

SAFETY ALERT #351



Dated: Sunday, 18th OCTOBER 2009

Title: ABRASIVE GRINDER WHEEL FATALITY



Injuries resulting from the use of angle grinders are numerous. The most common sites injured are the head and face. The high speed disc of angle grinders does not respect anatomical boundaries or structures and thus the injuries produced can be disfiguring, permanently disabling or even fatal. The vast majority of facial injuries are associated with foreign body penetration following shattering of the abrasive wheel.

RECENTLY: A worker was using a hand-held 5-inch angle grinder while working on a wrought iron gate when the abrasive wheel broke and pieces flew off. One piece cut into the worker's thigh, severing a large artery. The worker collapsed from the blood loss and later died. The accident investigation found that the abrasive wheel that broke was rated for a maximum of 6,110 rpm but the angle grinder was rated at 10,000 rpm. As well, the abrasive wheel was larger than 5 inches in diameter, preventing the installation of the guard provided with the grinder.

CASE 1: Case 1 occurred when a left-handed, 26 year old male was injured as the blade of the angle grinder he was using shattered at high speed. He sustained deep wounds to his right upper lip, nasal base and left cheek. These wounds contained particulate matter from the abrasive wheel, requiring fastidious debridement. The wounds were debrided and closed in layers, under local anaesthetic. He recovered well post operatively and was discharged from clinic **12 months later**.

CASE 2: Case 2 occurred when a right-handed, 40 year old male was injured when the angle grinder he was using kicked back from the edge of a wooden plank. He sustained an open soft tissue wound involving the right upper lip, philtrum and nasal tip. Again the wounds were contaminated with material from the abrasive wheel and also the wooden plank. His wounds were debrided, carefully and closed in layers under general anaesthesia. He recovered well post operatively and was discharged from clinic **9 months later**.

CASE 3: Case 3 occurred when a right-handed, 43 year old male was injured when the angle grinder he was using kicked up from the edge of a flag stone. The guard had been removed from the angle grinder by his neighbour and it was not replaced prior to its use. The patient sustained a linear open soft tissue wound on the right side of his face. The wound involved the chin, lips, cheek and supraorbital ridge. Unfortunately the right globe was also penetrated. The right mandibular parasymphysis, right maxilla and right supraorbital ridge sustained bony fractures. The wounds were debrided and closed in layers under general anaesthesia. The bony fractures were reduced and fixed with miniplates (parasymphysis and maxilla only). The right globe was enucleated and the final prosthesis fitted a few months later.

Angle grinders are used around the world in large numbers to cut stone, metal and concrete. They are also used to grind pre-welded joints and remove unwanted fragments of metal or ceramics. The discs themselves rotate between 6000 and 15000 revolutions per minute, depending on the machine type and the disc diameter used. As well as facial injuries, the main injuries are to the upper limbs and, less commonly, the lower trunk. Injuries occur for a number of reasons. Firstly the wheel itself may kick back from the surface it is cutting. This will send the rotating disc toward the operator, parallel to the axis at which it is being used. Hence the face is most often at risk of a penetrating wound when looking down along the axis of the cuts being made. This risk is increased markedly if the guard has been removed. The other main reason for injury is the use of the wrong size/type of disc or a worn/chipped disc. This will increase the likelihood of excessive vibration and of the disc shattering. This usually results in foreign body type injuries.

Safe Work Practices:

- Before using a power tool; both manufacturer's guidance and national guidelines should be consulted.
- Before using a grinder, always make sure the guard is installed.
- Never use an angle grinder above chest height
- Do not remove the guard unless for maintenance. Increases personal protection from direct and foreign body injury.
- Ensure that workers are adequately trained in the safe use of grinders and that they know about rpm limitations.
- Use only abrasive wheels that match the diameter and speed (rpm) rating of the grinder.
- Use the correct disc size and replace the disc when wear is obvious or the disc is chipped. Reduces the risk of a foreign body injury as a result of disc disintegration.
- Stop using if vibration is very apparent.
- Stand perpendicular to the plane of the cutting wheel, i.e. cut in a para-coronal plane to reduce the risk of kick back towards the sagittal plane of the body.
- Always wear appropriate personal protective equipment/clothing (gloves, goggles, and hard-hat with face shield). Hearing protection and flame-resistant clothing must also be worn.

Log of all equipment used on site is to be taken - all grinders that cannot have clarified their RPM speed should be taken out of use immediately. Supervisors to check equipment prior to & during use every day. Difficult to educate workers on this & close management is critical.