



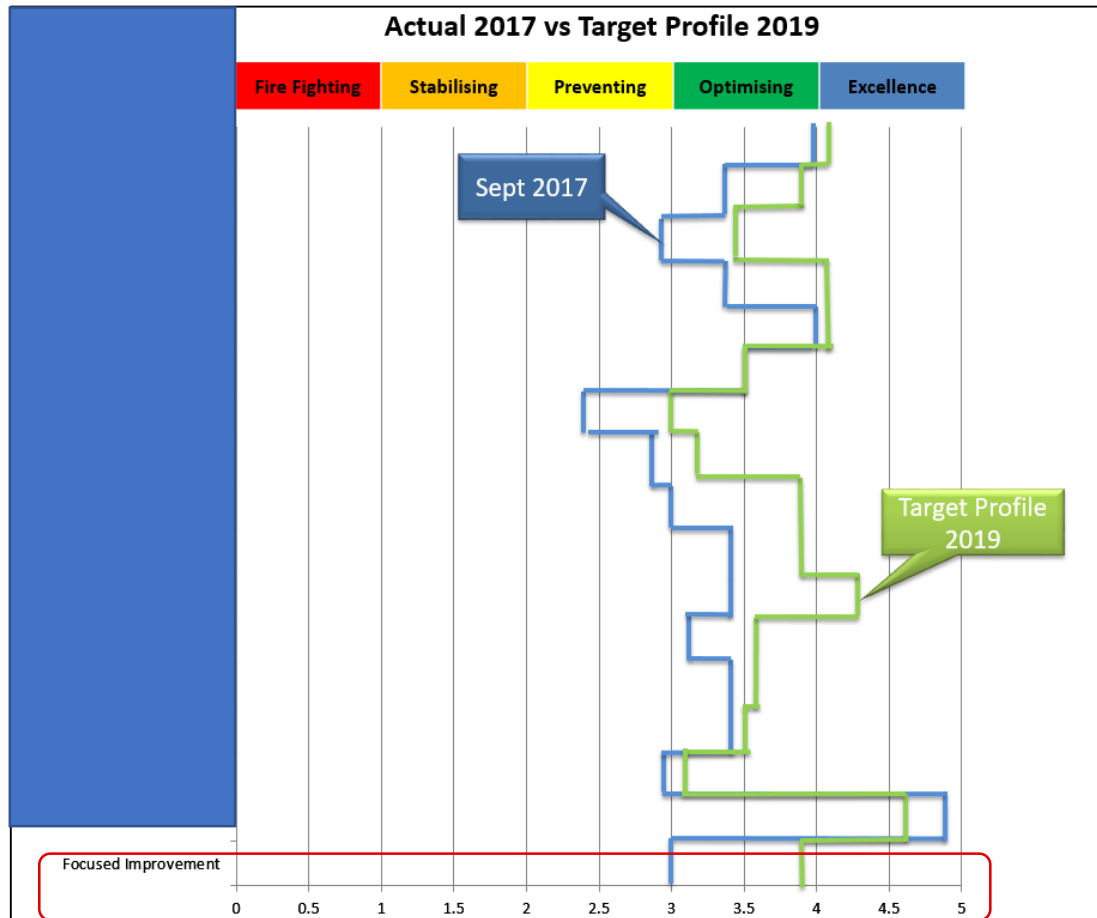
Focused Improvement Project: Downtime Reduction – Mechanical Joining Technology

 **pragma**

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Introduction: Background to Problem



- A leading automotive manufacturer in South Africa, embarked on a journey to implement a range of asset management best practices and entrusted Pragma as their strategic partner along the journey.
- Focused Improvement forms part of the asset management business processes that Pragma is entrusted to implement and facilitate.

2017 Results

- Focused improvement projects focus on large breakdown
- Lack of cross-functional teams in problem solving



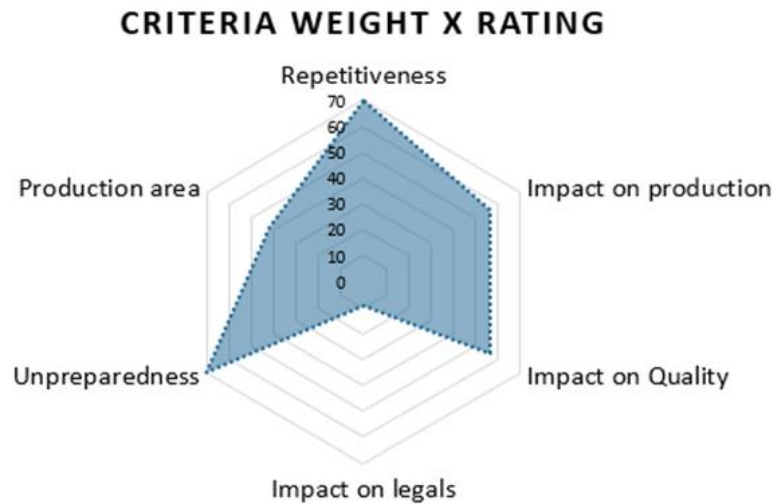
Optimising

- Improvement projects are formally selected and scoped based on a quantified criteria
- Project have a sponsor and feedback to management regularly
- Successful solutions are verified and deployed wider

Introduction: Background to Problem

Project Prioritisation Matrix

Criteria Weight	Criteria	Rating Description	Criteria Rating Value	Weight x Rating
7	Repetitiveness	>1 per week	10	70
8	Impact on production	>30mins	7	56
8	Impact on Quality	>10 units scrapped	7	56
9	Impact on legals	No Impact on HSSE	1	9
7	Unpreparedness	No Tactic/Recovery Plan	10	70
6	Production area	Main line	7	42
	Priority rating	Min FI Score: 280		303



Problem prioritisation matrix designed by the asset management team and used to quantify and rank issues to determine the required appropriate actions

A proactive loss and waste analysis and prioritisation of problems conducted scored this particular problem above the minimum score required to institute a focused improvement project.

- The hit map shows the results from the project analysis and prioritisation
- High scoring aspects are unpreparedness and repetitiveness

Introduction: Project Target and Team Members

Improvement target

Eliminate Production Downtime

Due date

30 September 2018

A team of interested and affected stakeholders with various background put together and meet on weekly basis

Maintenance Manager	Sponsor – Owner of the project and provides resources
Joining Specialist	Responsible for asset care plans of mechanical joining technology
Logistics Specialist	Ensures that the part supplier delivers high quality and correct specification parts on time
Asset Care Manager	Guide and support the team with implementation of the focused improvement project and asset management best practices
Asset Care Engineer	Spearheads the focused improvement projects
Maintenance Engineer	Supports with bottleneck analysis
Production Team Manger	Responsible for day to day running of the line and managing line operators
Mechanical Joining Artisan	Attend all breakdowns related to mechanical joining at the station



Define | What is the problem?

- Gun and part-hole misalignment

Why is it a problem?

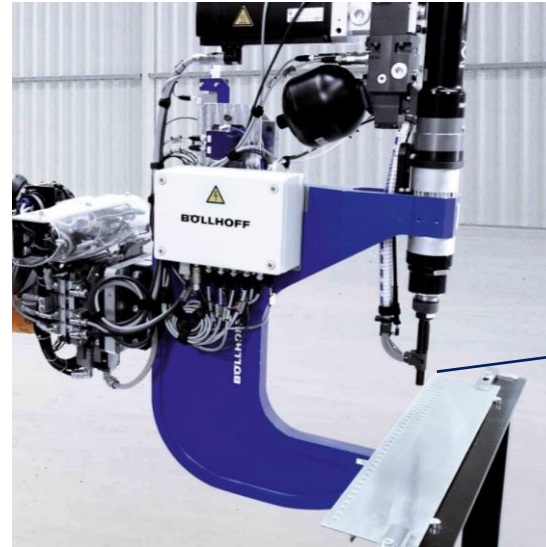
- Causes production downtime

Where is the problem?

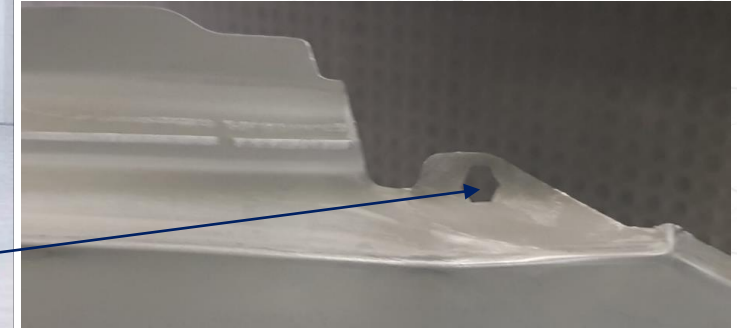
- Riveting Station

When did the problem start?

- Since the beginning of 2018 and spiked in CW 25 of the year



Riveting Gun (Source: Boellhoff.com)



Left Side wall

How big is the problem?

Safety impact/ Risk	None
Environmental impact/ risk	None
Cost plus lost to revenue	30 minutes a week
Frequency	Weekly

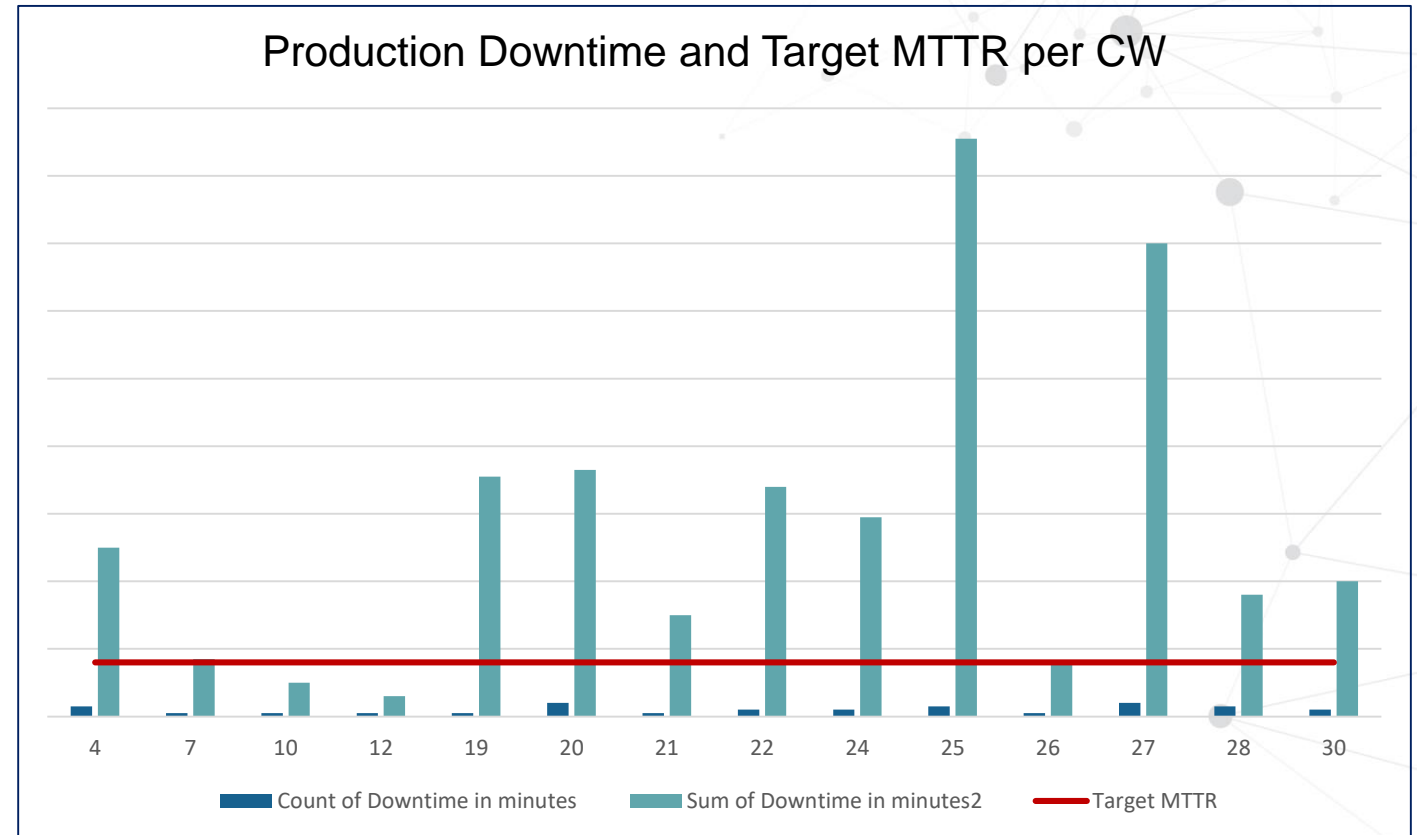
Measure | What does the data tell us about the problem?

Total production downtime lost year to date at the station

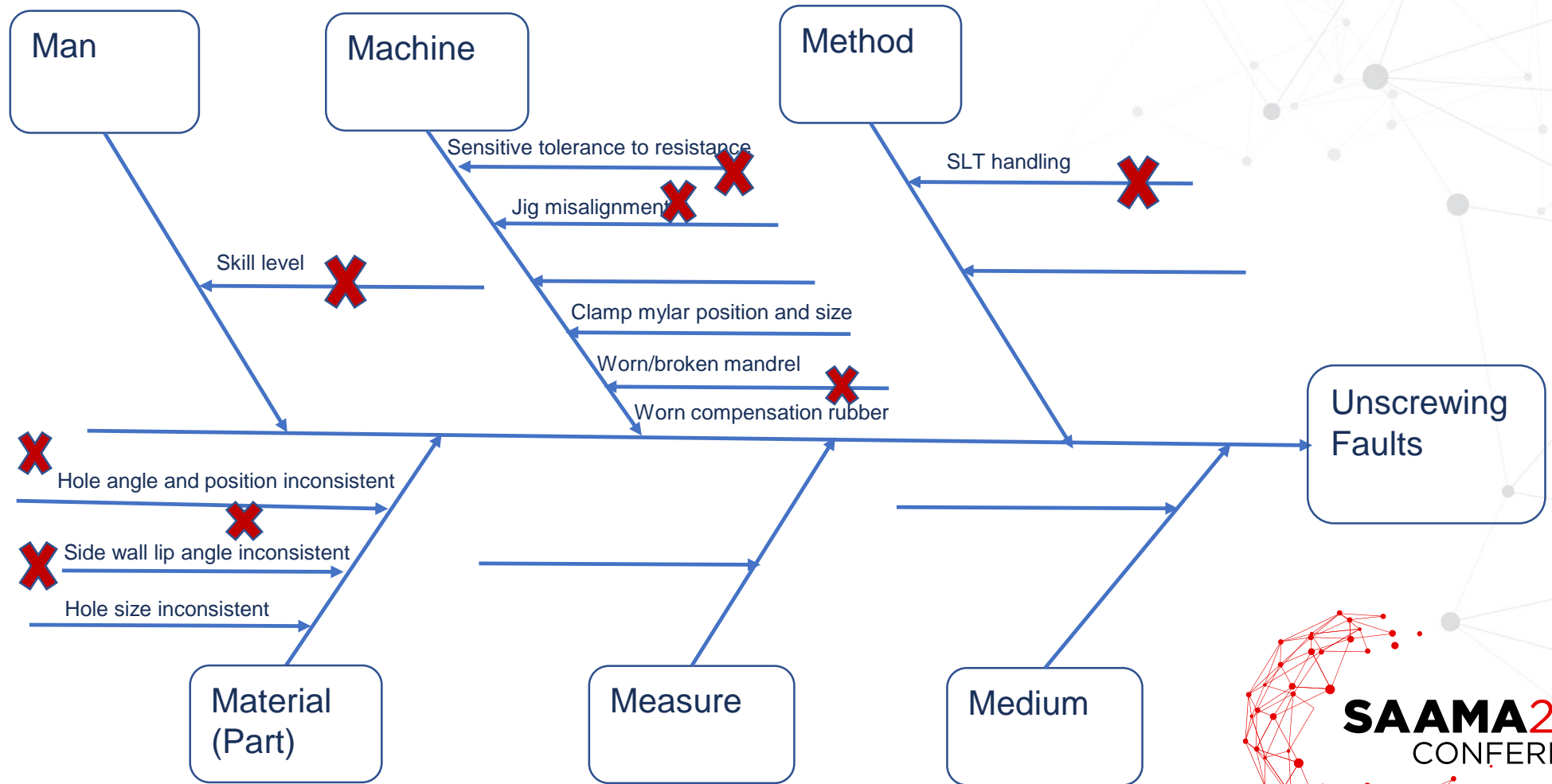
85% of the faults from left hand side of the station

66% of the faults reported as unscrewing faults from the mandrel

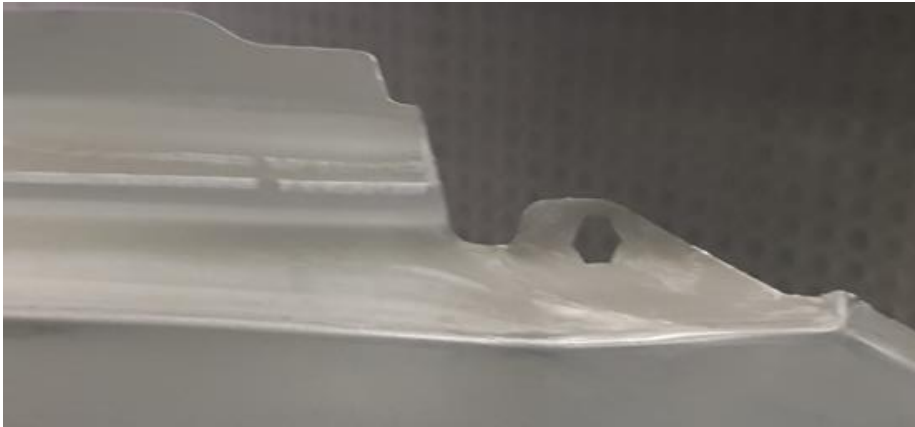
Inaccurate information gathered about the problem. HMI and PLC not synchronised, HMI identified actual faults which were reported as unscrewing faults by the PLC



Analyse | What is the root cause of the gun and part-hole misalignment?



Analyse | Material - Part – Could the part hole be out of specification?



Left Side wall

The logistics/parts specialist had measured the diameter of the hexagonal part-hole and found it to be within the specified tolerance

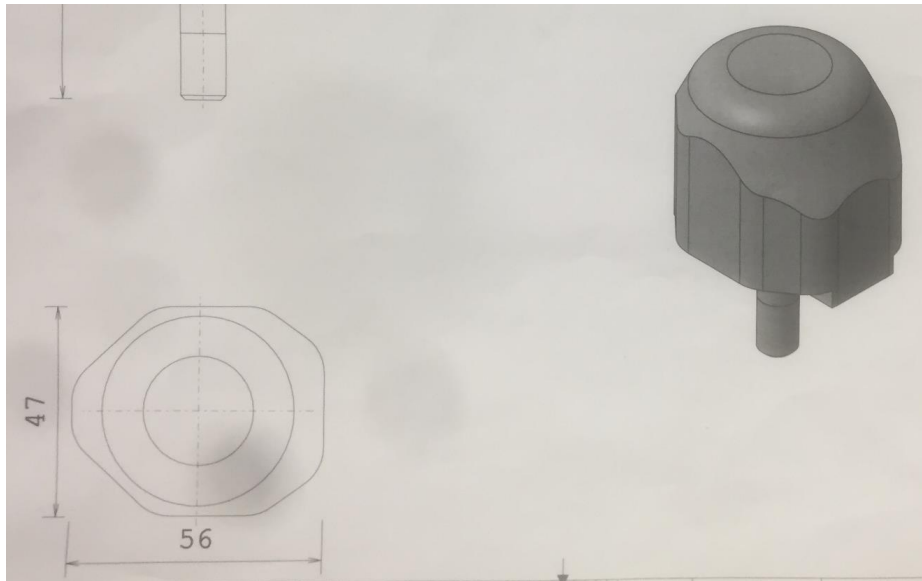
Picture on the right depicts a part that has an angle slightly twisted but was later proven to be an isolated incident by the logistics specialist

Handling of the part – most experienced operator were put at the station and production team manager monitored to ensure that the handling does not cause damage to the part angle

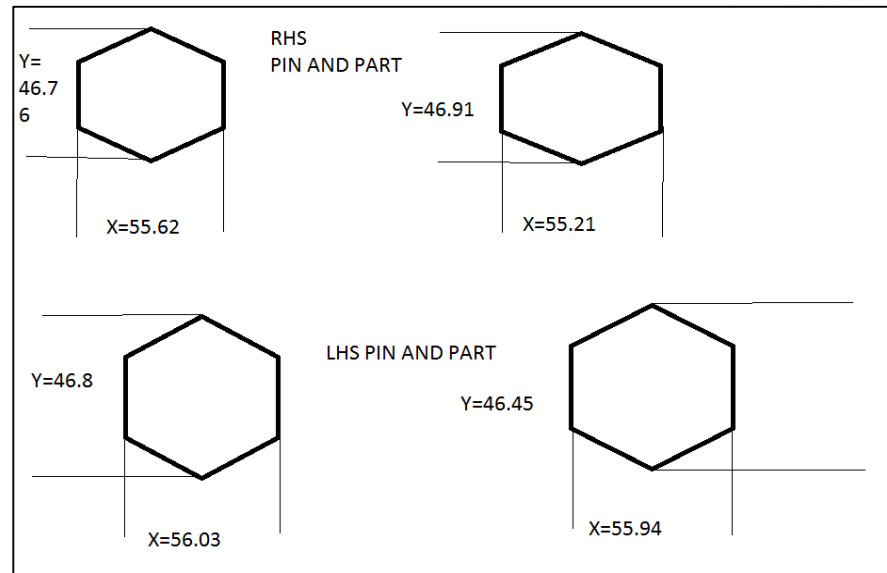
This eliminates the part from possible causes

Analyse | Machine – Locating Pin - Effect of the locating pin?

Analyse: Comparison of the right and the left hand side of the station



Original locating pin dimensions

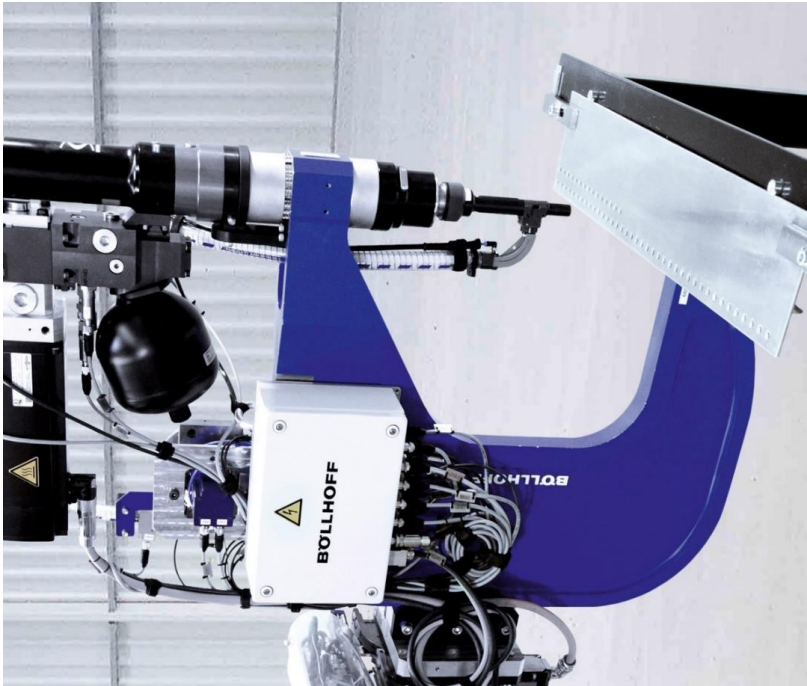


RHS & LHS locating pin and part hole size

When comparing the two diagrams original locating pin and current pin size, one notes that the locating pins are still within the 0.5 mm tolerance

This eliminates the locating pin from possible causes

Analyse | Machine-Gun – Could the gun be shooting inaccurate?



Riveting gun (Source: Boellhoff.com)

The mechanical joining specialist has tested the gun on numerous occasions and proved that the gun is shooting accurately

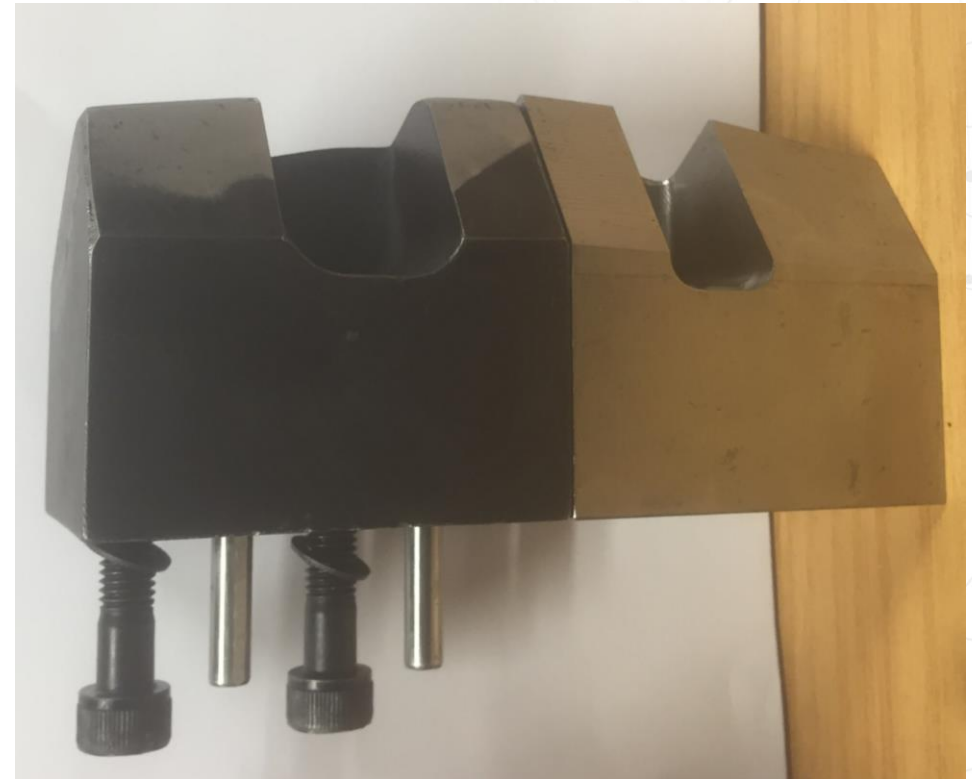
In the previous calendar weeks the specialist has replaced the gun with a new gun from the store and has high confidence that the gun is shooting accurately

All necessary steps have been taken in ensuring that the gun is operating with no faults. Compensation rubber changed and mandrel replaced more frequently by the artisans

This eliminates the gun from possible causes

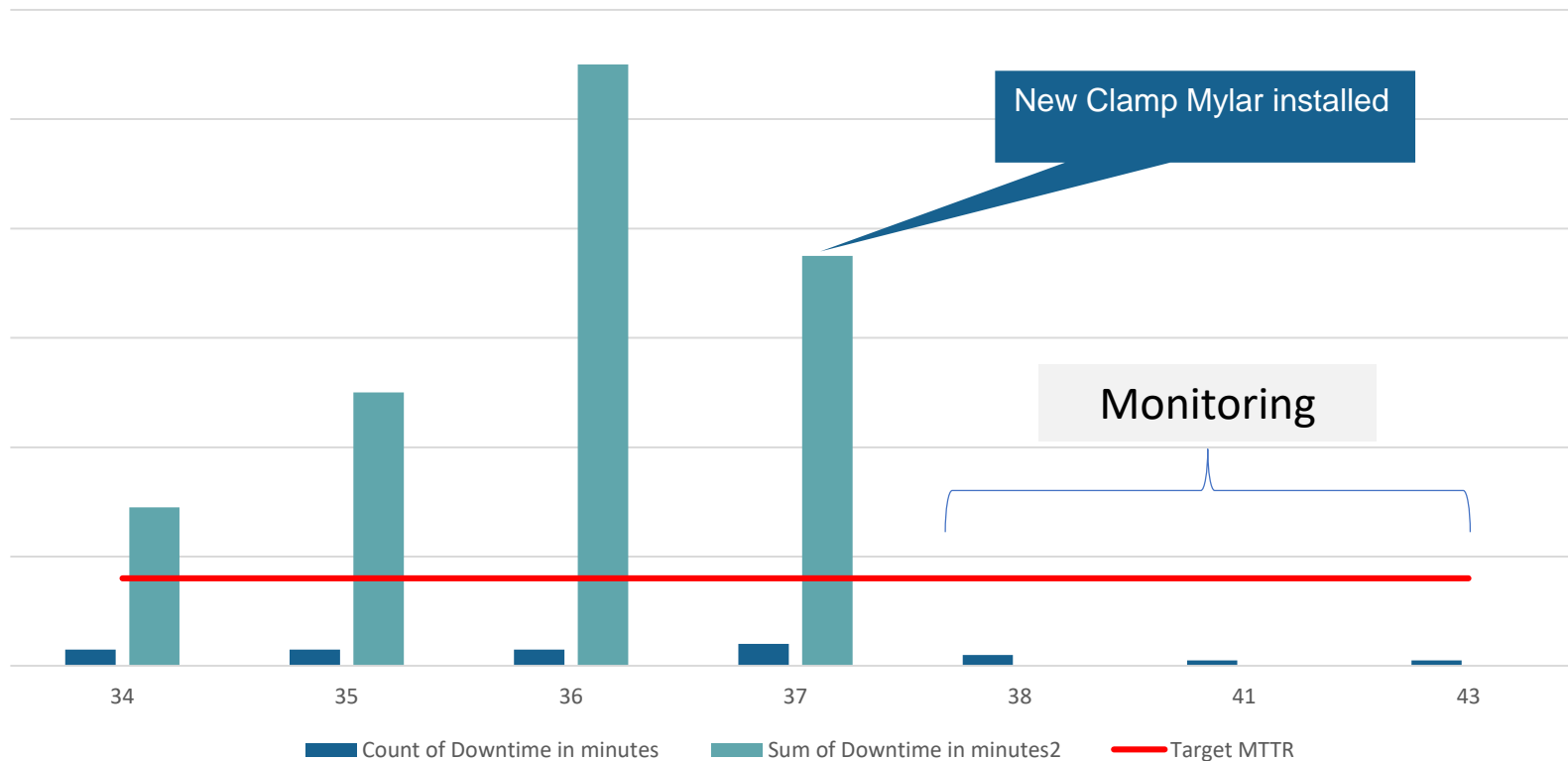
Analyse | Clamp Mylar – Is the mylar clamping correctly?

- The entire team decided to hold meetings at the station while operating and see what else could cause the gun and part-hole misalignment
- On calendar week 37, the team agreed to replace the mylar with a newly manufactured mylar
- The new clamp mylar has a larger surface area and hinges against the corner of the side wall. This minimises the allowable part movement on both X and Y axes and provides extra stability to the part



New clamp mylar and old clamp mylar

Production Downtime and Target MTRR per CW



- The combination of the improvement actions undertaken resulted in zero production downtime in calendar week 38.
- The team agreed to monitor the station for the next three weeks.

The station was monitored from calendar week 37 to 40 and there were no production downtime recorded. Control measures put in place to cement the improvement achieved and FMEA sheet has been updated as follows

- ❑ Activate weekly PM for replacement of mandrel to prevent failures due to a worn mandrel
- ❑ Introduced an annual PM for replacement of the compensation rubber
- ❑ Draw up a new SPL documenting all the processes followed to ensure that the problem is solved efficiently in future
- ❑ Manufacture same sized mylars for all similar riveting stations

Conclusion

Focus on areas with biggest impact

Prioritisation matrix

Cross functional teams

- Balanced and cross-functional teams to improve efficiency of the problem solving forum

Structured Problem Solving

Problem solving tools

- Standardised problem solving process across the organisation

Effective and transparent problem solving tools

Thank you

Any Questions?

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