



Real Case Scenario – Engine & Tractive System: PCB Manufacturing & Process Optimization

Scenario

Your team produces the Engine and Tractive System (ET) for a Formula Student race car at a series volume of 12 vehicles per year. The current BOM shows three central PCBs for the ET system:

PCB	Cost (Make)	Weight
Precharge	39,80 € (PCB) + 25,90 € (assembly/soldering by students) = 65,70 €	0,487 kg
IMD	48,25 € (PCB, commissioned to LuckyBear PCBs from Shenzhen, China)	0,436 kg
BMU	57,30 € (PCB, commissioned to LuckyBear PCBs from Shenzhen, China)	1,498 kg

The boards are currently manufactured by LuckyBear PCBs in China (2-layer, FR-4 substrate). Paste application (15 min), component placement (50 min), and soldering (25 min) are performed manually. Lead time from order: 3-5 weeks.

Tasks

1) Automated In-Circuit Testing: Currently, every assembled PCB undergoes a manual functional bench test (15 minutes per board). You are considering introducing automated in-circuit testing (ICT) using a bed-of-nails fixture. What cost factors, throughput effects, and quality implications should you weigh? How does this decision change given your production volume per year?

2) Field Failures: 2 out of the first 12 delivered BMU PCBs exhibit an intermittent fault after 80 km. Outline the 8D report process. Which cost categories apply?

3) Supplier Qualification: A local PCB manufacturer 30 km from your workshop offers to produce the IMD boards at 92,50 €/unit with 1-week lead time. LuckyBear PCBs currently delivers at 48,25 €/unit with 3-5 weeks lead time. Beyond unit price, what qualitative and cost factors drive your sourcing decision? Outline a supplier qualification process.

4) AI in Manufacturing: Your management asks you to evaluate the integration of AI into the ET PCB production and quality workflow for next season. Identify specific use cases and estimate their cost impact versus traditional methods. How would you validate the projected savings?

Judging criteria

The judges will focus on the following aspects during the judging process:

- Cost awareness and ability to quantify trade-offs



- Structured problem-solving and logical reasoning
- Correct use of production and logistics terminology

Presentation

The Real Case will be evaluated as part of the Cost and Manufacturing event. The team must prepare a presentation. The team will not be interrupted during the presentation.

Duration: 5 minutes maximum, followed by 5 minutes of Q&A with the judges.

Format: Maximum 5 slides or pages. Any format (digital or printed) is accepted.

Presentation slides or pages must be sent before the start of Static events:

- Mail subject: Car#_Real_Case
- Document name: Car#_Real_Case.pdf
- Deadline: August 20th, 2026 at 13:00 CEST
- Send to: michael.jauschnik@fs-alpeadria.com