

SAMPLE REPORT — TURBOCHARGER FAILURE

REPORT PREPARED FOR:
EXAMPLE FLEET SERVICES (PTY) LTD

VEHICLE	PASSENGER CAR (EXAMPLE)
VIN NUMBER	SAMPLE0000000001
REGISTRATION NUMBER	SAMPLE 01
ODOMETER READING	86 500 KM

REPORT BY:
ASWANAI (PTY) LTD
14 SEPTEMBER 2026

SAMPLE REPORT — TURBOCHARGER FAILURE

INTRODUCTION

The turbocharger shaft of a passenger-car engine had fractured, parting the turbine end from the compressor end. AswanAI was asked to establish the cause of the fracture from photographs of the two shaft halves and the wheels.

This examination was conducted on the evidence of photographs and the information reported by the customer.

TURBOCHARGER EXAMINATION

Turbocharger shaft

The shaft had fractured at the reduced section immediately inboard of the turbine-end journal, as seen in photograph 1. The fracture face was transverse and coarse, consistent with a fast final fracture; a finer-textured zone at one side of the edge could not be resolved at photographic scale.

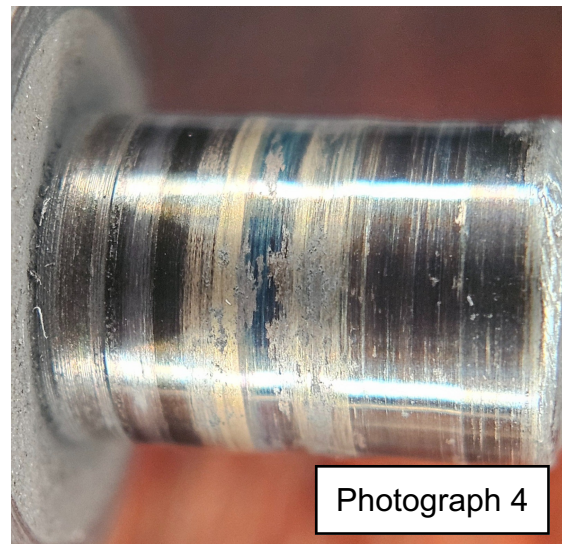
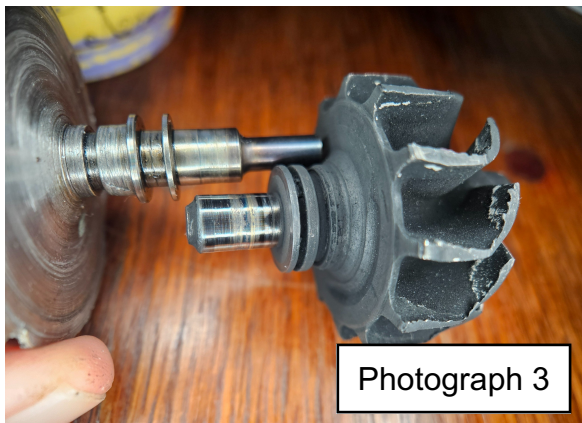


Photograph 1

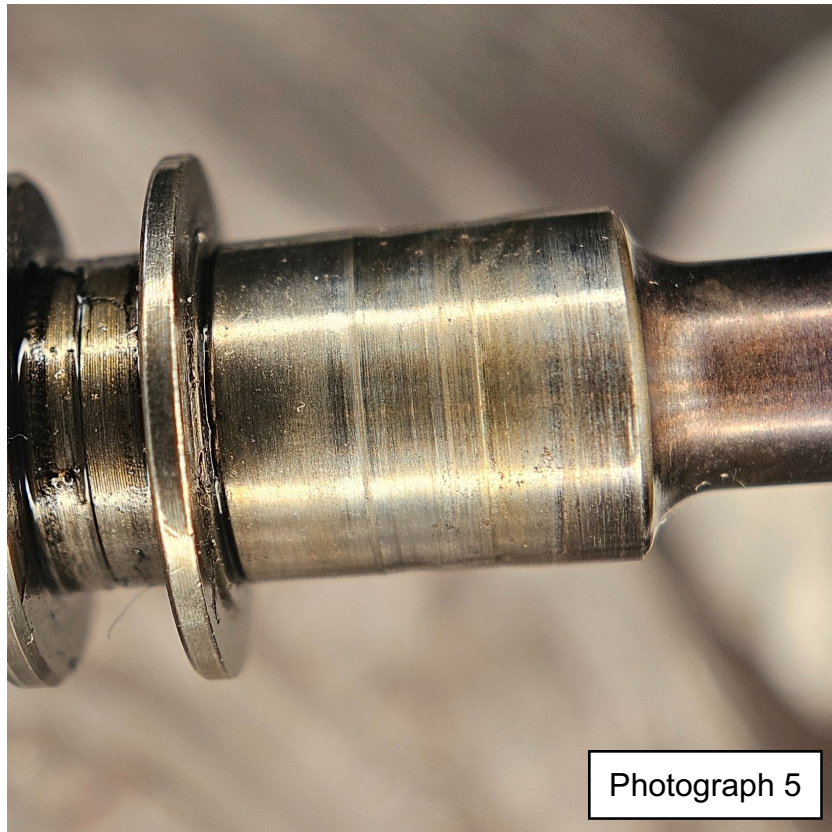
The turbine wheel retained a stub of the shaft, showing that the weld between wheel and shaft was intact, as seen in photograph 2. The stub was sooted black with hard lacquer on the seal land, showing that oil in this region had been exposed to high temperature.



The turbine-end journal carried blue and straw temper colours with fine circumferential scoring, and bands of copper-coloured material running right around the journal, as seen in photographs 3 and 4. The customer, with the part in hand, identified this material as smeared metal, consistent with bronze transferred from the bearing bush; a simple spot test for copper would confirm it.



The compressor-end journal was bright and unmarked, as seen in photograph 5. The running distress was therefore confined to the turbine end.



Photograph 5

Compressor wheel

The compressor blades were torn away at their tips around the full circumference of the wheel, as seen in photograph 6, consistent with the blades rubbing the housing while the rotor was turning.



Photograph 6

The back face of the compressor wheel carried heavy circular rub marks, as seen in photograph 7, showing that the rotor had also moved along its axis and rubbed the backplate.



Turbine wheel

The turbine wheel blade tips were likewise broken around the full circumference, as seen in photograph 8.



Thrust bearing

The thrust bearing, the centre housing and the oil were not available, and their condition could not be assessed.

COMMENT

A turbocharger shaft runs at very high speed on a film of oil in plain bronze bushes. The turbine end is the vulnerable end: it receives exhaust heat as well as friction heat, and it is the first to distress when the oil film breaks down.

When the film is lost, the bronze of the bush smears onto the journal and temper colours form on the steel. Even bands right around the journal show that the contact happened while the shaft was still whole and turning; a shaft that whirls only after it has broken gouges locally instead.

Both journals draw their oil from the same feed, so contaminated oil scores both ends; damage confined to the hot turbine end points to a heat-driven loss of the oil film. Tip damage all round a wheel is the pattern of a rotor that has lost its running position, not of a foreign object, which strikes only a few blades.

CONCLUSION

The oil film at the turbine-end bearing was lost and the bush ran metal-to-metal against its journal. The rotor then lost its running position, both wheels struck their housings, and the shaft fractured at the reduced section beside the failed bearing.

Why the oil film was lost — oil coked by a hot shutdown, a delayed or low-pressure oil feed, or degraded oil — cannot be determined from the shaft alone.

The reverse order — a fatigue crack in the shaft first, the bearing distress after — is not excluded on photographs alone and is carried as a live alternative until the fracture face is examined under a microscope.

RECOMMENDATIONS

- Examine the fracture face under a scanning electron microscope for fatigue marks, to settle whether the shaft cracked before or after the bearing failed.
- Review the vehicle's oil service record, oil pressure and shut-down practice, and fit the replacement turbocharger only after the oil feed has been checked.

ASWANAI (PTY) LTD
14 SEPTEMBER 2026