

WRITTEN TECHNICAL REPORT

Weighting: 70%

Module: ACMA4039 – Engineering Applications & Study Skills

Assessment: Root Cause Analysis – Technical Report

Student: Evan Forrest

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Engagement with Literature Skills (15 marks)

Mark awarded: 13 / 15

Evan demonstrated strong engagement with relevant academic, professional, and regulatory literature. The report appropriately references peer-reviewed sources such as Pietsch et al. (2024) and Sahoo (2021), alongside HSE guidance, ISO 45001, and legal frameworks such as the Management of Health and Safety at Work Regulations.

The literature is clearly linked to the investigation of recurring machine breakdowns and supports the rationale for using RCA and the 5 Whys within a manufacturing context. Strengths and limitations of RCA tools are explicitly discussed, showing awareness beyond simple description.

What was done well

- Good balance of academic literature and professional guidance.
- Clear discussion of strengths and limitations of RCA tools.
- Appropriate use of legislation and ethical considerations.

What could be improved

- More direct synthesis between academic sources would strengthen critical engagement.
- A brief comparison with quantitative tools (e.g. FMEA or Fault Tree Analysis) would add depth.

Suggested enhancement

- Add a short comparison table summarising *5 Whys* vs *FMEA* for recurring equipment failures in manufacturing.

Knowledge and Understanding Skills (25 marks)

Mark awarded: 22 / 25

The report demonstrates a very good understanding of risk management and RCA principles. Evan clearly explains OEE, availability losses, and how repeated proximity-sensor failures affected machine C199's performance. The explanation of RCA methodology and the role of preventive maintenance shows solid conceptual understanding.

The discussion linking downtime, customer impact, and future business risk demonstrates good awareness of operational consequences.

What was done well

- Clear explanation of RCA methodology and investigation steps.
- Good understanding of OEE and manufacturing performance metrics.
- Logical explanation of severity, occurrence, and detection concepts.

What could be improved

- Manufacturing process detail could be expanded slightly earlier in the report.
- More explicit linkage between RCA theory and long-term reliability strategy would strengthen depth.

Suggested enhancement

- Include a simple system diagram of the twin-spindle CNC machine highlighting sensor locations and coolant exposure.

Cognitive and Intellectual Skills (20 marks)

Mark awarded: 17 / 20

Evan demonstrated good analytical reasoning when justifying the RPN score and explaining how preventive actions reduced occurrence and detectability. The explanation of why severity remained relatively low but still impactful in terms of customer relations shows sound evaluative thinking.

The discussion of limitations demonstrates reflective awareness of methodological constraints.

What was done well

- Logical justification of RPN scoring.
- Clear explanation of cause-and-effect relationships.
- Appropriate reflection on limitations of the 5 Whys approach.

What could be improved

- More detailed justification of revised RPN values would strengthen evaluation.
- Greater prioritisation of risks would improve analytical clarity.

Suggested enhancement

- Add a before-and-after RPN bar chart to clearly visualise risk reduction.

Practical Application Skills (20 marks)

Mark awarded: 18 / 20

The application of RCA to repeated CNC machine downtime is realistic and well grounded in manufacturing practice. The use of maintenance records, OEE data, operator feedback, and scheduled preventive maintenance demonstrates strong practical relevance.

The proposed corrective actions are feasible, cost-effective, and clearly linked to measurable improvement, with forecast OEE rising to 68%.

What was done well

- Strong real-world industrial case study.
- Practical and proportionate corrective actions.
- Clear evidence of performance improvement after intervention.

What could be improved

- Brief discussion of longer-term monitoring or scalability would add realism.

Suggested enhancement

- Include an annotated image or schematic showing proximity sensor placement and coolant exposure pathways.

Transferable Skills for Life & Professional Practice (20 marks)

Mark awarded: 17 / 20

The report is clearly structured, logically ordered, and written in a professional tone suitable for both academic and industrial audiences. Tables are well presented and clearly support the discussion. The conclusion effectively summarises findings and reflects on RCA effectiveness.

Minor repetition and stylistic issues slightly reduce conciseness.

What was done well

- Clear technical report structure aligned with the brief.
- Professional tone and appropriate technical language.
- Effective use of tables to support analysis.

What could be improved

- Minor proofreading and conciseness improvements.
- Some tables could be referenced more explicitly in the discussion.

Suggested enhancement

- Add a final summary flowchart showing *downtime issue* → *RCA* → *preventive actions* → *improved OEE*.

Written Report Mark Summary (70%)

Criterion	Mark
Engagement with Literature	13 / 15
Knowledge & Understanding	22 / 25
Cognitive & Intellectual Skills	17 / 20
Practical Application Skills	18 / 20
Transferable Skills	17 / 20
Total (Written Report)	87 / 100

Weighted Contribution to Module (70%):
60.9 / 70