



PROBLEM SOLVING

Causes & Correction of Common Grinding Errors

Chatter

Indication	Cause	Methods of Correction
Chatter	Wheel out of balance	Re-balance wheel on own mounting. Re-balance wheel after truing. Run wheel without coolant to remove excess water. After removing wheel from machine, store on side to prevent water from settling at lower edge of wheel.
	Wheel out of round	True before and after balancing. True sides to face.
	Wheel grading too hard	Select softer grade, more open bond or coarser grit. See "Wheel Grading".
	Work centres or work rests not true or improperly lubricated	Check fit of centres and rests. Provide constant and even lubrication.
	Dressing	Use sharp diamond dresser rigidly held close to wheel.

Spirals on Work

Indication	Cause	Methods of Correction
Spirals (traverse lines) same lead on work as rate of traverse	Mis-alignment	Check alignment of head and tail stocks, also wheel head to work.
	Truing	Have truing tool set on work wheel contact line, but pointed down 3°. Round off edges of wheel face.





Wheel Grading Effect

Indication	Cause	Methods of Correction
Lack of cut; glazing; some loading; burning of work, chatter.	Wheel too hard in effect.	<p>Increase work and traverse speeds and wheel pressure (infeed).</p> <p>Decrease spindle speed, wheel diameter and width of wheel face.</p> <p>Open up wheel by sharper dressing</p> <p>Use thinner coolant.</p> <p>Avoid dwelling at end of traverse.</p> <p>Avoid gummy coolants.</p> <p>Use coarser grain size and softer grade.</p>
Wheel marks, short wheel life, not holding cut; Tapered work	Wheel too soft in effect	<p>Decrease work and traverse speeds and wheel pressure (infeed).</p> <p>Increase spindle speed, wheel diameter and width of wheel face.</p> <p>Dress with slow traverse and slight penetration.</p> <p>Use heavier coolants.</p> <p>Do not pass off work at end of traverse .</p>

Wheel Loading

Indication	Cause	Methods of Correction
Metal lodged on grains; or in wheel pores	Incorrect wheel	Use coarser grain size or more open bond to provide chip clearance. Use more coolant.
	Faulty dressing	Use sharper dresser. Dress faster. Clean wheel after dressing.
	Faulty coolant	Use more, cleaner and thinner coolant.
	Faulty operation effect of wheel.	<p>Manipulate operation to soften.</p> <p>See "Wheel Grading Effect".</p> <p>Use more in-feed.</p>





Wheel Glazing

Indication	Cause	Methods of Correction
Shiny appearance, smooth feel	Improper wheel	Use coarser grain size, softer grade. Manipulate operation to soften effect. See "Wheel Grading Effect".
	Improper dressing	Keep wheel sharp by using sharp dresser. Use faster dressing tool traverse. Allow more dressing tool penetration.
	Faulty coolant	Use less oily coolant. Use more coolant.
	Gummy coolant	Increase soda content if water is hard. Do not use soluble oils in hard water.
	Faulty operations	Use greater in-feed. See "Wheel Grading Effect"

Inaccuracies in Work

Indication	Cause	Methods of Correction
Work out-of-round, out-of-parallel or tapered	Work centres or work rests not true or improperly lubricated.	Check fit of centres and rests. Provide constant and even lubrication. Provide adequate steady rests.
	Improper dressing	Make sure machine conditions are the same at dressing point as at point of grinding position.
	Improper operation.	Do not permit wheel to pass off work at end of traverse, which causes taper at work ends. Decrease pressure, which springs work. Use harder wheel.
	Expansion of work	Reduce temperature of work by using more coolant and lighter cuts.





'Checking' of Work

Indication	Cause	Methods of Correction
Work shows check marks	Improper wheel manipulation	Prevent wheel from acting too hard. Do not force wheel into work. See "Wheel Grading Effect". Use greater and even flow of coolant.

'Burning' of Work

Indication	Cause	Methods of Correction
Work shows discolouration	Improper wheel	Use softer wheel or manipulate to get softer effect. See "Wheel Grading Effect". Prevent glazing and loading. Use more coolant.
	Faulty operation	Bring wheel to work more gradually, use less in-feed. Prevent stoppage of work while in contact with wheel.





Scratching of Work

Indication	Cause	Methods of Correction
Narrow and deep regular marks.	Wheel too coarse	Use finer grain size.
Wide irregular marks of varying depth.	Wheel too soft	Use harder grading. See "Wheel Grading Effect".
Widely spaced spots on work.	Oil sports or glazed areas on wheel face	Balance and true wheel. Avoid getting oil on wheel face.
Fine spiral or thread on work.	Faulty wheel dresser	<p>Replace cracked or broken diamonds. Use slower dressing traverse. Set dressing tool at angles of 5° down and 3° side. Turn diamond every third dressing.</p>
		<p>Tighten holder or diamond. Dress with less penetration. Do not allow tool to dwell in contact with wheel. Do not start dressing cuts on face-locate tool on face, but start cuts from edge. Make final pass in dressing in opposite direction to grinding traverse. Traverse diamond evenly across wheel face. Round off wheel edges-just chamfering or dressing back is not enough.</p>
	Faulty operation	<p>Prevent penetration of advancing or following edge of wheel by being careful to dress wheel face parallel to work. Reduce wheel pressure. Provide additional steadyrests. Reduce traverse in relation to work rotation. When making numerous passes, make slight change in traverse rate at each pass to break up pattern.</p>





Scratching of Work

Indication	Cause	Methods of Correction
Wavy traverse lines	Ragged wheel edges.	Round off wheel edges.
Isolated deep marks	Improper wheel dressing.	Use sharper dressing tools. Brush wheel after dressing using a stiff bristle brush.
	Coarse grains or foreign matter in wheel face.	Dress out.
	Bond disintegrates; grain pull out.	Coolant too strong for some organic bonds; decrease soda content.
Irregular marks	Loose dirt	Keep machine clean.
Irregular marks of varying length and width, scratches usually 'fishtail'	Dirty coolant	Clean tank frequently. Flush guards, etc, after dressing and when changing to finer wheels.
Deep irregular marks	Loose wheel flanges	Tighten flanges, using blotters
Grain marks	Wheel too coarse or too soft	Select finer grain size of harder grade wheel.
	Too much difference in grain size between roughing and finishing wheels	Use finer roughing wheel or finish out better with roughing wheel.
	Dressing too coarse	Less dresser penetration and slower dresser traverse
	Improper cut from finishing wheel.	Start with high work and traverse speeds, to cut away previous wheel marks; finish out with high work and slow traverse speeds, allowing wheel to spark out entirely.





Wheel Breakage

Indication	Cause	Methods of Correction
Radial break, three or more pieces	Excess wheel speeds	Reduce wheel speed to rated speed.
	Improper mounting of wheel	Correct improper mounting such as lack of blotters, tight arbors, uneven flange pressure, dirt between flanges and wheel.
	Over heating	Prevent overheating by using sufficient amount of coolant.
	Excessive wheel pressure	Prevent excessive wheel pressure on work.
	Jamming of wheel	Do not allow wheel to become jammed on work.
Radial break, two pieces	Excessive side strain	Prevent excessive strain on the side of the wheel
Irregular break	Wheel jamming	Do not allow wheel to become jammed on work.
	Wheel damage	Prevent blows on wheel. Do not use wheels that have been damaged in handling. Examine wheel before using. Check wheels for damage by 'ring test' or tapping.
General	Wheel arbor too tight	Do not use a wheel that is too tight on the arbor as wheel will break when started.
	Excessive wheel hammering	Prevent excessive hammering action on the wheel.





Coolants-Trouble Shooting Tips

Indication	Reason	Remedy
Excessive foam	High Concentration	* Check concentration and adjust to the recommended concentration.
	Soft Water	* Use foam depressant.
	Contamination	* Drain thoroughly and clean the reservoir. Then charge with a fresh coolant.
	Turbulence due to wrong machine design	*Modify machine design to avoid sharp corners for coolant passage. *Check to see if coolant drainline is free of all obstruction.
Corrosion of the work piece or machine	Low concentration	* Check concentration and adjust to the recommended concentration.
	Hard Water	* Check concentration of rust inhibitor.
	High chloride or sulphate content in the water	* Analyse the water and change to another product that is more compatible with these conditions.
Corrosion of the work piece or machine	High Bacteria Content	*Improve hygienic conditions, make a bacteria count and add biocide to bring the coolant to normal condition.
	Hot, humid conditions may accelerate corrosion problems	* Increase the concentration of mix. * Improve plant ventilation. * Apply suitable rust preventive.
Rancidity or Foul smell	Lack of ventilation	* Ensure coolant tank is kept open to air circulation atleast once in 2 to 3 days during long lay off or on holidays.





Coolants- Trouble Shooting Tips

Indication	Reason	Remedy
Rancidity or Foul smell	Low Concentration	*Check concentration and adjust to the recommended concentration. Supplement it with additives. (Biocide)
	Contamination	*Drain thoroughly and clean the reservoir. Then charge with a fresh coolant. * Ensure metal swarf and tramp oil is removed periodically from the coolant.
	High sulphate content	*Analyse the water and change to another product that is more compatible with these conditions.
	High tramp oil content	* Ensure tramp oil is removed regularly and add biocides.
Unsatisfactory surface finish or Bum marks on the work piece	Wrong Concentration	* Check concentration and adjust to the recommended concentration.
	Insufficient flow of coolant	*Increase the volume and readjust the nozzle so that a maximum amount of fluid reaches the metal removal area.
	Wrong direction of coolant nozzle	* Adjust the nozzle so that coolant is directed to the right spot.
	Cutting fluid is full of chips or grinding swarf.	* Check the dirt content (should not exceed 75mg/litre) * Check if filtration system is working properly. * Drain thoroughly and clean the reservoir. Then charge with a fresh coolant.





Coolants -Trouble Shooting Tips

Indication	Reason	Remedy
Unsatisfactory surface finish or Burn marks on the work piece	Water may be too hard	<ul style="list-style-type: none"> *Analyse the water and change to another product that is more compatible with hard water. * Use treated water.
Skin Irritation	High concentration	<ul style="list-style-type: none"> *Make a concentration analysis and adjust to the recommended concentration. Most frequently this is a human error or mechanical problem with the mixing devices.
	High PH (>9.5)	<ul style="list-style-type: none"> *Could be due to alkaline cleaners and or contamination. Only remedy is to flush out the contaminated coolant and use fresh coolant.
	Metal chips and grinding grit may cut the skin	<ul style="list-style-type: none"> *Repair defective filter media. *Encourage use of water proof barrier creams or protective gloves.
Eye, Nose or Throat Irritation	Operator's hand may be immersed continually in the cutting fluid	<ul style="list-style-type: none"> * Use material handling devices wherever feasible.
	High concentration	<ul style="list-style-type: none"> * Relocate workers who are allergic to some chemicals. * Make a concentration analysis and adjust to the recommended concentration. * Provide good ventilation/exhaust system in the shop floor. * Most frequently this is a human error or mechanical problem with the mixing devices.
	Excessive splashing or misting of the cutting fluid	<ul style="list-style-type: none"> * Reposition the guards on the machine to contain the splash or mist. * Encourage use of safety glasses.





INTERNAL GRINDING

<u>Source of Fault</u>	<u>Methods of Correction</u>
Spindles	: High speed internal grinder spindles of the ball bearing type are very sensitive to slight irregularities. Because of their special construction and special races and balls it is best that repairs be made only by the spindle manufacturer.
Machine Play	: Since both wheel and workheads may be of the swiveling type they must be checked for play and anchorage.
Belts	: Internal grinder belts with their high speed, short centres and small diameter pulleys must be checked frequently for oiliness, wear and tightness, slippage is an especially serious fault.
Dressing	: Faulty dressing is one of the most frequent causes of faulty grinding, short wheel life and poor finish. Keep careful watch to prevent wear in the diamond holder bearings. Because of the small size of the wheels used in internal grinding it is essential that the diamond be of proper size and maintained with a sharp point.
Wheel Characteristics	: Most internal wheels are less efficient than other wheels because of the extreme change in wheel diameters with no corresponding change in spindle speed. It is often possible to increase wheel life by using a wheel of greater width. Due to the limitations of chip clearance in internal grinding it is necessary to use coarse, open wheels.
Tapper in straight hole	: Be sure wheelhead is parallel with table travel; use softer wheel or increase work speed for softer effect; correct work or wheelhead angling; prevent gumminess of coolant; use lighter infeed; be sure wheel is dressed parallel to table travel; use harder wheel.

