



Case Study 04

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|------------------------|-----------------------|---|-------------------------|----------------|
| Annual saving | £ | 204,750 | ROI | 23 : 1 |
| Client details | Employees | 6 | Engaged | 6 |
| Project Details | Process review | 8 days | Install / review | 4 weeks |
| Improvement | 2.5 | mm saved on average for every piece cut | | |
| Improvement | 1.5% | saved in weight on average per piece | | |

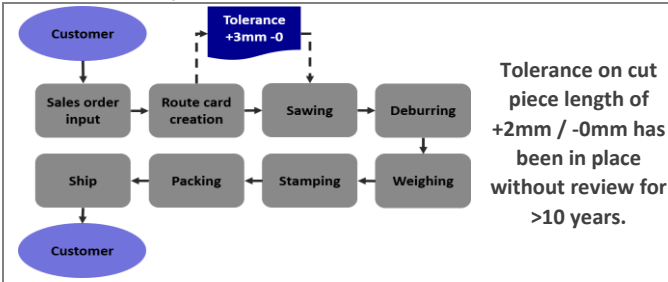
1 - Describe the problem

Observation that tolerances on cut billets seemed excessive. New sawing technology and greater understanding of customer needs could result in reduced tolerances and therefore material savings, nearer net shape, reduced tooling costs and processing time for subsequent processes.

5 - Implement the solution

| No. | Detail / Actions | Owner | Date | |
|-----|--|-------|-------------|-------------|
| 1 | Discuss needs with customer(s). | AA | ---/---/--- | |
| 2 | Discuss process capability expectations with saw machine manufacturer. | BB | ---/---/--- | |
| 3 | Discuss total productive maintenance requirements with m/c manufacturer. | CC | ---/---/--- | |
| 4a | Conduct process capability studies. | DD | ---/---/--- | |
| 4b | Machine capability (typical) C_p | | 1.414 | ---/---/--- |
| 4c | Machine capability (typical) C_{pk} | | 0.200 | ---/---/--- |
| 5 | Recalculate process tolerances based on customer needs and process capability. | EE | ---/---/--- | |
| 6 | Reprogram management system to auto implement tolerances to route cards | FF | ---/---/--- | |
| 7 | Implement 5s and TPM activities around saws. | GG | ---/---/--- | |

2a - Describe the process - current state



2b - Describe the achievable - future state

Understand customer needs. Cut to customer requirement. Understand and monitor process to anticipate variance.

3 - Identify the root cause(s)

This process, sawing, historically had a tolerance which was initially determined based on the process machinery in use in the past 10 years.

Some larger diameter billets had been scrapped as blades 'ran off', creating a wedge shaped billet.

Some customer complaints had been received as 'wedged' billets were produced on operator free 'night runs', and missed during the following day's sample inspection.

"We've always done it this way"

4 - Develop a solution

| | |
|---|--|
| 1 | Discuss 'real' requirement with customers. |
| 2 | Understand process capability. |
| 3 | Calculate and design 'new' tolerance(s) if possible. |
| 4 | Training / Implement controls. |

6 - Review and evaluate the results

| Example production batch study | | | |
|--------------------------------|---|--------------|--------|
| utol | 69.000 | max actual | 69.080 |
| ltol | 68.000 | min actual | 68.580 |
| tol | 1.000 | range actual | 0.500 |
| avg | 68.929 | tol/range | 2.000 |
| STD DV | 0.1178 | upper 6σ | 69.636 |
| utol-avg | 0.071 | lower 6σ | 68.222 |
| avg-ltol | 0.929 | +/- 6σ | 1.414 |
| CP | 1.414 | UTL C_{pk} | 0.200 |
| 1 | Understanding process capability and customer needs meant shorter billet lengths with no detriment to customer service. | | |
| 2 | Shorter billet lengths resulted in less machining for customers, reducing production cycle times, and increasing tool life. | | |
| 3 | SPC is performed in the cells and continues to demonstrate the worth of the improvements. | | |
| 4 | Total productive maintenance is critical. Machines and tooling must be in top condition to allow consistent and accurate cutting. | | |

7 - Reflect & act on improvement process. Standardise.

| | |
|---|---|
| 1 | Process must be revisited to consolidate improvements. |
| 2 | SMED exercise next, to maximise opportunities to increase 'cutting' value added time. |
| 3 | Continue to train client's inspector to become knowledgeable and competent with SPC and process capability. |
| 4 | |

Each CQual case study is a simplified summary only, of generally larger projects containing more detail