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General Safety & Workshop Etiquette

- In case of emergency
 - In case of **serious injury** call **112**
 - You are here : **Dachauerstraße 112h 80636 München (Munich Maker Lab e.V.)**
- The safety introduction course only covers the basics
 - If you are unsure about usage :
 - ask other members in person or in #workshop on Slack
 - Find any manuals online by googling for <machine model> manual
 - Links to helpful safety videos are found in the slide : "Links for Workshop Safety"
 - Useful information can be found on the safety printouts displayed on the wall
- Be physically up for the task
 - Don't use the machines if you had any alcohol at all or feel unwell/sick
- Be mentally up for the task
 - Do not let yourself be distracted by other members
 - Take it slow, avoid shortcuts
- Be dressed for the task, especially when working on rotating machines
 - No loose clothing (gloves, hoodie drawcords, etc)
 - No jewelry (rings, etc)
 - Tie back long hair
- Always unplug devices when changing anything on the setup
- Use dust extraction where possible
 - empty dust collector before use
 - Use dust extractor only for wood, not plastic or metal
- Before using a machine, check it for damage
- Report any problems/damage on Slack (No one will be mad, just report please)
- Use recommended PPE
- Be considerate of others

WORKSHOP SAFETY

General rules

- Read the machine manuals & safety instructions.
- If you don't know how to use a machine, check the wiki and ask in #workshop on slack before using it.
- Ensure the machine is in proper condition prior using it.
- Do not wear rings, watches, bracelets or similar objects.
- Tie long hair together.
- Wear tight-fitting clothes.
- Make sure you know what materials you are working with and if they are dangerous to the environment. Keep the room well ventilated if necessary.
- Be excellent to other users of the space: ask before doing annoying things that are loud, smelly or dusty. (See Law & Order, located outside the Workshop door)

Device	Required PPE	Required Authorisation	Comment
Angle grinder			Use working clothes resistant to grinding sparks. The workpiece must be securely clamped or otherwise secured against slipping. Keep flammable materials away. Use BOTH hands. Ensure proper ventilation.
Table circular saw		Instruction required Ask in #workshop on slack	Using the shop vacuum is required. Use the protective hood. Only use with riving knife.
Hand circular saw			Using the shop vacuum is required. Use guiding rails. Pay attention to the cable. Only use with riving knife.
CNC router		Instruction required Ask in #workshop on slack	Test emergency stop before using. Keep your body parts away from moving parts. Keep the protective hood closed while machine is working.
Grinding machines			Using the shop vacuum is required. Wear ear protection for long ongoing work. Do not use vacuum to remove dust from workpieces.
Bench grinder			Use working clothes resistant to grinding sparks.
Welding Machine			Keep flammable materials away. Check fire extinguisher before performing work. Keep the room well ventilated. Make sure other workshop users are safe.
Lathe			Do not wear gloves, rings, watches, bracelets or similar objects.
Hand Routing Machine			Using the shop vacuum is required. Use BOTH hands. Pay attention to direction and maximum speed. The workpiece must be securely clamped or otherwise secured against slipping.
Miter saw			Using the shop vacuum is required.
Jig saw			Using the shop vacuum is required. Pay attention to the cable. The workpiece must be securely clamped or otherwise secured against slipping.

Safety Equipment

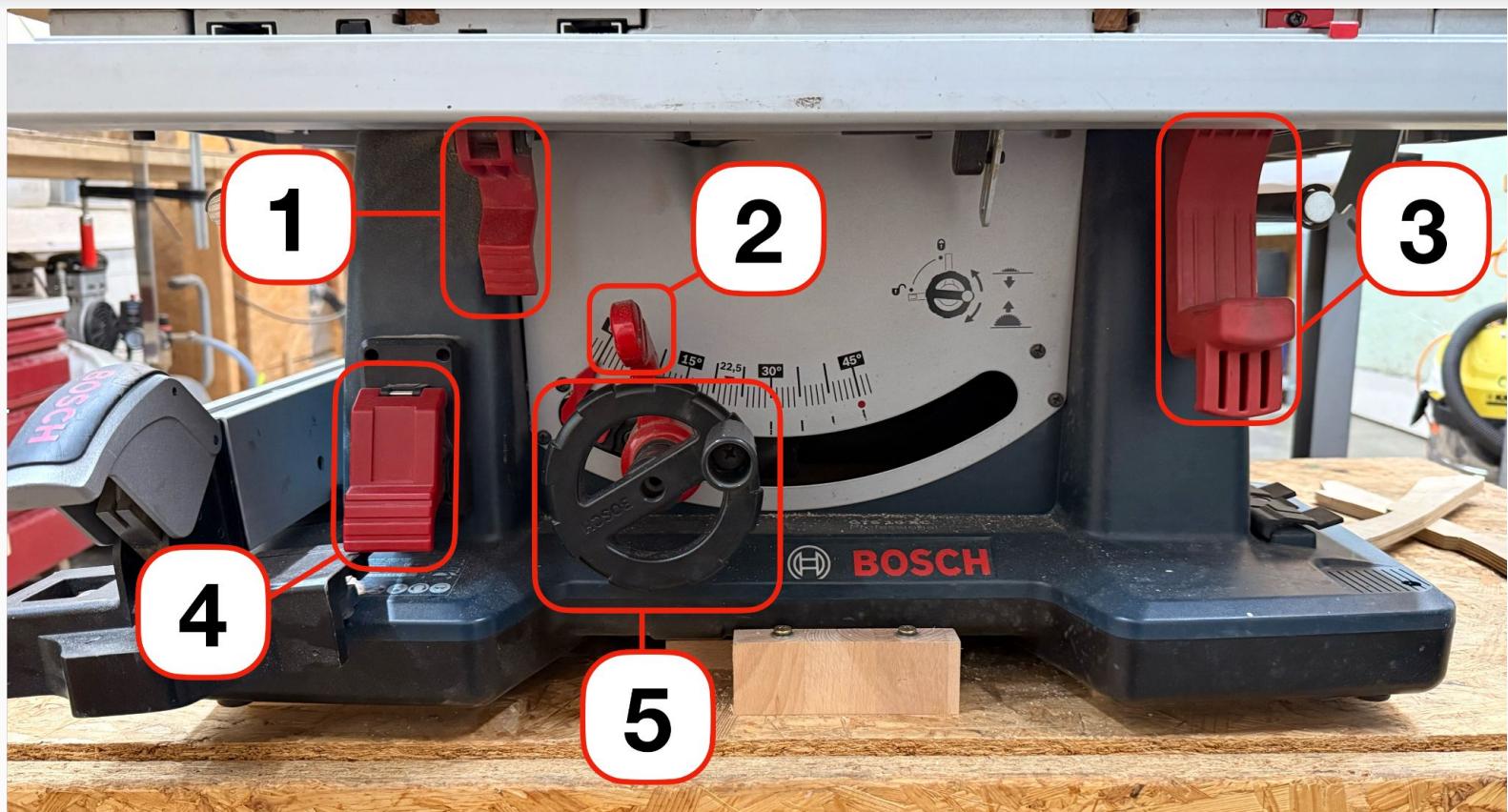
- Orange first aid box in the Kitchen
 - Items here are counted, let us know if you take something!
- Green band-aid dispenser below that, and simple first aid supplies in orange box in the workshop
 - can be used without notice
- Fire extinguishers
 - Powder in Kitchen
 - Powder next to main entrance gate
 - Foam in the Workshop
- Safety glasses
- B-Safety glasses (Mechanical impact rating 120 m/s)
 - Please use for : Table Saw, Mitre Saw, Hand Router, anything capable of throwing solid fragments at high speed.
- F-Safety glasses (Mechanical impact rating 45 m/s)
 - Please use for : tasks that produce light debris or fine particles, such as sanding, filing, or general workshop work where only low energy impacts are expected.
- Hearing protection
 - On the wall next to the safety glasses
- Dust/FFP2 masks not provided
 - Some might be for sale in MuMaExpress vending machine
- Various Gloves
 - careful, don't use gloves with rotating machines (google degloving if you are brave)

Table Saw

- Two Main Dangers:
- You cut your finger off
 - Never use gloves and mind long sleeves. If fabric gets caught by the saw blade, it can pull your hand and arm into the blade violently and cause very serious, possibly life threatening injuries
- Kickback
 - Wood gets caught in the rear part of the saw blade and is launched at you (or others) with very high force
 - This is extremely dangerous and may cause severe injuries, including ruptured internal organs or broken bones
- Checklist before use
 - Attach dust extraction (below the table, not on protective hood)
 - Ensure that all levers are in the locked position (See next slide for more detail)
 - Before cutting, do a dry run to ensure that there is enough room
 - Wood must be clear of the saw blade when turning it on
 - Never use wood that is warped, bent, or badly cracked (has internal tension)
 - Check wood for metals (nails, screws, etc.)
 - Always crank the saw-blade all the way down after use
- Correct blade height
 - Set the bottom of the gullet level with the top of the material to be cut – not only for safety, but also for optimal cutting performance and a cleaner cut.



Table Saw : controls and adjustments



1. Clamping handle for sliding table
 - a. *up = unlocked / down = locked*
2. Locking lever for setting the bevel angle
 - a. *Left = unlocked / right = locked*
3. Clamping handle for saw table expansion
 - a. *up = unlocked / down = locked*
4. On/off switch with safety switch
5. Crank for raising and lowering the saw blade
 - a. *Clockwise = blade up / Counterclockwise = blade down*

- Make sure every control and adjustment mechanism is locked before starting the table saw
- Be careful to not bruise or scratch your hand while adjusting Nr. 2

Table Saw : Kickback Checklist

- To minimize kickback risk it is required to :
- No “freehand” cuts. Always use a guide such as the rip fence, miter gauge, or a crosscut sled.
- Ensure no one walks by behind you
- Ensure workshop gate is closed
- Stand slightly to the side and not directly in front of the blade
- Never take off riving knife (Spaltkeil)
- Never touch the cut pieces until the blade has come to a full stop
- Never pull the workpiece backward while the saw blade is spinning.
 - Hold it in place with a push stick or push block, turn off the saw, and remove the workpiece only after the blade has come to a complete stop.
- Never use the rip fence together with the miter gauge, it can trap the workpiece and cause kickback.
- Mitre gauge
 - Make sure it clears saw blade

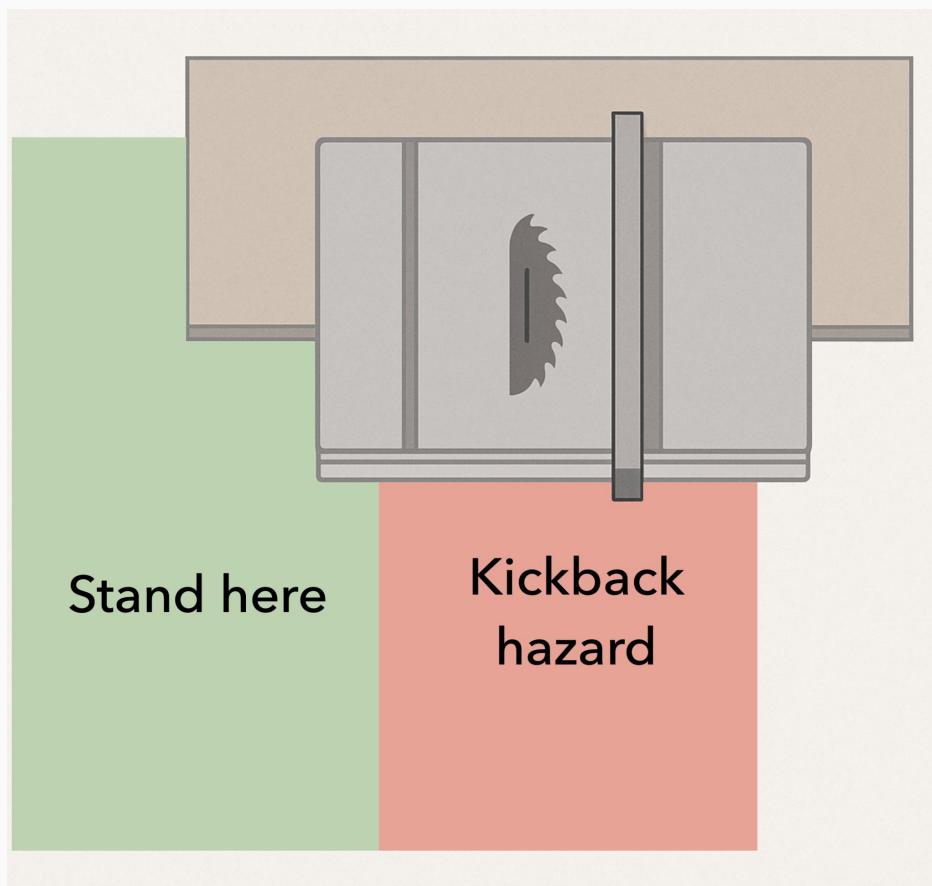


Table Saw : Push stick use

- They are in the wooden box underneath the table left to the Table saw
- Don't use the push stick too early – it can lift the workpiece off the table.
- Never push on the far right side of the workpiece (close to rip fence) – this can force it into the rear of the saw blade.

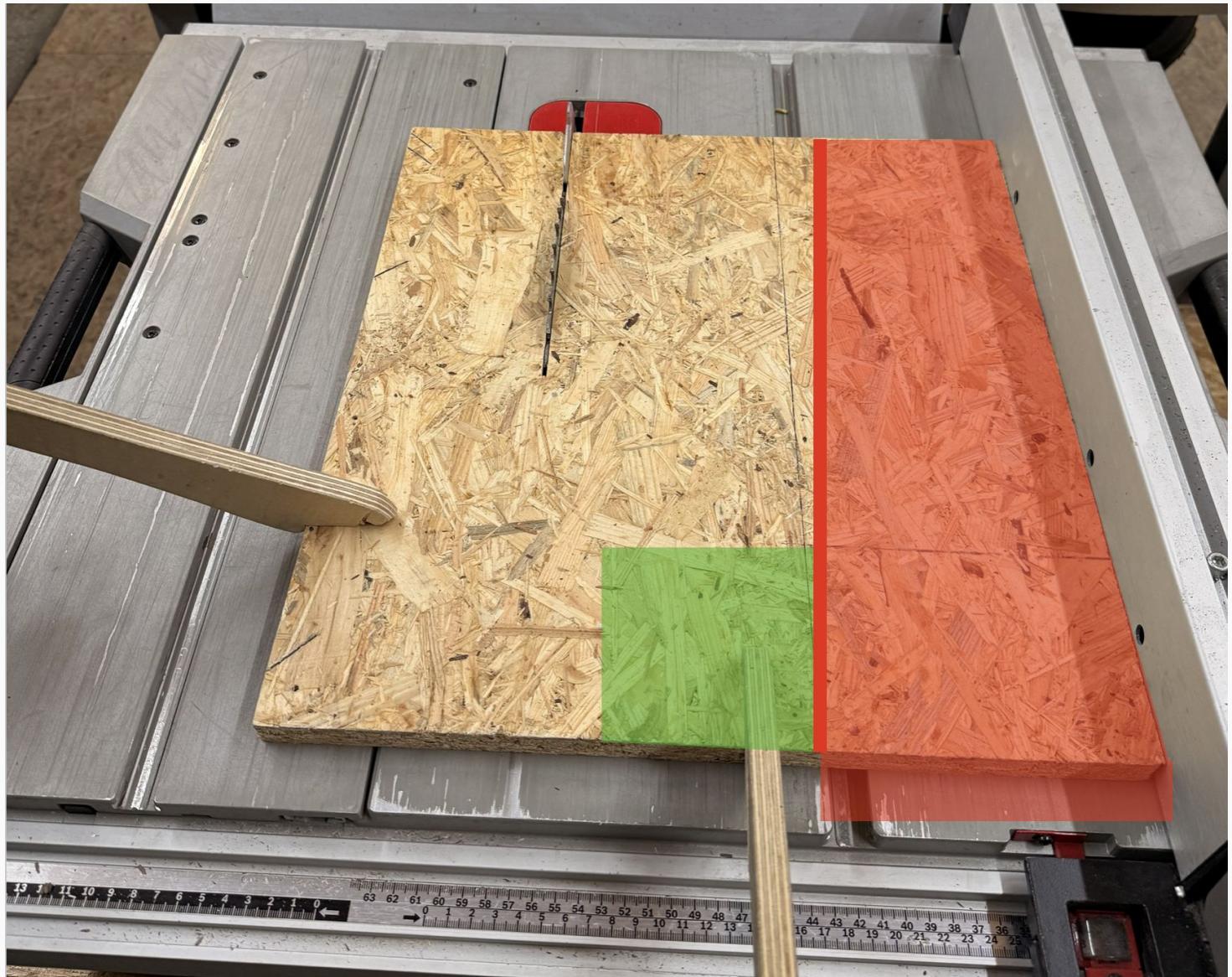


Table Saw : Push block use

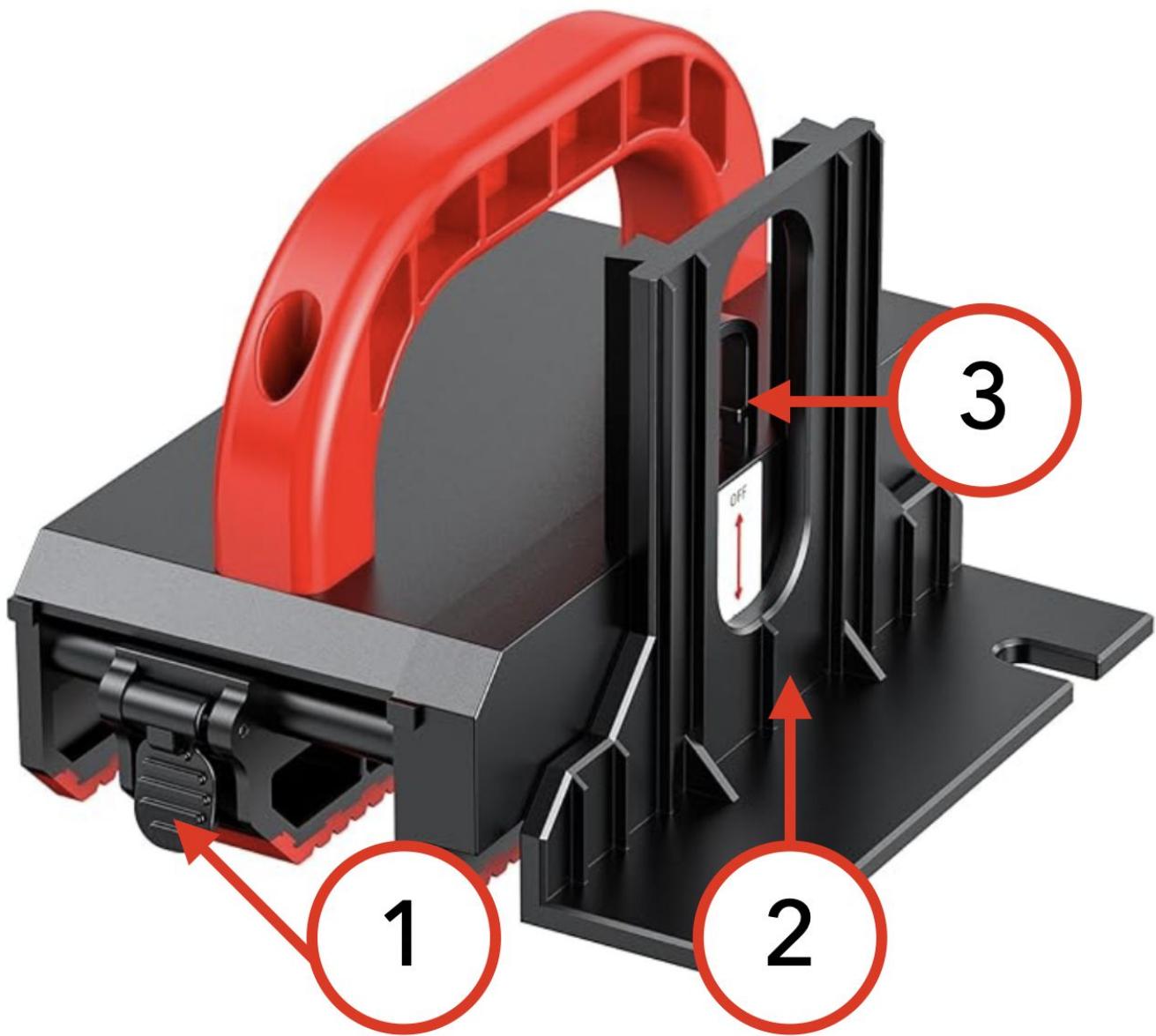
- This is a "3-dimensional" push block. Correct use pushes the workpiece in three directions: **downward → toward the rip fence → forward**. This reduces kickback risk and helps achieve cleaner, more accurate cuts.
- Always stand to the left of the cutting area while operating the table saw. Kickback risk is minimized, but never zero.
- Use in combination with rip-fence, not free handed
- Set table saw blade height properly
- Make sure the saw blade does not collide with the push block (do a dry run to check).
- Adjust the center leg with the lever (Part 1 on next page)
- with smaller pieces you can attach the "side part"
- Hand placement (typical)
 - Beginning of cut : keep your hand on the middle / rear part of the pushblock
 - End of cut : mind the sawblade emerging from your cut with your arm



- Link to how to use video : <https://www.youtube.com/watch?v=9ZdJEEyZ07w>

Push block : adjustments

- Adjust the center leg with the lever (1)
- For smaller / thinner pieces you can attach the side guide (2 ; 3)
- 1 lever for adjustable center leg
- 2 side guide
- 3 lock / unlock side guide

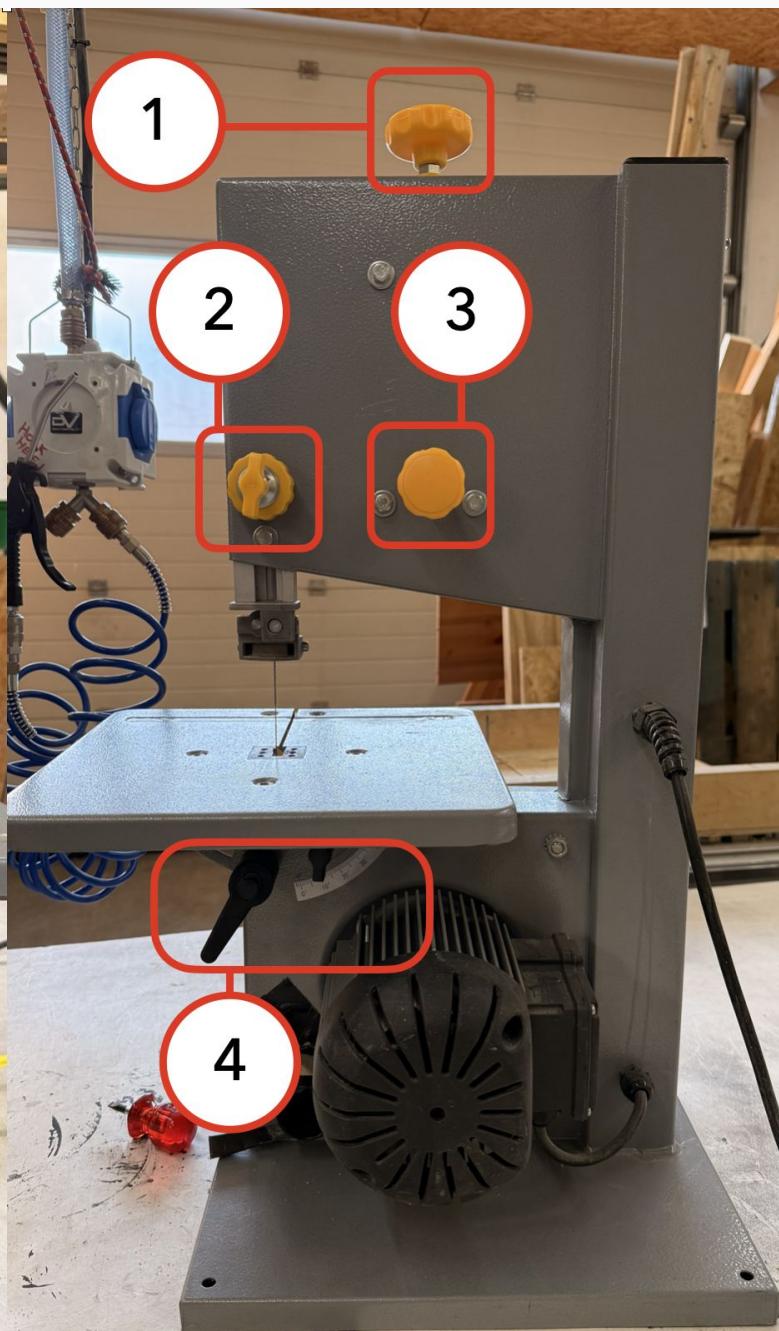


Band Saw

- How to prevent cutting off your finger :
 - don't push on the end of the work piece because the band saw blade will emerge from it.
 - use push sticks when possible
- How to prevent other injuries :
 - No loose clothing (gloves, hoodie drawcords, etc), no jewelry (rings, etc), tie back long hair
 - wear hearing protection and safety glasses (dust mask if necessary)
 - If cutting plastic or more exotic materials be aware of fumes
- Material
 - Wood (no big pieces, needs to lay stable on the worksurface)
 - hard plastics (don't use shop vacuum and be aware of fumes)
 - No metal
- Before use
 - clamp the base of the bandsaw to a table
 - check tension of band saw blade
 - make sure all adjustment mechanisms are tightened (see Bandsaw controls and adjustments)
 - lower the guide as much as possible
 - Only turn on with work piece clear of the saw blade
 - keep push stick or other cutting supports close
- Before cutting :
 - turn on machine to check if band saw blade is running smoothly
- While cutting
 - Don't cut tight turns
 - don't let the workpiece fall off the work surface uncontrolled
- the band-saw rip-fence is...

Band Saw : controls and adjustments

- 1 Bandsaw blade tension adjustment
- 2 Upper blade guide head adjustment
 - turn the locking knob to unlock the wheel underneath it
 - turn the wheel to set upper blade guide head height
 - lock again with knob
- 3 Change angle of upper bandsaw wheel
- 4 Change angle of work surface and lock it

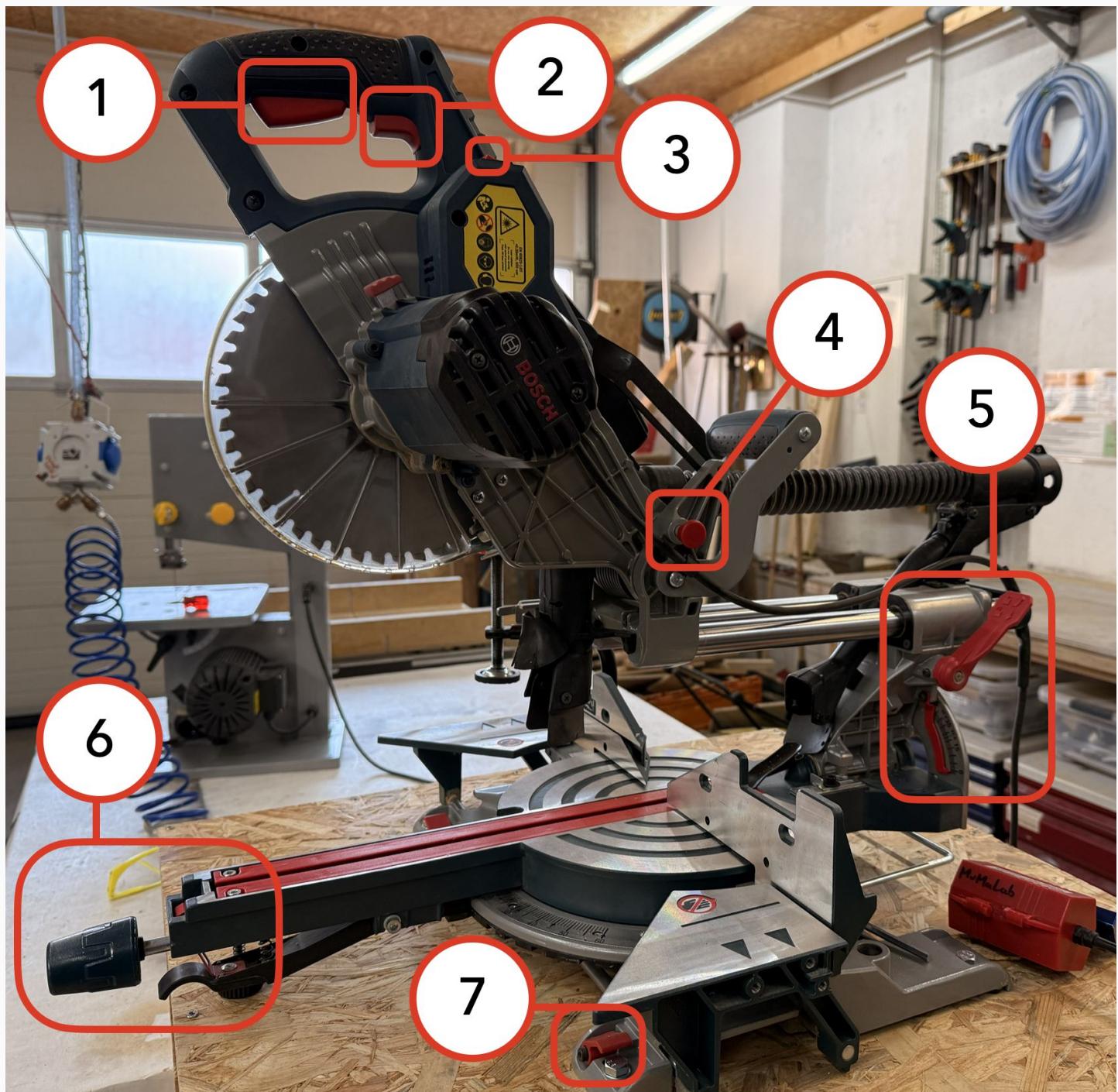


Mitre Saw

- Main dangers :
 - You cut your finger off
 - stay clear with your hands of the mitre saw work surface
 - Kickback
 - you break your finger or cut yourself
- Prevent kickback
 - don't cut too fast
 - let the mitre saw spin up (\approx 4 sec.)
 - don't raise the blade up to fast (especially if you use a stop block)
 - make sure workpiece is secured properly (material clamp and supported by both fences)
 - see "before cutting"
- Before use
 - make sure all adjustment mechanisms are locked
 - connect chip and dust extraction
 - wear hearing and eye protection
 - No loose clothing (gloves, hoodie drawcords, etc), no jewelry (rings, etc), tie back long hair
- before cutting
 - make sure fence is not in the way of the saw blade
 - secure workpiece at least with the material clamp
 - make sure workpiece is firmly pressed against the fence
 - Longer or larger workpieces require additional support to prevent them from being caught by the saw blade or moving or falling uncontrollably
- while cutting
 - if something goes wrong while cutting,
 - still do not put your hands on the mitre saw work surface
 - stop the cut and turn off saw
- Materials
 - Only wood, no metals
 - no really small work pieces
 - No warped or bend wood
 - check for nails, screws or other metals
- Always : if it doesn't feel right in the gut, don't make the cut.

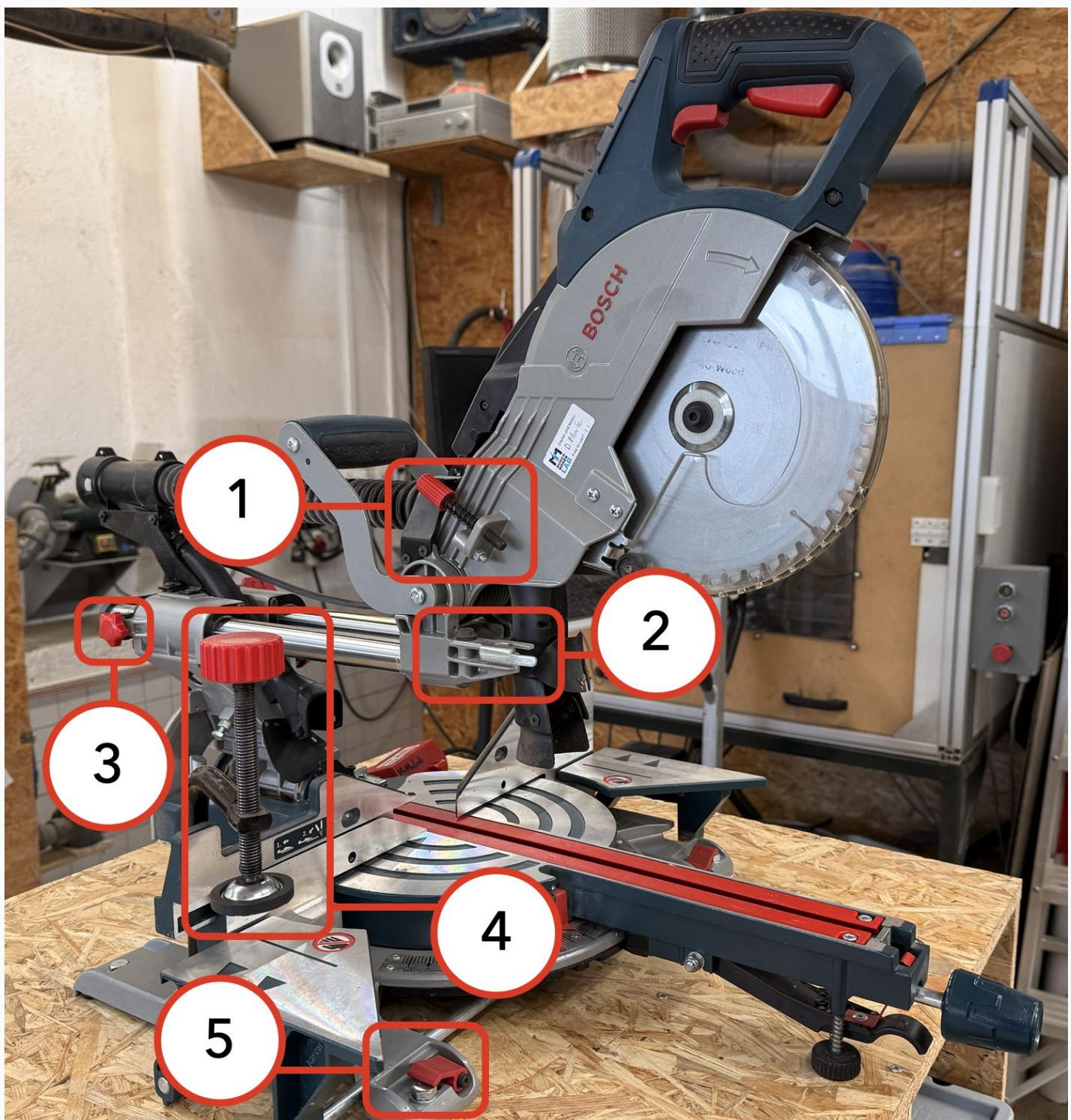
Mitre Saw : controls and adjustments right side

- 1 Locking switch for releasing the tool arm
- 2 On/Off switch saw blade
- 3 laser on / off (don't look directly into the laser)
- 4 transport lock
- 5 Clamping lever for bevel angle and Scale for bevel angle
- 6 Locking knob for various mitre angles and mitre detent lever
- 7 Clamping lever of the saw-table extension right side



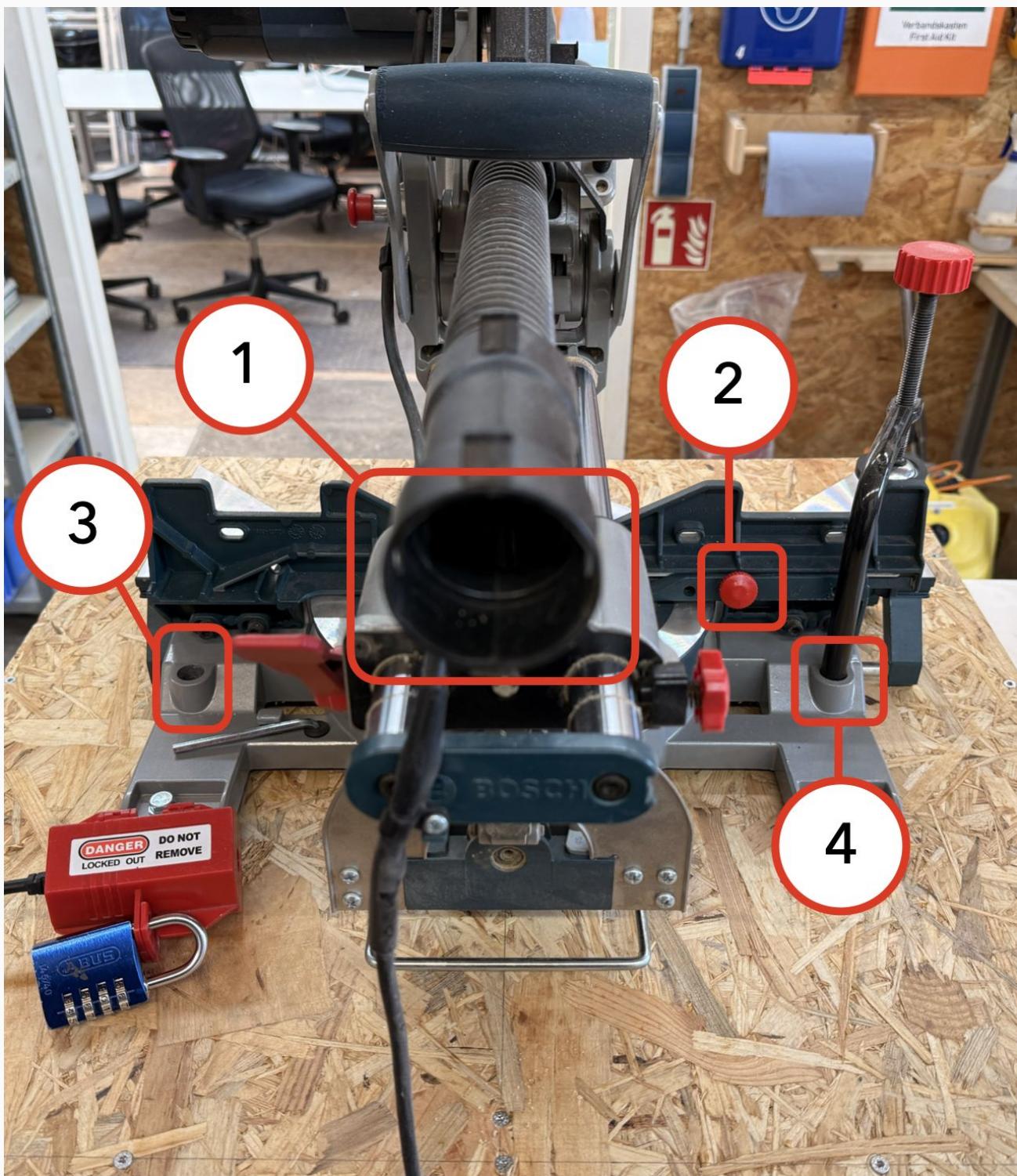
Mitre Saw : controls and adjustments left side

- 1 Adjusting screw of depth stop
- 2 Depth stop
- 3 Locking screw for slide device
- 4 Material clamp
- 5 Clamping lever of the saw-table extension left side



Mitre Saw : controls and adjustments back side

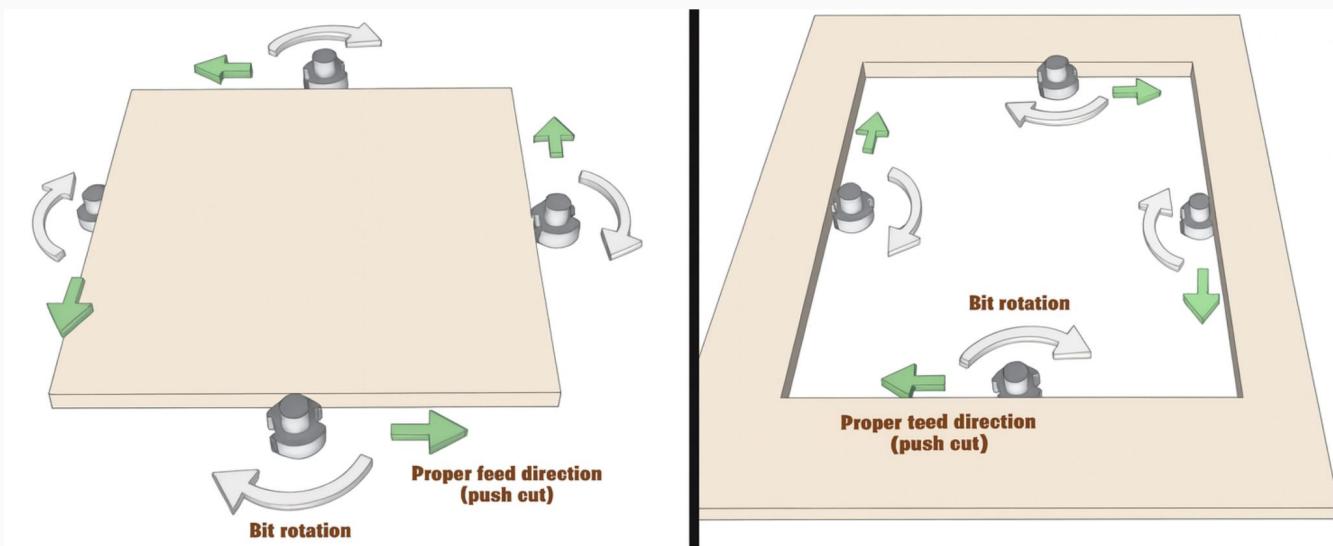
- 1 Chip and dust ejector, vacuum connection
- 2 Locking screw of the adjustable fence
- 3 Mounting hole for material clamp
- 4 Mounting hole for material clamp



Hand Router

- Observe the “K” marker for correct clamping depth
- Each bit has its own speed, see back of the box and specification on the Hand Router
- Do not overtighten the collet (Spannzange)
- Do never get on eye level with the router bit, it can „explode“
- always secure workpiece with at least two points of fastening
- Briefly check that the bit spins correctly and stable by holding the router away from your body and starting it slowly.
- Check wood for any metal inlays or embedded objects.
- Remove material in smaller passes, avoid taking too much at once, especially with hardwood.

- Push cuts



- Perform push cuts – they are safer and help prevent slipping, kickback, and heat buildup on the router bit.
- Climb cuts (moving the bit in the opposite direction of a push cut) can be useful or sometimes necessary, but they should only be performed with caution and appropriate skill.

Links for Workshop Safety

- Table saw safety
 - <https://www.youtube.com/watch?v=LLvXrmLLvKs>
 - Basics how to cut from 6:18 min
- Handrouter safety
 - <https://www.youtube.com/watch?v=mcLBmdYs5iU>
 - Cut direction from 2:35 min
- Miter saw safety
 - https://www.youtube.com/watch?v=gP6YMkx_Rn4
 - Crossing arms from 5:30 min
- Push block use
 - <https://www.youtube.com/watch?v=9ZdJEEyZ07w>