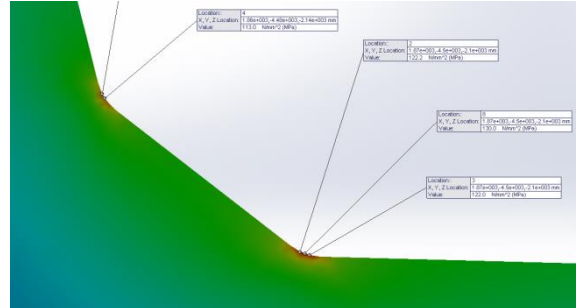
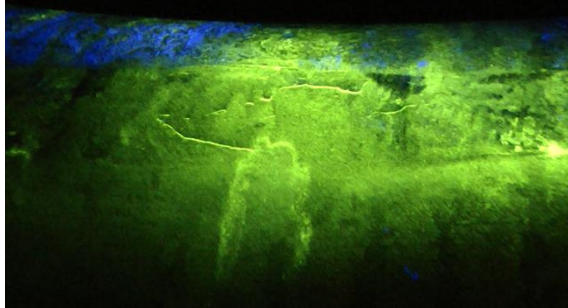


# Gilmore Engineers

## Failure Analysis Specialists



For over 30 years, Gilmore Engineers Pty Ltd has been a leader in the investigation and analysis of accidents and failures. We are one of only a few consultancy groups in the world that has a speciality in failure analysis. Services are provided to many corporations, insurers, individuals, and their counsel. Typical failures include machinery and system-of-work failures leading to property loss and personal injury. Specific services include analysis of component failure and redesign, experimental testing, design auditing, Finite Element Analysis (FEA), Computational Fluid Dynamics (CFD) material testing, corrosion analysis, fire investigation and auditing of safety standards.

Examples of failure analysis projects Gilmore Engineers have completed include:

### Failure Analysis of a Boom Crane

A boom crane was supporting a large piece of mining equipment, when it failed causing catastrophic loss of both pieces of equipment. Gilmore Engineers investigated the source of the failure and identified a number of factors that contributed to the multi-million dollar loss.



### Helicopter Crash due to Driveline Failure

A helicopter driveline component ruptured its fuel tank mid-air, resulting in a crash and loss of life. A bolted joint was put under scrutiny to determine whether the design, installation or maintenance was responsible for the crash, after an incorrect component sequence was discovered.

### Semi-Trailer Rollover Carrying Live Load

A prime mover and semi-trailer combination carrying livestock rolled over while negotiating a curve on a NSW highway. Gilmore Engineers investigated the incident, including the design of the road, road surface condition and signage, and provided an expert engineering report for the court explaining the contributing factors to the incident.



### Failure Analysis of a SAG Mill

A 34ft diameter SAG mill developed cracks in the corner weld near the end of its service life. Gilmore Engineers inspected the Mill and conducted Finite Element analysis on the mill to determine the reduction in stress intensity at the repaired site and provided recommendations for continuing use and the potential replacement. Gilmore Engineers also performed a design review of the replacement Mill, including independent Finite Element analysis and independent quality assurance during the manufacture of the new SAG Mill components in Turkey and China.



### Safety Investigation for Haul Truck Personnel Access

After a mine safety incident, Gilmore Engineers were engaged to design a safe access system for a Caterpillar 777D. Australia Standards requirements were researched and a new access platform was designed both to minimise cost, and ensure the safety of operators.



### Failure Analysis of a Girth Gear

KCGM contracted Gilmore Engineers to review a mill girth gear failure and the numerous reports that had been produced regarding the excavation. Gilmore Engineers produced a management-level report analysing the failure and providing a recommendation for the potential remaining life of the gear.

### Drill Rig Continual Maintenance

4 drill rigs were reviewed after a history of failures. Gilmore Engineers were tasked with determining whether the failures were caused by poor design, manufacture or operator error. Issues involving the pneumatic system, compressor shaft, cooling system and overheating were identified and detailed.



### Water Pipe Sight Glass at Parliament House, Canberra

In 2004, a Perspex water pipe sight glass failed, flooding the Cabinet Room of the Australian Parliament House in Canberra, resulting in hundreds of thousands of dollars' worth of damage. Gilmore Engineers modelled the sight glass, analysing its strength using the Finite Element method and conducted destructive tests on the proposed replacement.



### Rock Hammer Accelerated Wear and Failure

In 2013, Gilmore Engineers inspected a series of failed rock hammer components. Based on visual inspection alone, various failure methods were able to be ruled out, resulting in a renewed focus on the remaining likely causes of failure.



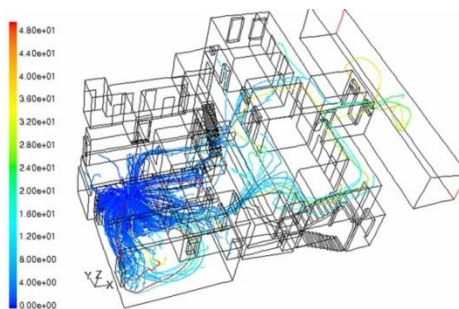
### Truck Differential Yoke Failure

An underground mine concrete truck impacted a wall on a relatively steep decline. Concern about whether the truck's brakes or driveline had failed or whether operator error was responsible was investigated. Gilmore Engineers determined the driveline had failed during the impact and that the brakes were in serviceable condition at the time of the incident.



### Crane Engine Fire

A mobile crane caught fire whilst driving between sites. Gilmore Engineers investigated the fire initiation and drew focus to the engine turbocharger and its inadequate heat shielding. Given the high surface temperatures, fire broke out causing a high level of damage.



### Modelling of a building fire

A CFD study was undertaken on a critical building fire within an accommodation complex which resulted in loss of life. Results from the study were integrated into the police investigation enabling determination of cause and qualification of the overall building hazard. The same simulation technology has since been successfully validated by Gilmore Engineers against experimental data in a full-scale mock building burn.