

Case Study

Design of Experiments and TPM reduced die-casting porosity

Project background

Competing companies made very similar products but had different manufacturing strategies. One bought in component parts and cast other parts in its foundry. The other did the opposite. A conglomerate decided to buy both companies. One foundry was then closed to achieve the acquisition synergies. However the quality of transferred castings was unacceptable, despite purchase of new machines.



Problem

Porous aluminium castings were causing more than 50,000 parts per million defects with high variability from week to week. A Lean Six Sigma project was set up.

The Black Belt and his team discovered after rolled throughput yield studies that the die cast equipment process was not repeatable. Die cast process parameters were not yielding consistent results. Many staff from the foundry which closed had left the company and the foundry staff at the other site did not fully understand the process requirements.

Solutions

The process was optimised using design of experiments (DoE) on factors such as phase start, phase speed and pressure. Staff training gap analysis and plans were developed using attribute gauge Repeatability & Reproducibility (gauge R & R) techniques.

Staff were shown how to distinguish between the customer face and non-customer face, give a maximum size for each occurrence of porosity and display examples of porosity reject types.

Detailed cost of quality studies were also carried out using questionnaires designed by the team. Standard operating instructions were improved and process staff were re-trained. A total preventive maintenance (TPM) programme was also introduced.

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Business benefits

Die casting scrap was reduced by 93%. Rolled throughput yield for casting, fettling machining and assembly increased to 97.5%. Quality costs in fettling, machining, turning, drilling and tapping were virtually eliminated and sales engineers were free to concentrate on selling.