James de Havilland takes a closer look at the intricacies of current machinery

The anatomy of...

Cylinder grinders

Despite the simplicity of methods employed in cylinder grinding, there remains a degree of confusion regarding spin and relief methods. What is the difference and do they matter? James de Havilland offers his thoughts on the issue.

Some points to consider when choosing a grinder.

- **Accuracy and durability.** The grinder should perform accurately for at least a decade. When choosing a grinder, find out the maintenance requirements and projected service life. Compare machine specifications and ensure the unit will meet the tolerances you demand and that these are easily achieved.

- **Coping with cooling.** Some modern cutting units use a hydraulic cooling system. If the unit is relatively new, the existing relief on the back cylinder blade is likely to have sufficient depth to be ground off. If this is not the case, a relief grind may well remain and the cutting blade will still benefit from the relief. Conversely, the relief is obviously eroded each time the cylinder is reground. It could be argued that those responsible for the sale of cylinder grinding equipment have outlined what specific tools do far more complex than it needs to be.

- **Rough mowers, for example, may have a thicker cutting edge with a reduced relief. This is to ensure the cylinder cutting edge maintains enough strength to cope with the volume of grass. With a spin grind, there is no relief cut into the back of the blade. So the cutting edge presented to the grinder is simply reground. If the cylinder is relatively new, the existing relief on the back cylinder blade is likely to have sufficient depth to be ground off. So although the spin grind will not have cut a relief, the existing relief may well remain and the cutting blade will still benefit from the relief. However, the relief is obviously eroded each time the cylinder is reground. So it follows that if the relief is removed it will need to be reground. If the cylinder is to be returned to the manufacturer for service, it is best to consider relief grinding as a separate process; its job is to cope with thicker, heavy mowing. If the blade cutting edge can be reground at the same time, then it follows that the job will be carried out faster and hence the somewhat confusing description of spin relief grinding; the grinding stones spin but the cylinder blades are ground in turn - the cylinder is not powered during the grinding process itself.

- **Relief/Relief spin grinding**

  - **Technical terms**

    - The relief on the back of a blade is cut to a specific relief angle. The relief angle will typically be set by the mower manufacturer and will range between 20 to 45 degrees. The cutting area of a given blade is often referred to as the land, so a blade with a relief that reduces the blade thickness to 1mm has a 1mm land.

  - **Spin grinding**

    - As the name suggests, spin grinding will typically sharpen the cutting edge and, assuming the blade has been set up correctly, restore the edge profile to its original angle to the manufacturer’s specification. The time it takes to do the job is influenced more by how long it takes to get the cutting unit into the grinder and correctly setting it up than the actual grinding process itself.

  - **Is a relief essential?**

    - No, but it is accepted that relief grind units will stay on cut longer than those that are spun ground. Only cylinders can be exclusively treated to a spin grind and still deliver decent performance. Manufacturer advice, however, tends to favour a relief grind for fine turf mowers, noting that with or without contact the technique reduces friction which in turn cuts heat generation which can help preserve the cutting edge for longer. Reduced friction also reduces overall wear and power consumption. The latter can help save fuel.

With thanks to Hunter Grinders – a division of 1289 Ltd. & Co of Latchworth Ltd.
Some points to consider when choosing a grinder.

1. **Accuracy and durability.** The grinder should perform accurately and maintain its cutting edge for a long period, typically at least a decade. When choosing a grinder, find out how well the machine maintains its specifications and projected service life. Compare machine specifications and ensure the grinder meets your demand.

2. **A well-managed in-house grinding station will not occupy much workshop space.**

3. **Coping with coning.** Enough settings to suit any cutting units have the cylinder ground in the frame during manufacture. During use, the cylinder can be subject to 'coning' due to metal ground out behind the blade or with an air gap. The relief helps reduce friction between the cylinder cutting edge. The relieved cutting edge retains enough strength to cope with thicker, heavy mowing. With a spin grind, there is no relief cut into the back of the blade. So the cutting edge presented to the mower manufacturer is simply reground. If the cylinder is relatively new, the existing relief on the back cylinder blade is likely to have sufficient depth not to be ground off. Although the spin grind will not have cut a relief, the existing relief may well remain and the cutting blade will still benefit from the relief.

4. **Note the gantry to facilitate the movement of Lloyds & Co of Grinders – a division of English & Co of Latchworth Ltd.**

5. **Spin grinding in action, with the cylinder in situ in the cutting unit.**

6. **The relief on the back of a blade is often referred to as the land; so a blade with a relief that reduces the blade thickness to 1mm has a 1mm land.**

7. **Step-by-step Analysis... Cylinder grinders**

   - **It could be argued that those responsible for the sale of cylinder grinding equipment have made outlining what specific tools do far more complex than it needs to be.**
   - **In very simple terms, modern golf course mowers are designed to produce a high quality of cut.**
   - **This quality can only be maintained if the cylinders – or reels – are kept not only sharp but also maintained with the correct relief on the blade or with an air gap.**
   - The relief is essentially a section of metal ground out behind the blade to reduce the actual width of the cylinder cutting edge. The relief helps reduce friction between the cylinder and bottom blade – or bedknife – where a cylinder is set to light contact.
   - The relief also provides a degree of extra clearance behind the blade that in turn can help with the dispersal of clippings; this applies to cylinders set to both contact and air gap settings.
   - The relief cut into the blade essentially reduces the cutting edge width to around 1mm; this can vary according to manufacturer specifications and type of mower.

   - **The cutting edge has been relief ground, leaving a thin 1mm thick ‘land’ on the blade.**

   - **Rough mowers, for example, may have a thicker cutting edge with a reduced relief.**

   - **This is to ensure the cylinder cutting edge retains enough strength to cope with thicker, heavy mowing.**

   - **With a spin grind, there is no relief cut into the back of the blade.**

   - **So the cutting edge presented to the mower manufacturer is simply reground.**

   - **If the cylinder is relatively new, the existing relief on the back cylinder blade is likely to have sufficient depth not to be ground off.**

   - **Although the spin grind will not have cut a relief, the existing relief may well remain and the cutting blade will still benefit from the relief.**

   - **Conversely, the relief is obviously eroded each time the cylinder is reground.**

   - **So it follows that once the relief is removed it will need to be re-ground if the cylinder is to be returned to the manufacturer’s original specification.**

   - **Although this is a simplification, it follows that the relief essentially describes the edge of the cylinder blade where metal has been removed to reduce the width of the cutting edge.**

   - **Is a relief essential?**

   - **No, but it is accepted that relief ground units will stay on cut longer than those that are spun ground only. Cylinders can be exclusively treated to a spin grind and still deliver decent performance.**

   - **Manufacturer advice, however, tends to favour a relief grind for fine turf mowers, noting that without or without contact the technique reduces friction which in turn cuts heat generation which can help preserve the cutting edge for longer. Reduced friction also reduces overall wear and power consumption.**

   - **The latter can help save fuel.**

   - **Of equal importance, a reduced land on the blade can ensure the...**

   - **Technical terms**

     - **The relief on the back of a blade is cut to a specific ‘relief angle’. The relief angle will typically be set by the mower manufacturer and will range between 20 to 45 degrees.**

   - **The cutting area of a given blade is often referred to as the land; so a blade with a relief that reduces the blade thickness to 1mm has a 1mm land.**

   - **Spin grinding**

     - **As the name suggests, spin grinding will typically sharpen the cutting edge and, assuming the grinder has been set up correctly, restore the edge profile to its original angle to the manufacturer’s specification.**

     - **The time it takes to do the job is influenced more by how long it takes to get the cutting unit into the grinder and correctly setting it up than that actual grinding process itself.**

     - **There are those that suggest a simple spin grind is always inferior to a relief/relief spin grind. This is a misleading argument because, as previously outlined, a relief may still be present following a spin grind.**

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cylinder blade to bottom blade angles are more tightly controlled for a cleaner and more consistent cut. A spin grind will typically need to be carried out more often as the cutting edge tends to dull sooner.

As with backlapping, spin grinding delivers best results if carried out little and often.

Regardless of technique adopted, the most important issue is to keep cylinders sharp. So spin grinding will always be preferred to dull cylinders.

So relief is best?

Simple answer is yes. Manufacturers put a relief on the back or trailing edge of a blade for a reason. It is not just a case of slapping on some backlapping compound, winding on a little extra pressure on the bottom blade and then running the cylinder up to speed in reverse. The job needs to be carried out according to the mower manufacturer’s instructions and performed long before the blades on the cylinder are really dull.

So it follows that grinding the bottom blade is as important as the top. The correct bottom blade ‘shear’ angle is absolutely critical to the performance of the cutting unit. The sharpest cylinders will not deliver if they are acting on a dull or incorrectly profiled bottom blade. So it follows that grinding the bottom blade is as important as honing the cylinders. Bottom blades also have a finite life, with a wear limit mark cast into many OEM designs.

Should you buy your own grinder? The view from one manufacturer, Hunter Grinders. Accepting a manufacturer will always argue in favour of buying its products, the following may help those considering grinding ‘in-house’.

Cost.

The expenses related to sending cutting units out to be sharpened will range between £100 and £150. Some units may need to be ground more than once a year due to ever increasing frequencies of top dressing applications hastening cylinder wear.

Quality of cut.

In-house grinding can help ensure units are kept in premium condition throughout the whole of the cutting season – around 80% of grinding work with third parties is carried out over winter. Owning your own machine enables grinding schedules to be timed around top dressing programs, weather patterns and competitions.

Quality of grind.

Golf courses operating their own grinding equipment will not face the same pressure to grind large numbers of units, this in turn allowing – it is hoped – far more time to be dedicated to the grinding process. Automatic grinders are offered. These make it easier to maintain repeatedly high levels of grinding performance. With your own grinder, you are in charge of your own quality control.

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