

WRITTEN TECHNICAL REPORT

Weighting: 70%

Module: ACMA4039 – Engineering Applications & Study Skills

Assessment: Root Cause Analysis – Technical Report

Student: Ryan Tamlin

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Engagement with Literature Skills (15 marks)

Mark awarded: 14 / 15

Ryan showed very strong engagement with relevant professional, legislative, and academic literature. The report makes effective use of the IMechE Code of Conduct, ISO 31000, the Management of Health and Safety at Work Regulations, and peer-reviewed sources such as Pietsch et al. (2024). These are well chosen and clearly linked to high-risk engineering environments.

The literature is integrated smoothly into the discussion and supports the rationale for using structured RCA methods in heavy engineering.

What was done well

- Strong use of legislation, standards, and peer-reviewed sources.
- Clear linkage between literature and real industrial practice.
- Appropriate focus on high-risk sectors and professional responsibility.

What could be improved

- Slightly more comparison between academic sources would strengthen critical synthesis.
- A brief reference to additional RCA tools in the literature would add breadth.

Suggested enhancement

- Add a comparison table linking *ISO 31000*, *5 Whys*, and *RPN* to how each informed decisions in this case study.

Knowledge and Understanding Skills (25 marks)

Mark awarded: 23 / 25

The report demonstrates a very high level of understanding of risk management and RCA principles. Ryan clearly explains why RCA is essential in heavy engineering environments and accurately describes both the 5 Whys and RPN methodologies.

The explanation of gas composition, toxicity, and operational risk associated with the crude gas main shows strong technical awareness and contextual understanding.

What was done well

- Clear explanation of RCA theory and purpose.
- Strong understanding of high-risk industrial systems.
- Accurate description of severity, occurrence, and detection concepts.

What could be improved

- Manufacturing context could be briefly summarised earlier to anchor the reader sooner.
- A short comparison with another quantitative tool (e.g. HAZOP) would add depth.

Suggested enhancement

- Include a simple system diagram of the crude gas main showing flow direction, bends, and inspection points.

Cognitive and Intellectual Skills (20 marks)

Mark awarded: 18 / 20

Ryan demonstrated strong analytical reasoning throughout the RCA. The use of the 5 Whys clearly identified design-related root causes rather than surface-level symptoms. The justification of initial and revised RPN values is logical and supported by operational history and inspection limitations.

The discussion of why severity was reduced post-mitigation is clearly reasoned and technically justified.

What was done well

- Logical and structured root cause identification.
- Strong justification of RPN score changes.
- Good evaluation of detection limitations and improvements.

What could be improved

- Residual risk could be discussed more explicitly in the conclusion.
- Some numerical comparisons could be summarised more concisely.

Suggested enhancement

- Add a before-and-after RPN bar chart clearly highlighting reduction in severity, likelihood, and detection improvement.

Practical Application Skills (20 marks)

Mark awarded: 19 / 20

The practical application of RCA is a major strength of this report. The case study is highly realistic and clearly based on real industrial experience. The use of ultrasonic thickness measurements, over-plating, and infrared thermography demonstrates strong practical engineering judgement.

The corrective actions are appropriate, proportionate, and clearly linked to the identified root causes.

What was done well

- Excellent real-world industrial case study.
- Strong linkage between inspection data and corrective actions.
- Effective demonstration of risk reduction.

What could be improved

- A brief discussion of long-term monitoring strategy would add further realism.

Suggested enhancement

- Include an annotated photograph or schematic highlighting erosion-prone areas and inspection coverage zones.

Transferable Skills for Life & Professional Practice (20 marks)

Mark awarded: 18 / 20

The report is professionally structured and clearly written. Sections flow logically, figures are well referenced, and the technical tone is appropriate for both academic and industrial audiences. The conclusion effectively reflects on both strengths and limitations of RCA.

Minor stylistic refinements would further improve clarity.

What was done well

- Clear structure aligned with the coursework brief.
- Professional technical writing style.
- Effective use of figures and appendices.

What could be improved

- Minor conciseness improvements in some sections.
- Slight tightening of language in the conclusion.

Suggested enhancement

- Add a summary flowchart showing *failure* → *RCA* → *mitigation* → *reduced risk*.

Written Report Mark Summary (70%)

Criterion	Mark
Engagement with Literature	14 / 15
Knowledge & Understanding	23 / 25
Cognitive & Intellectual Skills	18 / 20
Practical Application Skills	19 / 20
Transferable Skills	18 / 20
Total (Written Report)	92 / 100

Weighted Contribution to Module (70%):
64.4 / 70