

## Hand and Table Router Risk

“The woodworking industry has one of the highest rates of accidents caused by contact with moving machinery. The majority of these are because of operator’s hands or fingers making contact with the rotating cutters. Analysis of accidents investigated by HSE has found that the most common causes were:

- inadequate or missing guards;
- Inadequate or lack of operator training” from HSE risk assessment of CNC routers.

It is important that before any person uses the router in any configuration that they are approved and inducted by a previously approved trainer or owner of the router.

The router may be used in one of two ways: free-hand and mounted into the router table. Since using the router free-hand would generate a large amount of dust in the air and sawdust on the ground it may not be used free-hand until this problem has been solved. However the procedure will be detailed here none-the-less.

### Procedure: free-hand

The operator loosens the collet which hold the router bits by holding the drive shaft secure and loosening the collet nut using the spanner provided with the router. In order to loosen the cutter the drive shaft and bolt are turned away from each-other. They are turned towards each-other to tighten the chuck. The operator places the router bit in the collet chuck and tightens it so that it may not come free during cutting.

The operator also attaches the cutting guard and the parallel on the router for free-hand cuts. The piece of work to be routed must be securely clamped or it should be ensured that it will not move during the cut. The router is turned on (the blade starts spinning) and the router is passed slowly and evenly from right to left against the surface to make the cut. In the case of climb cutting (not normally recommended as this may result in a poor cut finish) this direction is reversed. When the length of the piece has been cut the router is moved away and turned off. The setup procedure is reversed: parallel removed, chuck loosened, blade removed and chuck tightened. Any chippings, dust and other mess is cleaned up and disposed of.

### Hazards Identified:

1. Loosening the router chuck is fiddly using two spanners in a small space and if the chuck is stiff and the spanners slip this may in some circumstances result in getting cut by the router blade or bruising fingers on the router. This is mitigated by ensuring that the spanners provided are straight and not warped before loosening the chuck.
2. The router collet holder and nut may not compress adequately because of dirt and dust accumulating in the collet assembly. This is best addressed by checking that the collet assembly is clean before each use.
3. Electrocutation may result due to electrical contact from the interior electronics with the outside metal components. This hazard is mitigated by yearly PAT tests for electrical compliance.
4. The router blades may be very sharp and so care is needed when handling them to avoid cuts.
5. When the router is in use the blade rotates very fast and so worn cutters which maybe unbalanced or poorly loaded cutters may come free. This risk is mitigated by regular inspection of the cutters to be used, and training in the proper loading and unloading of the cutter blades.
6. If the user slips the router may tumble and in rare cases cause injury by the high speed blade

directly making contact with the operator or a nearby person. To mitigate this the operator must maintain a firm stance while using the router and maintaining a firm grip on the router. The router itself will turn off if it is dropped and so in free-hand mode the trigger must not be tampered with.

7. Loose hair, clothing and jewellery may be caught in the rotating cutter which would cause severe injury. To mitigate this risk the operator must keep long hair tied up, ensure they are wearing no dangling jewellery and that any loose sleeves or other clothes are held in place away from the router during operation.
8. The router during operation makes a lot of noise which might permanently damage the hearing of the operator and nearby people. To mitigate this risk the operator must wear ear protection and advise other users in the environment to do the same.
9. The router during operation makes a lot of chips and dust which might hit the operator or nearby users in the eyes. To mitigate this risk the operator must wear eye protection and advise other users in the environment to do the same.
10. Fingers may be placed dangerously close to the cutter blade in operation which would result in serious injury. To mitigate this risk the work piece must be only held in place with clamps and others in the workspace keep back from cuts in progress.
11. Dust and chips are created readily by routers which may harm the operator and the environment. To mitigate this risk extraction must be used if the work will create a lot of dust, or dust masks must be used but only if no-one else in the workshop will be bothered.
12. If the incorrect collet is used this heightens the risk of the router bit coming loose. This risk will only be mitigated by education of future users during training.

Risk	Severity (1-5)	Probability (1-5)	Risk factor/comment
1 – loosening router blade	1	4	4 - fine
2 – Dust build-up in collet	4	2	8 – serious risk. Requires regular cleaning of router collet.
3 – electrocution	4	1	4 - fine
4 – handling cutter	2	2	4 - fine
5– cutter coming loose during operation	4	2	8 –serious risk. Requires training and inspection of the collet assembly and cutter before each use.
6 – router being dropped	3	2	6 – requires training
7– loose hair etc. getting caught	4	2	8 – serious risk. Requires training and awareness
8 – ear damage	2	2	4 – same as with all workshop equipment more or less
9– eye damage	3	2	6 – operator <b>must</b> use eye protection and bystanders should be made aware of risk.

10– injury to fingers	4	2	8 – severe risk. Requires training, sensitivity and awareness of the surroundings.
11– Dust Control	1	5	5 – moderate risk to other users of the workshop. Needs to be controlled using appropriate extraction.
12– Use of incorrect collets.	3	2	6 – operator must select the correct collet. Confusion between 6mm and ¼inch is possible.

Control measures:

Ear protection

Eye protection

All adjustments and settings must be made with the power disconnect.

Dust extraction must be used at all times unless this will result in unsafe operation – when alternative dust control measures must be arranged.

With good training and vigilance by the owners the risk should be made as low as is practicable but it is worth stressing that a router is potentially as dangerous as any of the other tools if not treated with respect.

## Procedure: router table

This procedure is similar to that for free hand but has some key differences which will be in **bold**.

**The router is mounted into the router table and made secure with the use of the clamps on the underside. This is done before the blade is mounted and with the routed power disconnected to avoid unnecessary risk of injury.**

**The router table must be clamped to the surface it is placed on to avoid movement of the table during use.**

**A vacuum cleaner or other means of dust extraction is secured to the dust extraction port in the router table. This is important as it allows the work to be unimpeded but detritus but also maintains a dust-free environment as much as possible.**

The operator loosens the chuck which hold the router cutter blade by loosening the bolt on the drive shaft and holding the drive shaft secure with the spanner provided with the router. In order to loosen the cutter the drive shaft and bolt are turned away from each-other. They are turned towards each-other to tighten the chuck. The operator places a router bit in the chuck and tightens it adequately so that it may not come free during cutting.

**The plug from the router is plugged into the router table which is plugged into the mains in turn. This allows the router table's override switch to be used instead of the router's power switch. The operator must make sure the override switch is kept off.**

**In order for the router to be used in the table the power trigger must be taped down. This is another reason why the override switch is necessary.**

**The guards on the router table must be aligned appropriately for the work piece so that they maintain pressure on the workpiece into the cutter blade.**

**The router is turned on (the blade starts spinning) with the override switch and the work piece is passed slowly and evenly from right to left against the surface to make a cut. Here push sticks must be used to keep fingers away from the router blade. When the length of the piece has been cut the router is turned off.**

**The setup procedure is reversed: power cords detached and any tape used to hold the trigger down must be removed, chuck loosened, blade removed and chuck tightened, and then the table clamps removed followed by the router removed from the table.** Any chippings, dust and other mess is cleaned up and disposed of.

**Hazards Identified:**

1. Loosening the router chuck is fiddly using two spanners in a small space and if the chuck is stiff and the spanners slip this may in some circumstances result in getting cut by the router blade or bruising fingers on the router. This is mitigated by ensuring that the spanners provided are straight and not warped before loosening the chuck.
2. Electrocution may result due to electrical contact from the interior electronics of the router or **router table with the outside metal components.** This hazard is mitigated by yearly PAT tests for electrical compliance.
3. The router blades may be very sharp and so care is needed when handling them to avoid cuts.
4. When the router is in use the blade rotates very fast and so worn cutters which maybe unbalanced or poorly loaded cutters may come free. This risk is mitigated by regular inspection of the cutters to be used, and training in the proper loading and unloading of the cutter blades.
- 5. If the work piece is not held securely with two push sticks and the appropriate guards it may be fired by the router blade across the room.**
6. Loose hair, clothing and jewellery may be caught in the rotating cutter which would cause severe injury. To mitigate this risk the operator must keep long hair tied up, ensure they are wearing no dangling jewellery and that any loose sleeves or other clothes are held in place away from the router during operation.
7. The router during operation makes a lot of noise which might permanently damage the hearing of the operator and nearby people. To mitigate this risk the operator must wear ear protection and advise other users in the environment to do the same.
8. The router during operation makes a lot of chips and dust which might hit the operator or nearby users in the eyes. To mitigate this risk the operator must wear eye protection and advise other users in the environment to do the same.
- 9. The router may be left with the trigger switch enabled which may cause the router to start up and spin the tool – resulting in injury.**
- 10. Fingers may be put into close proximity to the moving cutter blade. To mitigate this risk the operator must handle the work piece with two push sticks. One parallel and another perpendicular (towards guard/cutter blade) to the direction of the cut.**
- 11. The router may come loose during the cut if the clamps are not sufficiently tightened**
- 12. Dust buildup under collet and incorrect collet being used will increase the risk of the router bit coming loose during operation. This risk is mitigated with regular cleaning of the router and education of future users to select the appropriate cutter.**

Risk	Severity (1-5)	Probability (1-5)	Risk factor/comment
1 – loosening router blade	1	4	4 - fine

2 – electrocution	4	1	4 - fine
3 – handling cutter	2	2	4 - fine
4 – cutter coming loose during operation	3	2	6 – requires training and regular inspection of cutter blades
5 – piece being shot across room	2	3	6 – requires training and push sticks
6 – loose hair etc. getting caught	4	2	8 – serious risk. Requires training and awareness
7 – ear damage	2	2	4 – same as with all workshop equipment more or less
8 – eye damage	3	2	6 – operator <b>must</b> use eye protection and bystanders should be made aware of risk.
9 – router trigger left enabled.	3	2	6 – a trigger securing mechanism that is attached to the table must be used to ensure that the securing mechanism is removed when the router is removed from the table
10 – fingers in proximity with blade	4	2	8 – big problem and probably biggest for router in this configuration. Addressed through training and continuing emphasis on safe operation practice.
11 – router coming out of its clamps	2	2	4 - fine
12 – collet selection and dust control	4	2	8 – serious risk. Requires regular cleaning of router collet housing and education of users to select correct router bits/collet.

Control measures:

- Ear protection
- Eye protection
- Push sticks
- Router trigger retainer.

With good training and vigilance by the owners the risk should be made as low as is practicable but it is worth stressing that a router is potentially more dangerous than any of the other tools if not treated with respect.