

WRITTEN TECHNICAL REPORT

Weighting: 70%

Module: ACMA4039 – Engineering Applications & Study Skills

Assessment: Root Cause Analysis – Technical Report

Student: Todd Marshall

Student ID: 2312993

Engagement with Literature Skills (15 marks)

Mark awarded: 14 / 15

Todd demonstrated outstanding engagement with academic, professional, and regulatory literature. The report integrates peer-reviewed research, UK legislation, international standards, and professional guidance seamlessly, including extensive use of ISO frameworks, HSE legislation, the IMechE Code of Conduct, and current journal literature.

Sources are not merely cited but actively used to justify methodological choices, risk scoring approaches, and professional responsibilities. The literature review clearly supports the argument that high-risk manufacturing environments require structured, evidence-based RCA and PFMEA approaches.

What was done particularly well

- Excellent balance between academic research and industry standards.
- Clear synthesis of sources rather than descriptive listing.
- Strong linkage between literature, customer requirements (Rolls-Royce Nuclear), and practical engineering decisions.

Suggested enhancement

- A single synthesis table mapping *key academic theories* to *specific PFMEA decisions* would further emphasise the already strong integration.

Knowledge and Understanding Skills (25 marks)

Mark awarded: 24 / 25

The report demonstrates an exceptional level of knowledge and understanding of risk management, RCA, and PFMEA in a real industrial context. Todd shows deep understanding of inherent risk, controllable risk, and the limitations of engineering systems operating under extreme conditions (e.g. molten metal at >1700 °C).

The explanation of why severity remains high while occurrence and detection are reduced through PLC-controlled systems and engineered safeguards is technically accurate and clearly articulated.

What was done particularly well

- Excellent explanation of PFMEA logic and RPN variability between organisations.
- Strong understanding of customer-driven quality requirements.

- Clear articulation of why some risks can only be managed, not eliminated.

Areas for improvement

- None required; this level of understanding is well above Level 4 expectations.

Cognitive and Intellectual Skills (20 marks)

Mark awarded: 19 / 20

Todd demonstrated outstanding analytical and evaluative thinking. Risk scoring decisions are justified clearly using engineering judgement, operational constraints, and empirical understanding of the process. The comparison of initial and final RPN values is well reasoned and numerically justified.

The report shows mature evaluation of system limitations, human factors, and why engineered controls are preferable to procedural reliance.

What was done particularly well

- Clear, technically sound justification of all RPN changes.
- Excellent evaluation of detection limitations and system robustness.
- Strong recognition of residual risk and the concept of “acceptable risk”.

Suggested enhancement

- A single consolidated RPN reduction summary table (top 3 risks only) would slightly improve visual clarity, though the analysis itself is already excellent.

Practical Application Skills (20 marks)

Mark awarded: 20 / 20

This is an outstanding example of practical RCA application. The case study is authentic, complex, and clearly based on real industrial responsibility. The PFMEA, PLC control implementation, sieving systems, extraction design, and oxygen control strategies demonstrate professional-level engineering practice.

Figures on pages 14–16 (PLC thermostat, POD system, decant station, and process flow) strongly support the analysis and clearly demonstrate how risk reduction was achieved through engineering controls rather than procedural reliance.

What was done particularly well

- Exceptional realism and industrial credibility.
- Excellent integration of photographs, schematics, and process flow.
- Clear demonstration of measurable risk reduction outcomes.

Transferable Skills for Life & Professional Practice (20 marks)

Mark awarded: 19 / 20

The report is professionally structured, clearly written, and suitable for both academic and industrial audiences. Figures are well labelled and referenced, the executive flow is logical, and conclusions are well supported.

The PDP is also well considered and clearly linked to professional development within engineering management.

What was done particularly well

- Professional technical writing style.
- Excellent structure and clarity.
- Strong reflection on learning and continuous improvement.

Minor enhancement

- Slight conciseness in a small number of explanatory paragraphs would improve readability further, though this does not detract significantly.

Written Report Mark Summary (70%)

Criterion	Mark
Engagement with Literature	14 / 15
Knowledge & Understanding	24 / 25
Cognitive & Intellectual Skills	19 / 20
Practical Application Skills	20 / 20
Transferable Skills	19 / 20
Total (Written Report)	96 / 100

Weighted Contribution to Module (70%):
69.3 / 70