

## Warranty Guide

The purpose of this guide is to enable you to advise your customer as the correct application of OKADA Working Tools and assist you to resolve complaints immediately they occur.

When a tool has apparently failed to give satisfactory service life, a visual inspection often quickly resolves the cause and saves transport costs and frustration when warranty is rejected.

### How a Demolition Tool Breaks Rock and Concrete

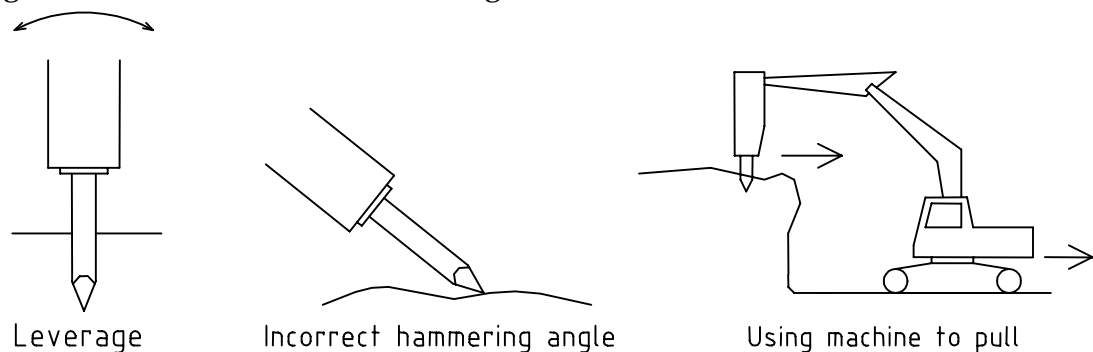
When the hammer piston strikes the top of a working tool, it sends a compressive stress wave down to the working end of the tool. Provided the working tool is in contact with the rock or concrete which requires breaking, it is this compressive stress wave which fractures the rock. Immediately following the compressive stress wave, a tensile stress wave is formed due to the hammer piston lifting from the top of the working tool. This cycle of compressive and tensile stresses flowing down the tool is repeated for each hammer blow.

Obviously, anything that interferes with the 'strength' of the compressive stress wave during service, for example 'free running' or bending of the working tool due to leverage, will result in loss of breaker efficiency of up to 80% and possible fatigue failure of the tool itself.

### Cause and Effect of Fatigue

The continuous cycle of compressive and tensile stresses in the working tool, even under correct operating conditions, create fatigue stress in the tool which can lead to the fatigue failure of a working tool before it is worn out. Again, anything which interferes with the cycle of compressive and tensile stresses will also increase the level of fatigue stress being applied to the working tool and thus increase the risk of early fatigue failure of the tool.

1. The main cause of increased fatigue stress in working tool is any form of side pressure during service which creates bending the tool as a lever, using the incorrect driving angle or attempting to break ground using the pull of the machine are all detrimental to the life of a working tool and should be avoided (see Figure 1).



**Fig. 1**

Remember, the hydraulic power available in the machine far exceeds the strength of a working tool if it is being used incorrectly and can "snap the tool like a carrot"

2. Other causes of increased fatigue stress in a working tool include:

#### a) 'Free running'

In general this is any situation where the hammer piston strikes the top of the working tool, but the working end is not in proper contact with the rock or concrete to be broken. This includes jobs where the tool slides off the work and also when break-through of thin concrete slabs or boulders occurs.

#### b) Cold

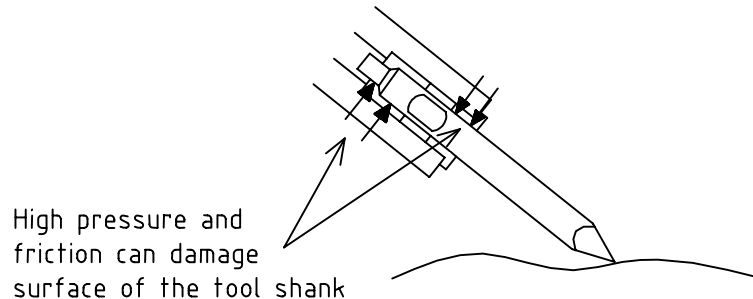
Low temperature causes a working tool to be more susceptible to fatigue failure. Tools

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should be warmed before use.

### c) Mechanical and thermal damage

Any form of damage to the surface of a working tool renders it more liable to suffer fatigue failure. Thus all care must be exercised to prevent accidental gouging, or contact welding ('galling' or 'pick up') due to contact between the tool and the bushings through the lack of lubrication or excessive bending ( see Figure 2 )



**Fig. 2**

### d) Lubrication

Care must be taken to avoid metal to metal contact that, as a result of galling or pick-up, could cause deep damage marks which, in turn, lead to the formation of fatigue cracks and eventual failure of the working tool. Ensure that the shank of the working tool is well lubricated before locating in the machine. Molybdenum bisulphide grease is recommended for this application at three hourly intervals or as per manufacturers instructions.

### e) Corrosion

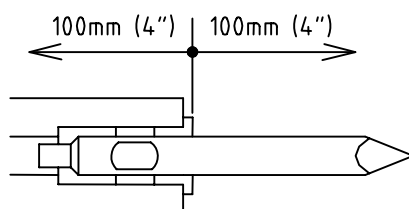
A rusty working tool is more likely to suffer fatigue failure, thus keep tools well greased and sheltered from the weather when not in use.

## Demolition Tool Fatigue Failure

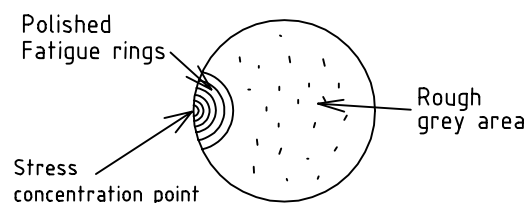
A working tool fatigue failure will generally occur approximately 100 mm (4") either side of the chuck front face ( see Figure 3 ) or through the retainer pin flat.

Another slightly less common failure area can fall approximately 200 mm (8") from the working end, subject to nature of use.

The fracture face itself will normally exhibit a semi circular polished area with the remainder being of a rougher appearance ( see Figure 4 ).



**Fig. 3**



**Fig. 4**

The polished semi-circular area in Figure 4 is the fatigue area and generally starts from a damage mark or other stress raiser on the outside of the working tool and spreads inwards. The fatigue area slowly widens until the stresses being applied to the working tool cause sudden failure of the remaining section.

Generally, the size of the fatigue area indicates the level of stress applied to the tool, i.e. the smaller the fatigue area, the higher the stress level, although it must be borne in mind that

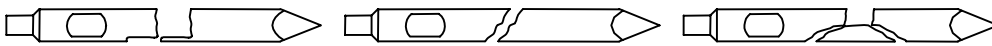
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once initiation of a fatigue crack has taken place, it requires a lower stress level to cause it to grow.

### Typical Failures ( guide to warranty claims )

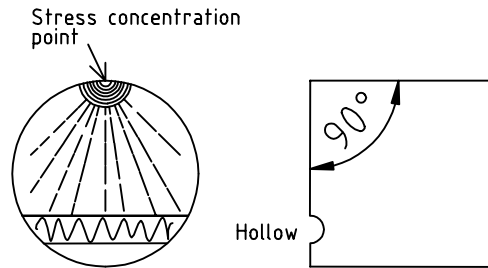
OKADA AIYON working tools are manufactured from first class materials and then heat treated to produce a fatigue and wear resistant tool. Thus when a tool has apparently failed to give a satisfactory service life, a brief visual inspection can often give a quick indication of the cause.

Fig. 5. Typical fractures caused by excessive bending of the working tool. Warranty claims rejected.



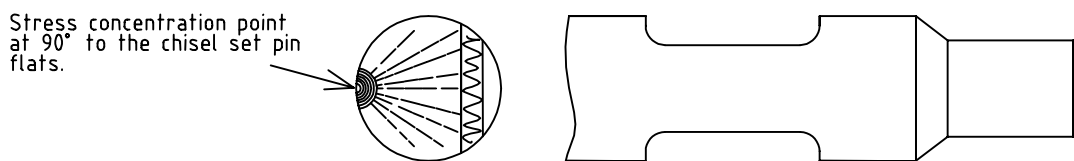
**Fig. 5**

Fig. 6. Typical of high stress fracture, usually caused by using the machine to 'pull'. Warranty claims rejected.



**Fig. 6**

Fig. 7. Typical fracture caused by levering tool while buried in the burden. Warranty claims rejected.

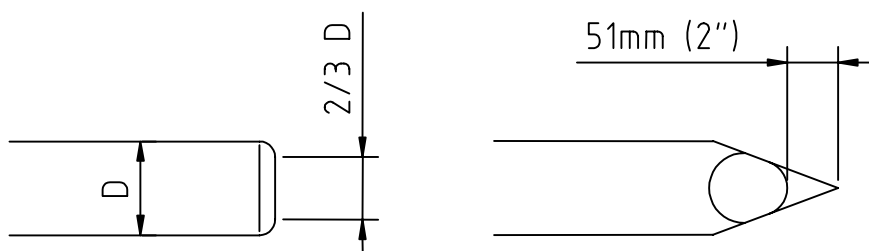


**Fig. 7**

### Wear

Wear is influenced by ground conditions, but as a general guide the following applies:

Fig. 8. Blunt tools worn more than 1/3 diameter ormoil points and chisels worn back more than 51 mm (2") of working end classed as reasonable life. Warranty claims rejected.



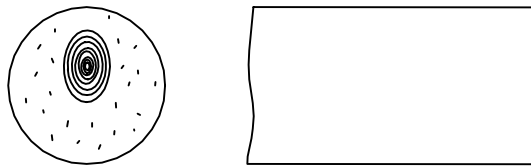
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**Fig. 8**

Fig. 9. Mushrooming; this is caused by driving the point into hard dense material for too long a period of time without penetration. This generates intense heat, softening the point, thus causing it to 'mushroom'. This is not a manufacturing fault. Warranty claims rejected.

**Fig. 9**

Fig. 10. Note fatigue lines originate from internal point, not outer diameter. Very rare failure type due to steel defect. 100% warranty accepted.

**Fig.10**