Root Cause Analysis of Complex Technical Issues for Industrial Die Casting

Context
The Die Casting Life Cycle Management (LCM) team has the task to solve complex equipment failures occurring around the world without an easy access to information. Because some failures have been recurring for years, there is the need for a better methodology which addresses their root cause to prevent the recurrence of such failures. This is the purpose of the root cause analysis methodology designed for the Life Cycle Management team which is presented below.

Process

- **D0** Plan
  - 1 engineer full-time
  - Travels to customers
  - Measuring equipment
  - Laboratory analysis

- **D1** Create the multidisciplinary team
  - 4 LCM engineers
  - Simulation Engineer
  - Customer Support Lead
  - Methodology Coach
  - Guest members from other departments

- **D2** Define and understand the problem

- **D3** Contain the problem
  - Inspect the shaft & verify alignment.
  - Test the effectiveness of the safety catcher.
  - Immediately replace damaged parts.

- **D4** Root cause identification and verification
  - Causal Map
    1) Start from the problem and ask why until the cause is no longer actionable
    2) Validate or reject each cause

- **D5** Develop corrective actions

- **D6** Implement and validate corrective actions

- **D7** Prevent recurrence

- **D8** Congratulate the team and reflect

Example Case: Mechanical Safety Catcher Failure

Understand the Problem
- Deep scratches on shaft (>=0.2mm)
- Damaged safety catcher
- Damaged bronze bushing → Safety catcher brakes radial displacement is 0.2mm. Safety issue

Corrective Actions
- Design modifications
- New alignment procedure
- Technicians training

Implement and Validate
- Design modifications tested
- Alignment procedure added in commissioning and maintenance manuals

Prevent Recurrence
- Review other optional systems
- Workshop to share the investigation results

Key Learning Points
1. Build an interdisciplinary team
2. Go see things with your own eyes (customers, production, etc...)
3. The importance of planning and following the process
4. Do not rush to the solution
5. Document and share everything you learn

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