B

Drilling Techniques and Speed Chart for

PILLAR DRILL

DO NOT use this machine unless you have been instructed in its safe use and operation and have been given permission

Personal Protective Equipment and Clothing


Safety glasses must be worn at all times in work areas.


Long and loose hair must be contained.


Hearing protection must be worn.


Dust mask or other appropriate respiratory protection must be worn


Close fitting/protective clothing must be worn.


Rings and jewellery must not be worn.

PRE-OPERATIONAL SAFETY CHECKS

- ✓ Double check the condition the drill has been left in, including but not limited to: the power supply, the switch and other controls, the handle, and the chuck.
- ✓ Fully understand and map out the task you wish to accomplish.
- ✓ Ensure that you are about to use the correct bit and drilling speed (refer to the Pillar Drill Speed Chart located overleaf).
- ✓ Before powering the drill, check and double check that the belts within the drill are not loose and are in the correct position.
- ✓ Check that the bit is installed tightly within the chuck.
- ✓ Always make sure to wear the relevant PPE associated with the drill.
- ✓ If you are in any way unsure of any of the above steps, always reach out for a second opinion.

OPERATIONAL SAFETY CHECKS

- ✓ Be sure to secure your project with a vice/clamp before use.
- ✓ Make sure to use some waste wood as a back material beneath the project, to prevent damaging the drilling surface and chip-out on the underside of the project.
- ✓ Before making contact with any project with the drill, ensure that the bit does not wobble during use.
- ✓ Keep your hands clear of both the project and the drill bit during rotation.
- ✓ On deeper use, be sure to back off the project regularly to clean the bit and allow it to cool.
- ✓ Be aware of any unusual feedback from the drill (strange noises, wobble, etc.)
- ✓ Turn off the drill before changing the bit or altering the speed setting.

ENDING OPERATIONS AND CLEANING UP

- ✓ Switch off machine and perform another visual check, ensuring that no alarming wear and tear has taken place.
- ✓ Power the drill off at the mains.
- ✓ Once the bit has cooled, remove it safely.
- ✓ Ensure that the drill is put away neat and tidy.
- ✓ Clear away any waste created during use and dispose of it properly.

DON'T

- ✘ Do not use faulty equipment. Immediately report suspect machinery.
- ✘ Do not neglect to use the proper PPE, regardless of the job at hand.
- ✘ Do not leave tools unattended.
- ✘ Do not use the drill without ensuring that everybody present is wearing the relevant PPE.
- ✘ Never use the drill if you are under the influence of medication that can cause drowsiness or other side effects which could impair your motor skills.
- ✘ Do not allow anybody else to operate the drill if they are not briefed in it's safe use.
- ✘ Don't attempt to alter the speed belts inside of the drill while the drill is still receiving power.
- ✘ Do not lean in close to the drill, your face should never approach the project or the drill during use.

POTENTIAL HAZARDS AND INJURIES

- ⓘ Hearing related injuries from loud noise.
- ⓘ Cut/abrasion/puncture injury from coming into contact with the drill bit during use.
- ⓘ Cut/abrasion/puncture/impact injury if the project is not properly and securely clamped down before drilling, as it could rotate alongside the drill bit.
- ⓘ Clothing can become entangled in the drill during use.
- ⓘ Potential burn related injuries if the drill bit is handled before it has cooled.
- ⓘ Exposure to heat, dust, and potential projectiles during use.
- ⓘ The tool can be a potential electrical hazard if not maintained and handled properly.

This Standard Operating Procedure does not necessarily cover all possible hazards associated with this equipment and should be used in conjunction with other references. It is designed as a guide to be used to compliment training and as a reminder to users prior to equipment use. Users acknowledge that improper use of equipment increases their risk of harm and that this is a decision they make. Anyone found to be using equipment incorrectly will have their usage rights removed pending a re-induction on the safe use of the equipment; this may incur a charge of £10 for each induction.

A*	*For use by Lead Makers and trained staff only. Use by anyone else is strictly prohibited.*	***A***	*For use by adult members (18+) who have received and signed the specific induction package. No Lone Working.*
B	*For use by adult members (16+) who have received and signed the specific induction package. Lone Working Permitted.*	***C***	*For use by all members (6+) under the supervision of adult members/Lead Makers who have received and signed the specific induction package. Adult Lone Working Permitted*

PILLAR DRILL SPEED CHART

Recommended Drilling Speeds (RPM)							
Drill Type	**Softwood**	**Hardwood**	**Acrylic**	**Brass**	**Aluminium**	**Steel**	**Notes**
Twist Drills *							
1mm – 5mm	3000	3000	2500	3000	3000	3000	Lubricate the drill with cutting oil when drilling steel 3mm or thicker. User centre punch on all holes to prevent drill from wandering.
6mm – 10mm	3000	1500	2000	1200	2500	1000	
11mm – 15mm	1500	750	1500	750	1500	600	
16mm – 25mm	750	500	N/R	400	1000	350	
Brad Point Drills *							
3mm	1800	1200	1500	N/R	N/R	N/R	Raise 6 mm and smaller bits often to clear shavings and prevent heat build-up.
6mm	1800	1000	1500	N/R	N/R	N/R	
10mm	1800	750	1500	N/R	N/R	N/R	
12mm	1800	750	1000	N/R	N/R	N/R	
15mm	1800	500	750	N/R	N/R	N/R	
19mm	1400	250	750	N/R	N/R	N/R	
22mm	1200	250	500	N/R	N/R	N/R	
25mm	1000	250	250	N/R	N/R	N/R	
Forstner Bits							
6mm – 10mm	2400	700	N/R	N/R	N/R	N/R	Raise 6 mm - 10mm bits often to clear shavings and prevent heat build-up. Make several shallow passes with larger bits; allow bit to cool between passes.
13mm – 16mm	2400	500	250	N/R	N/R	N/R	
19mm – 25mm	1500	500	250	N/R	N/R	N/R	
28mm – 32mm	1000	250	250	N/R	N/R	N/R	
35mm – 50mm	500	250	N/R	N/R	N/R	N/R	
Multi Spur Bit *							
53mm – 101mm	250	250	N/R	N/R	N/R	N/R	Smaller sizes also available; use Forstner Speeds.
Hole Saws *							
25mm – 38mm	500	350	N/R	250	250	N/R	Do not use with brass or aluminium thicker than 1.5 mm. Avoid dense hardwoods.
40mm – 50mm	500	250	N/R	150	250	N/R	
53mm – 64mm	250 – 500	N/R	N/R	150	250	N/R	
Spade Bits *							
6mm – 13mm	2000	1500	N/R	N/R	N/R	N/R	Clamp work to table to improve quality of hole.
15mm – 25mm	1750	1500	N/R	N/R	N/R	N/R	
28mm – 38mm	1500	1000	N/R	N/R	N/R	N/R	
Spade Bits with Spurs							
9mm – 25mm	2000	1800	500	N/R	N/R	N/R	Best bit for acrylic. Clamp work securely.
Flat Bits *							
6mm – 13mm	2000	1500	N/R	N/R	N/R	N/R	Clamp to work table to improve quality of hole.
15mm – 25mm	1750	1500	N/R	N/R	N/R	N/R	
28mm – 38mm	1500	1000	N/R	N/R	N/R	N/R	
Circle Cutter							
6mm – 13mm	500	250	250	N/R	N/R	N/R	Drill one side, flip material, place centre bit in its hole and resume
15mm – 25mm	250	250	250	N/R	N/R	N/R	
Countersinks							
2 flute	1400	1400	N/R	N/R	N/R	N/R	Raise and lower frequently for quicker cutting.
5 flute	1000	750	750	250	250	250	
Countersink Screw Pilot Bits							
All Sizes	1500	1000	500	500	N/R	N/R	Clear twist drill often.
Plug Cutters							
All Sizes	1000	500	N/R	N/R	N/R	N/R	Cut to full depth so bit chamfers plug

N/R – Not Recommended

- Recommendations are based on visual and tactile tests under workshop conditions. Drilling faster than recommended can cause overheating. Speeds slower than recommended may cause poor quality holes.
- All wood testing done on face grain. Reduce speeds when drilling end grain.
- Speeds based on new bits.

*For Drill Types marked with * be sure to use extra wood as a back material to avoid chip-out.*

Trouble Shooting	
Symptom	**Solution**
Drill produces a very high pitch squeal/Drill bit becomes very hot.	Drill is running too fast.
Drill bit dulls very quickly/Drill bit becomes very hot.	Lubrication is required.
Drill bit wobbles.	Damaged drill bit/Ensure the bit is correctly positioned in the chuck.
Drill Bit skates across the metal surface.	Centre punch is too small/Smaller pilot hole is needed.
Drill Bit grabs as it breaks through.	Too much pressure/Drill is running too fast.