding built-in components are found in the appendix of this description.

### 2.1 Symbol description

**Safety instructions are designated by symbols. In addition, there is always a signal word heading the information indicating the severity of the danger or hazard that may be encountered.**

 A blue square icon with a white lowercase letter 'i' inside, representing an information symbol.	<b>HINT:</b> Indicates a potentially hazardous situation which, if not avoided, could result in property damage or environmental contamination.
 A yellow triangular warning symbol with a black border and a black exclamation mark in the center.	<b>WARNING:</b> This signal word and symbol indicates a risk which can lead to severe injury or even death, if not avoided.
 A yellow triangular attention symbol with a black border and a black exclamation mark in the center.	<b>ATTENTION:</b> This signal word and symbol indicates a risk which can lead to small injuries, if not avoided.
 A red triangular danger symbol with a white border and a black exclamation mark in the center.	<b>Danger:</b> This signal word and symbol indicates a risk which can lead to severe injury or even death, if not avoided.

	<p><b>Prohibition for people with pacemakers</b> This sign stands for activities involving risks for people with pacemakers. These areas are prohibited for people with pacemakers!!</p>
	<p><b>Warning of hazardous electrical voltage</b> This sign stands for activities on all components carrying live voltage.</p>
	<p><b>Danger due to hot surface</b> This sign stands for activities involving contact with hot objects.</p>

## 2.2 Limitation of Liability

All data and notes in these instructions were prepared with consideration to the statutory standards and regulations, the present state of technology, as well as our many years of knowledge and experience.

Under the following circumstances the manufacturer will not assume any liability:

- Non-compliance with these instructions
- Used other than for the intended purpose
- Unauthorized or unapproved personnel
- Unauthorised rebuilds or modifications
- Unauthorized technical changes
- The use of unauthorized replacement parts or non-original accessories

The actual scope of delivery can, by special designs, deviate from the explanations and presentations given here, because of the utilization of additional order options, or because of the most recent technical changes.

The responsibilities agreed in the delivery contract, the General Terms and Conditions as well as the delivery conditions of the manufacturer and the statutory regulations valued at the time of conclusion of the contract are effective.

## 2.3 Copyright

The contents of this instruction are copyrighted. It is to be used for the purpose of operating the machine, only. Any other use without a written permission is forbidden.

## 3 Safety

This section gives an overview of all-important safety aspects for optimum protection of the personnel, as well as for the safe and fault-free operation. Other task-based guide-lines are included in the sections regarding the individual phases of life.

### 3.1 Intended use

SmartBench is exclusively used for holding provided tools that serve to process various materials and surfaces.

Intended use also includes compliance with instructions specified by the manufacturer concerning operation, servicing and maintenance. Every application in excess of the intended use and/or other use, can lead to hazardous situations and is considered misuse.



**WARNING:**  
**Danger due to misuse!**

Improper use of the SmartBench can cause dangerous situations.

- Operation outside the values specified in the section Technical data.
- Bypassing the safety devices.
- Remodelling, refitting or changing of the device or parts of it, with the intention to alter functionality or usability.
- If machining process involves flammable cooling lubricants.
- Processing light alloys such as aluminium, magnesium and titanium alloys without extraction attachments and corresponding safety measures.
- Operating the machine, although it is not in perfect condition from a technical point of view.
- Operating the machine in potentially explosive environment.

**The manufacturer shall not be held liable for any damage due to misuse of this equipment.**

## 3.2 Fundamental dangers

In following section, all residual risks are named that can still result from the machine, even when the appliance is used as intended.

In order to minimize personal injuries and property damage and avoid dangerous situations, all here mentioned safety-guidelines and those mentioned in further sections must be followed.

### 3.2.1 Hazards from electrical power

Product must be used with an earthed power supply, protected by an RCD.

#### **Electric current**



**DANGER:**  
**Life Hazard through electrical shock!!**

Touching conductive parts causes a direct danger to due to electrical shock. Damage to the insulation or individual components can mean danger to life.

- Any work required at the electrical system may only be carried out by a Yeti Tool certified electrician.
- In case of damage to the insulation, switch off the power supply immediately and have repairs carried out by a Yeti Tool supplier.

### 3.2.2 Hazards from damaged cables

ANY damaged cables **MUST** be replaced from genuine a Yeti Tool supplier, to ensure that the components meet minimum safety standards.

## 4 Technical Specifications

Before starting to work on active parts of electrical systems and equipment, establish a voltage-free state throughout the duration of the work, this must take place according to the 6 following safety regulations:

1. Activation.
2. Secure it from being switched on again.
3. Determine voltage free status.
4. Earth and short circuit.
5. Provide protection by covers or barriers for any neighbouring live parts.





6. Never attempt to bypass or de-activate fuses or cut-outs. When replacing fuses or circuit breakers make sure to adhere to the correct ampere rating. Keep moisture away from live parts.

### Stored charge



**DANGER:**  
**Risk of death due to stored voltage!**

Electronic charges could be stored in electric components that still exist after switching off and disconnecting from power-supply. Contact with these components can lead to severe injury or even death.

- Before starting work disconnect mentioned components from power-supply. Wait 10 minutes, in order to assure that the internal capacitors discharge completely.

#### 4.1.1 Dangers by mechanics

### Rotating tools



**WARNING:**  
**Risk of injury from rotating tools!**

Clamped tools such as milling spindles can lead to severe personal injury or material damage.

- Before the start of any work, ensure that all covers and protective devices are correctly installed and function correctly.
- Never touch moving tool during operating process!
- Before exchanging tools, always pull power plug of the milling motor or turn off the machine and secure against restarting.

### Axis motion



**WARNING:**  
**Risk of injury by axis motion!**

Collision by people with components of the machine (Y/ X axis, Units, turntable with work piece, tools) can cause severe injuries.

- Body parts are kept away from moving components and axis limit switches.
- Do not reach into gaps between trapezoidal screws and adjacent components.
- Do not reach into gaps between unit and Y-bridge.
- Only work on the machine when it is idle.
- Only work with personal safety equipment.

## Falling materials



**WARNING:**  
**Injuries by falling materials!**

During operation chips, tools (or parts of it) could be thrown out uncontrollably or cause severe injuries to skin and eyes.

- Wear face shield or fully closed and tight-fitting goggles, protective clothing, protective gloves and safety shoes.
- If particles enter your eyes, immediately get medical attention!

## Unexpected start-up of the machine



**WARNING:**  
**Risk of injury caused by unexpected start-up of the machine**

The machine and the used tools can start-up unexpectedly, change their direction or stop. Limbs can get trapped.

- It must be ensured that, no body parts get in the danger zone of the machine.
- Protect working area against unintentional access.

## Tools



**ATTENTION:**  
**Risk of injuries by negligent handling of tools!**

By handling tools negligent, lacerations and crushing injuries can be caused.

- Tools must be handled with care and used in accordance with the regulations.
- Take weight into account when transporting tools.
- Wear safety shoes and protective gloves.

## Sharp edges and corners



**ATTENTION:**  
**Risk of injuries by sharp edges and corners!**

Sharp edges and corners can cause abrasions and cuts on your skin.

- Working near sharp edges and corners should be done with great caution.
- If in doubt wear protective gloves.

#### 4.1.2 Dangers by high or very low temperatures

##### Hot surfaces



**ATTENTIONS:**  
**Risks by hot surfaces!**

Tools, work pieces and chips can heat up during operation. Skin contact with hot surfaces causes serious burns of the skin.

- As a matter of principle, for all tasks with tools, work pieces and chips, protective clothing and gloves must be worn.
- Before all tasks, make sure that all surfaces have cooled down to the ambient temperature.

#### 4.1.3 Risk of fire

##### Highly flammable materials



**ATTENTION:**  
**Risk of fire by highly flammable materials!**

Organic dust produced by coal or wood or inorganic dust from magnesium, aluminium, zinc or titanium can catch fire and cause severe injuries and death.

- Do not smoke within the danger zone and the immediate vicinity. Refrain from contact with open flames or sources of ignition.
- Keep a fire extinguisher at hand in the immediate vicinity of the work area.
- Do not process light alloys such as magnesium, aluminium, zinc and titanium without an extraction system and relevant security measures.
- Suspend any work activities in case of fire. Leave the danger zone until the all clear signal is given

#### 4.1.4 Radiation hazards

##### **Magnetic fields**



**DANGER:**  
**Danger to life by magnetic fields!**

Magnetic fields of step motors can cause severe injuries or death, as well as serious damage to materials.

- Persons with pacemakers must keep away from the machine! It can effectively provoke a dysfunction of the pacemaker.
- Persons with metallic implants must not be allowed in the area of the machine. Implants can heat themselves up or be drawn-in.
- Take off all metal objects (Jewellery, watches, pens etc.) before starting maintenance operation.
- No electronic equipment is to be taken into the magnetic source area. These could get damaged.
- No storage media, credit cards etc. are to be taken into the magnetic source area. Containing data may be deleted.
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#### 4.1.5 General work-related dangers

##### **Noise**



**ATTENTION:**  
**Risk of injury by noise!**

The noise levels occurring in the operating area may cause severe hearing damage.

- Always wear hearing protection when working.
- Only stay in the danger area when required.

## Dirt and objects lying around



**Attention:**  
**Risk of tripping by dirt and objects lying around!**

Soiling and objects left lying around are sources of slipping and stumbling and can cause considerable injuries.

- Always keep the work area clean.
- Remove any objects which are no longer required from the working area, especially those near ground.
- Designate tripping positions with yellow-black marker band.

### 4.1.6 Responsibility of the operator

#### **Operator**

Operator is the person who operates the machine for commercial or economic purposes or leaves the use / application to a third party and bears responsibility during the operation of the product for the protection of the user, the staff and third party.

#### **Operator obligations**

The machine is used in the commercial sector. The operator of the machine is therefore subject to the legal obligations concerning occupational safety. Apart from the safety instructions given in this manual, it is necessary to meet all safety, accident prevention and environmental protection requirements applicable to the equipment's field of use and operating site.

The following principles apply in particular:

- The operating company must inform itself about the effective industrial regulations and determine additional hazards in a risk assessment that result through the special working conditions at the place of operating the machine. He must implement this in the form of operating instructions for the operation of the machine.
- During the complete usage time of the machine, the owner must check whether the operating instructions created by him correspond with the current status of the regulations and must adapt them if necessary.
- The owner must clearly regulate and specify the responsibilities for installation, operation, maintenance and cleaning

- The operator of the machine must ensure that all persons having access to it, have read and understood these instructions. In addition, they must at regular intervals train the employees in how to deal with the machine and inform them about potential hazards.
- The operating company must provide the required safety equipment for the personnel and order to wear protective equipment.

Moreover, the equipment operator is responsible for ensuring that the equipment is always in proper technical condition.

Thus, following applies:

- The operating company must make sure that any and all maintenance intervals described in this instruction are carried out.
- The owner must arrange for all safety equipment to be checked regularly for functionality and completeness.

## 4.2 Staff requirements

### 4.2.1 Qualification

The different Tasks contained in this instruction require different qualifications auf persons that are intrusted with these tasks.



**WARNING:**  
**Risks caused by insufficient qualifications of persons!**

Insufficient qualified persons cannot assess the extent to which they represent a risk handling with the machine and therefor run the risk of injuries or death for themselves and others.

- Work on or in the unit must be done only by duly qualified staff and in full compliance with the appropriate instructions and pertinent regulations.
- Keep insufficiently qualified persons away from the work area.

Only persons of whom it may be expected that they perform their work reliably are permitted as personnel. Persons whose responsiveness is affected, e.g. by drugs, alcohol or medicines are not authorized.

In this instruction all required qualifications, for the different people, with different tasks are named:

#### **Operator**

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The operator was instructed by the operating company in a briefing about the tasks assigned to them and instructed about possible hazards because of improper conduct. Tasks, which are carried out beyond the normal operation, only are allowed to be carried out by an operator if this is mentioned in this instruction and the operating company has assigned the operator expressly.

### **Electrician**

Only a Yeti Tool trained electrician may carry out any work on the SmartBench.

### **Qualified personnel**

Qualified personnel based on their professional training, know-how and experience as well as knowledge of the applicable standards and regulations can perform assigned work activities and to detect and to avoid possible dangers on their own.

### **Manufacturer**

Curtain maintenance work is only allowed to be carried out by authorized and skilled personnel. Other personnel are not authorised to carry out these tasks. In order to carry out this maintenance work, please call our customer service!

#### 4.2.2 Instruction

The owner must train staff regularly. For record-keeping purposes, a log of training conducted must be kept with following minimum contents:









- Date of training
- Name of trained person
- Contents of training
- Name of trainer
- Signature of trained person and trainer

#### 4.2.3 Personal protective equipment

Personal protective equipment prevents from impairments with respect to the safety of personnel during work. Personnel must wear personal protective equipment while working on the machine, which are mentioned in different sections of this instruction.



#### 4.2.4 Description of personal protective equipment

	<p><b>Protective clothing</b></p> <p>Protective clothing is close fitting, with low resistance to tearing, with narrow sleeves and without protruding parts.</p>
	<p><b>Chemical resistant safety gloves</b></p> <p>Suitable chemical resistant safety gloves must be worn to protect your skin from aggressive chemicals.</p>
	<p><b>Hearing protection</b></p> <p>Hearing protection prevents irreversible damage to hearing.</p>
	<p><b>Industrial protection helmet</b></p> <p>Industrial protection helmet prevents from injuries by falling or suspended objects.</p>
	<p><b>Safety glasses</b></p> <p>Safety glasses prevent injuries in eyes from parts flying around or squirts of fluids.</p>
	<p><b>Protective gloves</b></p> <p>Protective gloves protect the hands from rubbing, abrasions, cuts or more profound injuries, as well as when touching hot surfaces.</p>
	<p><b>Protective cover</b></p> <p>Wear protective cover to protect long hair from being caught, wrapped up in, or drawn into moving parts.</p>
	<p><b>Safety boots</b></p> <p>Safety shoes protect the wearer's feet against falling objects, from being crushed, slippery surfaces and being run over by vehicles.</p>

## Safety installations



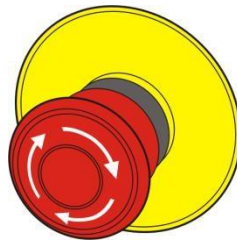
### **WARNING:**

**Malfunctioning safety installations may pose a fatal risk!**

Malfunctioning or deactivated safety installations may cause severe injuries and even death!

- Before starting to work, check all safety installations regarding their functional efficiency and correct installation.
- Never deactivate or bypass safety equipment.
- Take care to ensure that safety installations are always accessible.

### 4.2.5 Description of the installed safety installations



*Figure 1: E-Stop Button*

By pressing the emergency-stop-button ([Figure 1: E-Stop Button](#)) the machine is shut down by immediately switching off the energy supply to the machine drives. After pressing the emergency-off-button, it must be turned to be able to turn the machine on again.



### **WARNING:**

**Danger to life when unintentional switching the machine back on!**

Unintentional start-up of the machine can lead to severe injuries and death.

- Before switching on the machine make sure, that the cause of the emergency-stop is eliminated, and all safety installations are correctly installed and functional.
- Only unlock the emergency-stop-button ([Figure 2: E-Stop Button](#)) when there is no risk.

*Figure 2: E-Stop Button*



#### 4.2.6 Safety installations, which must be updated by the owning operator

##### **Extraction**

When processing light metal alloy such as magnesium, aluminium and titanium an extraction system must be installed.



##### **HINT:**

##### **Risks to human health and environment!**

Wrong handling and no extraction system can cause production of particulate matter.

Particulate matter damages mostly the airways, because it gets inhaled. Following health effects related to particulate matter concentrations are generally known:

- Temporary impairments of the repertory
- Higher medication requirements for asthma patients
- Increased hospital admissions
- Increased mortality caused by cardiovascular problems and respiratory diseases

#### 4.2.7 Behaviour in case of fire or accidents

##### **Preventive measures**

- Always be prepared for accidents or fires!
- Keep first aid facilities (first aid box, blankets etc.) and fire extinguishers accessible at all times.

- Familiarise personnel with accident reporting, first aid and rescue equipment.
- Keep access routes clear for rescue vehicles.
- 

#### **Measures for fire and accidents**

- Cause emergency-stop by pressing emergency-stop-button immediately.
- If there is no risk for own health, remove all persons from the danger zone.
- Instigate first aid measures, if necessary.
- Call the fire brigade and/or rescue service.
- Fire: Fight fire with fire-extinguishers, if there is no risk for own health. Continue firefighting until fire-brigade arrives.
- Inform responsible persons at the place of action...
- Clear access routes for emergency vehicles.
- Instruct rescue vehicles.

#### 4.2.8 Environmental protection



HINT:

**Risk for environment caused by carelessly handled hazardous substances!**

Handling with hazardous substances can be dangerous for the environment if handled carelessly, especially when disposed wrong. This can cause severe damages to the environment.

- Please pay attention to the correct handling and disposal of below mentioned hazardous substances.
- If environmentally hazardous substances are accidentally released into the environment, take suitable measures immediately. In case of doubt inform the responsible local authority of the damage

#### **Lubricants**

- Lubricants, such as grease and oils, contain toxic substances. They must not reach the environment. The disposal must be taken place by a specialised waste management company.

#### **Gear oil**

- Gear oil contains many toxic substances. They must not reach the environment.
- The disposal must be taken place by a specialised waste management company.

## 4.3 Signage

Following symbols and signs are found in the working area. They apply to the immediate neighbourhood in which they are displayed.



**WARNING:**  
**Risk by legible signage!**

Over the years stickers and signs may become dirty or defaced in any other way; so that hazards are not recognized, and necessary operating instructions have been adhered. This is a risk of severe injury!

- Always keep safety, warning and operating instructions in a well legible condition.
- Immediately replace damaged or obliterated signs or labels.

### 4.3.1 Mandatory signs

**Take notice of instruction**



**Only use the machine after reading the instructions!**

### 4.3.2 Prohibition signs

**Prohibitions for people with pacemakers**



In the area of this sign a strong electromagnetically field is possible, which can disturb or disable pacemakers. Persons with pacemakers must not stand near the machine.

**Prohibition for people with metal implants**



Persons with metallic implants must not be allowed in the area of the machine. Implants can heat themselves up or be drawn-in by the electro-magnetically field.

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**Operation with necklace is prohibited**

Risk of entrapment or entanglement in moving parts. Take off necklaces before entering the signed area.

**Operation with tie prohibited**

Risk of entrapment or entanglement in moving parts. Take off tie before entering the signed area.

**Operation with long hair prohibited**

Risk of entrapment or entanglement in moving parts. Persons with long hair must wear a hair-net or hair cover.

**4.3.3 Warnings****Voltage**

Only skilled electricians can work in signed areas. Unauthorized people must not enter these signed working areas or open so signed cupboards.

**Automatic start**

The start of the machine in production systems is indicated by a flashing light or acoustic signal. From this moment on all works must be finished. After signalling, leave danger zone. Always maintain an adequate distance to all moving parts, risk of hands, hair and clothing being drawn in.

**Hot surface**

Hot surfaces, such as hot machine parts, container and materials, may not always be noticeable. Do not touch without protective gloves!