

Correctly diagnosing turbo overspeeding

When a turbocharger fails, the failure is almost certainly the result of some external fault or pressures. Melett explains the causes of turbocharger overspeeding and how to diagnose them.

Common Turbo Failures

Common turbo failure modes create much discussion between customers and our technical department. To help identify common failures, and to provide advice on how to prevent future failures from occurring, we have created a series of helpful guides.

Overspeeding is a term used when a turbo is operating well above its normal operating limits.

What causes overspeeding?

The most common causes of turbo overspeeding are:

- Engine modifications, including 'chipping' or 'over-fuelling'
- Inconsistent flow of air into the turbo - this can be caused by a tear in the air hose or it becoming completely detached, or by restrictions in the air intake filter or pipe work
- The wastegate or VNT mechanism has been set incorrectly
- Worn injectors
- Installing an incorrect turbo
- Loss of signal to the SREA (Simple Rotary Electronic Actuator) for the wastegate or VNT control

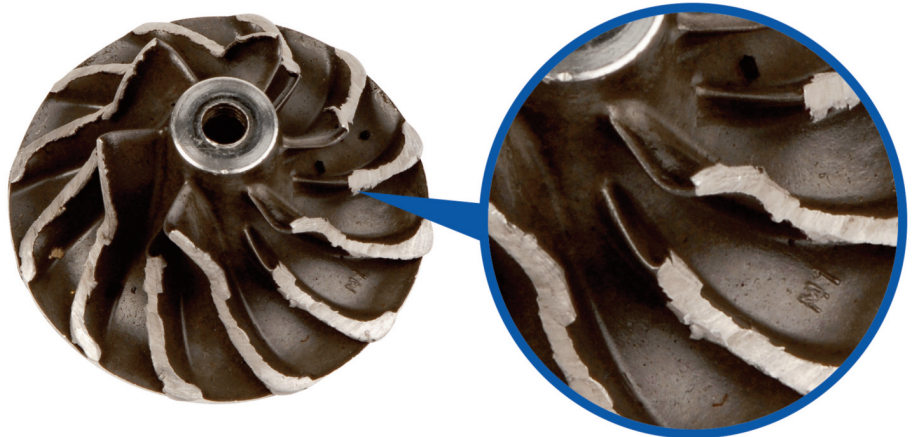
Visual effects of overspeeding

The most common visual indicators of overspeeding are:

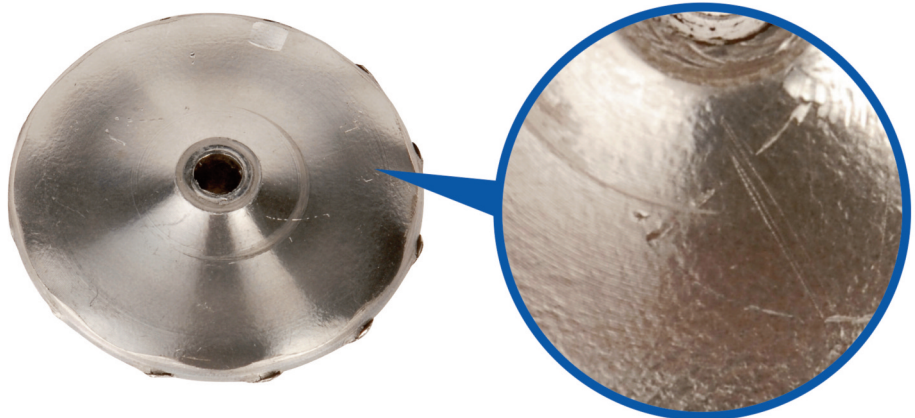
- The 'orange peel' effect
- Inducer blade damage, which can be a consequence of housing rub
- Staining due to oxidation
- Partial loss of blades
- Burst wheel

The 'orange peel' effect explained

'Orange peel' effect on the back face of the compressor wheel is created by expansion and contraction. When the compressor wheel overspeeds, it grows in size. This expansion causes cracks between the grain boundaries of the metal. In mild cases, the inducer returns back to its original state (like elastic, but in



During overspeeding, the inducer can grow in size and rub against the housing



Orange peel on the back of the inducer is another sign of overspeeding

most cases, these cracks begin to grow and eventually part of the hub can break away.)

Quite often, overspeeding is overlooked as a cause of the turbo failure, as the symptoms of other failures can occur as a result of this overspeeding. Material transfer and discolouration of parts may indicate a lack of lubrication. Scoring to parts could indicate oil contamination, however the particles that have caused the scoring could have broken away from the bearings as a result of the overspeeding and may also create an imbalance in the turbo.

This imbalance can also cause compressor rub and turbine wheel rub in the housings, which in turn can lead to the shaft snapping and loss to part of the inducer blades.

All in all, overspeeding causes a lot of damage and is often the primary failure mode. Recognising these features when diagnosing a failed turbo can save time and money.

For further information on this subject, contact Melett at: sales@melett.com.

