Standardization of Boeing Tooling Communication and Information

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INTRODUCTION

What is Tooling at Boeing?

Tooling at Boeing refers to unique structures and equipment built for very specific production needs (Fig. 1 + 2). All tools at Boeing are individualized and do **NOT** refer to traditional tools such as drills, hammers, screwdrivers, etc. Tools vary in scale, from drill to hull templates.

Fig 1. Example of a large tooling structure at Boeing

Fig 2. Example of another large tooling structure at Boeing

Problem Statement

Tooling fulfillment is inconsistent and fails to meet projected schedules in the 767 Line, resulting in an increasingly large backlog. There are currently 99 old open orders dating back five years.

Goal

To improve communication, accountability, and order visibility in the Tooling Value Stream (TVS) to prevent and address tooling order delays.

METHODOLOGY

Interviews & Surveys:

Surveyed the work processes and opinions of various TVS roles on tooling delays and the impacts those delays have on their work.

Conducted multiple interviews with 7 TVS members in roles ranging from Tooling Engineer Manager to Tooling Integration Analyst.

Interview Results:

Our interviews revealed some of the problem spots within the TVS

"There are different ways of including buffer and overhead times so maybe Boeing could better align how we schedule orders" -Anonymous Boeing Employee

"This is a 24 hour business with 3 shifts, communication between shifts is where there is a break down." -Anonymous Boeing Employee

SOLUTION 1

Data Analysis

We analyzed non-value added (NVA) time at each station by comparing the estimated flow time & process time. This enabled us to see the relative quantities of time spent at each station. We found that the CMA - construction station processed with the highest average NVA time (42.53%, in Fig. 3) due to the uncommon causes* (Fig. 4).

Causes: lacking capacity/materials, downtime, etc.

Our recommendation is that the Boeing TVS...

- Track the capacity & available materials at each station
- Check shop availability before scheduling orders
- Increase the completion time of orders by 1σ of the estimated delay time
- Outsource work to companies to prevent order delays
- Implement control charts to track all orders

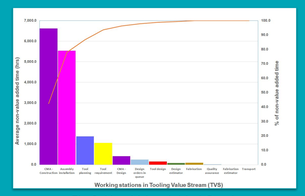

Fig 3. Non-Value Added Graph

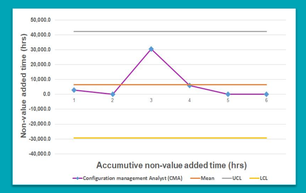

Fig 4. Accumulative Non-Value Added Graph

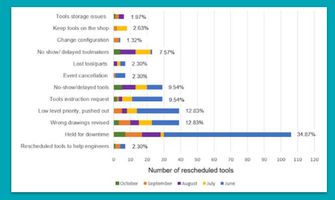

Fig 5. Boeing Held-for Reason Codes and Amounts

SOLUTION 2

Dashboards

Dashboards help improve visibility for tooling orders and provide other relevant information such as headcount and number of late orders.

For TVS (Fig. 6 + 7 below) - Performance metrics and most delayed orders:

1. Provides TVS Leads (Fig 6)/Workers (Fig 7) awareness of overall progress and issues
2. Promotes communication for solving delays. Minimizes the need for using multiple softwares, thereby consolidating information

For Shop/Production (Fig. 8 below) - Displays current and upcoming tool orders scheduled to enter the TVS, as well as any relevant notes:

1. Facilitates accountability between TVS and Shop
2. Creates ample lead time to address schedule conflicts *before* causing last minute delays (as seen in the long bar of Fig. 5 above)

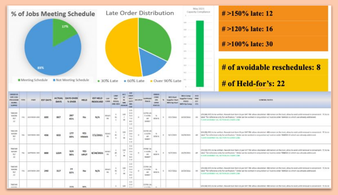

Fig 6. Dashboard for TVS Leads

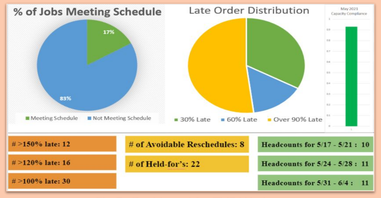

Fig 7. Dashboard for TVS Workers

Fig 8. Dashboard for Production Floor

CONCLUSION

To address the root causes of the tooling delays, our project solution focused on improving communication, accountability, and visibility within the TVS.

Impact

So far in 2021, 20% of the TVS orders are delayed.

Our dashboards create more visibility and accountability throughout the TVS. We project an improvement of 5%, with a decrease in delayed orders in the schedule backlog after implementing the dashboards and data analysis process.

Future Considerations

Further process investigation will take place such as...

- Hiring IEs for second and third shift support
- Verifying actual capacity and amount of material prior to accepting orders
- Increase standard process time by 1σ
- Documenting detailed reasons for order changes and additional rescheduling
- Redefining roles to improve order ownership

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