Technical Information.

The determination of the correct speeds and feeds to be used with disposable tipped cutters cannot be given exactly as it depends on a large number of inter-related factors which vary from job to job. However, general guidelines can be given which should result in a good starting point for further refinement.

The basic starting point is to determine the cutting speed to be used. The table below shows a range of materials commonly encountered, with a range of cutting speeds for each group of materials. Where natural timbers are being used, consideration should be given to the hardness of the timber, the structure of the timber in terms of the tendency of the fibres to lift or split, the abrasive quality of the material, and so on. Your timber supplier can often give detailed information on the features of the material they are supplying and recommend suitable cutting speeds and feeds.

Man-made materials are very much more consistent in their machining characteristics and similar speeds and feeds can be used from batch to batch.

MATERIAL	CUTTING SPEED (Meters/sec)
Hardwood	60-100
Softwood	50-90
Chipboard	50-80
MDF	40-65
Plywood	50-80
Plastic laminated board	40-60

	Rotational Speed R.P.M.				
Diameter	**40M/sec**	**50M/sec.**	**60M/sec**	**70M/sec**	**80M/sec**
25	20,000	20,000	20,000	20,000	20,000
50	15,000	19,000	20,000	20,000	20,000
75	10,000	12,500	15,000	18,000	18,000
100	7,500	9,500	11,500	13,000	13,000
125	6,000	7,500	9,000	9,000	9,000
150	5,000	6,500	7,500	7,500	7,500
175	4,500	5,500	6,500	6,500	6,500
200	3,500	4,500	5,500	5,500	5,500

Important Notes.

1. The spindle speeds shown above have been rounded to the nearest 500 R.P.M.
2. On the larger diameter cutters, and the higher cutting speeds, the spindle speeds have been reduced from the theoretical value to allow for the higher stresses caused by the high rotational speed.
3. **DO NOT EXCEED THE ROTATIONAL SPEED MARKED ON THE CUTTER BODY .**

Determination of Feed Speed

The calculation of the optimum feed is dependent on a number of factors and these must be taken into consideration in order to reach a satisfactory solution. The factors affecting the feed rate will be the size and rigidity of the cutter together with the chip space available. On very small cutters, the cutting edge has limited chip space and lower rates of feed are necessary otherwise breakage will occur.

On the other hand, too low a feed rate will cause the cutter to rub rather than cut.

Machine and job rigidity is another factor which must be considered. Parts must be adequately located and rigidly held down so that cutting forces cannot move the part. This will ensure a safe operation as well as allow maximum feed rates to be achieved commensurate with the required surface finish. Low feed rates will create a better finish than high feed rates.
The proposed feed rate can be easily calculated as shown below.

Suggested Chip Thickness

MATERIAL	CHIP THICKNESS (mm / Tooth)
Hardwood	0.2 - 0.7
Softwood	0.3 - 0.8
Chipboard	0.3 - 0.8
MDF	0.3 - 0.6
Plywood	0.3 - 0.6
Plastic laminated board	0.3 - 0.7

Let N = Rotational speed of cutter in R.P.M.
Z = number of wings on the cutter.
C = Chip thickness

$$\text{Then FEED RATE in Meters /Min} = \frac{N \times Z \times C}{1000}$$

For example.
For a 2 wing cutter, rotating at 9000 r.p.m, with a proposed chip thickness of 0.3 mm, the feed rate will be:

$$\text{Feed rate} = \frac{9000 \times 2 \times 0.3 \text{ Metres}}{1000} \text{ / min}$$

$$= 5.4 \text{ Metres/ min}$$

Spindle Speeds:

The majority of our tools are marked with a maximum tool r.p.m. Therefore before mounting the tools, it is always better to compare the tool's maximum r.p.m. with the machine's r.p.m. settings. The tool MUST NEVER be run above the specified r.p.m.
Please pay particular attention to worn or damaged tooling where the damaged tool could be out of balance and therefore dangerous. Remove and replace immediately.
If in doubt, below are some general r.p.m. rules:

1 Solid carbide routers to a maximum diameter of 20 mm ..... max 22,000 r.p.m.
2 Routers with 1/2 inch or 16 mm shank with a cut diameter of 25 mm or less. .... max 18,000 r.p.m.
3 Routers with a 20 or 25 mm shank with a cut diameter of 50 mm or less ..... max 16,000 r.p.m.
4 Routers with a 20 or 25 mm shank with a cut diameter of 125 mm or less ..... max 12,000 r.p.m.
5 Routers with 1/4 inch shank with a cut diameter of 20 mm or less ..... max 20,000 r.p.m.
Please note 1/4 inch shank routers are for hand trimming only and need extra special care when setting up and using.
6 All spindle moulder cutters with a cut diameter of 125 mm or less ..... max 12,000 r.p.m.
7 All spindle moulder cutters with a cut diameter of 180 mm or less ..... max 9,000 r.p.m.
8 All spindle moulder cutters with a cut diameter of 250 mm or less ..... max 6,000 r.p.m.
9 All spindle moulder cutters with a cut diameter of 270 mm or larger ..... max 4,200 r.p.m.