Using Technology to Support Lean Production in a CNC Machine Shop

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CNC Industries, Inc.

Precision Machining at its Best!

Fort Wayne, Indiana
www.cncind.com

Introduction

- Name and history
- Started at 16
- Wrote a data collection module
- Degree in I.S. – Computers and Finance
- Jobmanager I, Jobmanager II

Steven Deam, Jr.
VP Finance
I.T Manager

CNC Industries' Transformation

- Boxes of paper collected in first 5 years of business
    - 50-75
- Boxes of paper collected in last 5 years
    - 10 boxes (required by contractual agreements for physical data retention)
- Jobs shipped in first 5 years:
    - 1700 with 1,000,000 parts shipped
    - Avg 588 parts per order
- Jobs shipped in last 5 years:
    - 8700 with 4,000,000 parts shipped
    - Avg 459 parts per order

Result *– in just one metric we can see substantially reduced use of printed material*

Note – jobs done in the 90's were significantly simpler and required less information and data per job than the jobs that we have had in the last 5 years.

Role Of Data

- How it is perceived:
  - A punishment
  - Busy work
  - Confusing
  - A headache
- How we *can* use it:
  - Answer questions
  - Report results
  - Make suggestions
  - Reduce waste
  - Improve communication
  - Reduce mistakes

A typical “Info Station”

CNC Industries data philosophy: Good software does not make decisions for us, but it helps us make better decisions faster

Data Vs Making Chips

- If the purpose of the machine shop is to ‘make chips’ why does CNC Industries put such an emphasis on Data?
  - A recent prospective customer: “I passed 50 shops like yours on the way down to here, why do you deserve our business?”
  - Tools, machines, material, and other machining pieces have become commodities, not differentiators
  - How does a better usage of Data give a competitive edge?

Data Vs Making Chips – cont'd

- Best answered through an example:
  - 10 years ago we printed job routers (travelers, packets, etc) for each job that had all the critical information for a job in them
  - Back then a job was ordered from us, manufactured, and shipped – that was the extent of it
  - If anyone needed to find the job router they could easily find it and exchange any papers necessary
  - Now we have jobs that run for 3-5 years, manage inventory for multiple customers – over 300 part numbers for a single customers with many assemblies in the mix.
  - A single job may frequently be in prep, machining, inspection, finishing, inventory, and outsourcing all at the same time – how long does it take to get *all* information updated when there is a change?
  - Better data utilization may be a hidden cost saver – it might not be tangible but it can have big effects on the bottom line.
  - When a problem does occur it can be discovered and fixed quicker – with less chance of a non-conforming part being created
  - Staff make better decisions

I.T. - Expenses or Investments?

- It's not uncommon to see shops that have millions of dollars in CNC machinery running a single CAD workstation on a 10 year old computer.
- With an attitude of IT investment, rather than IT expense, the dynamic can change
- CNC Industries has an Info Station at *every* machine and other important locations in our shop
    - No-one is ever more than a few feet from all information that they need to do their job well
    - All processes are uniformly performed an entered in our ERP (Job Manager)

Importance of Standardization…

- It is startling to us how many companies, both customers and vendors, cannot:
  - e-sign documents
  - Create PDF forms
  - Implement online data collection
  - Send PO’s and invoices through a digital system
  - Import data from a non-excel source into their system

How to Improve?

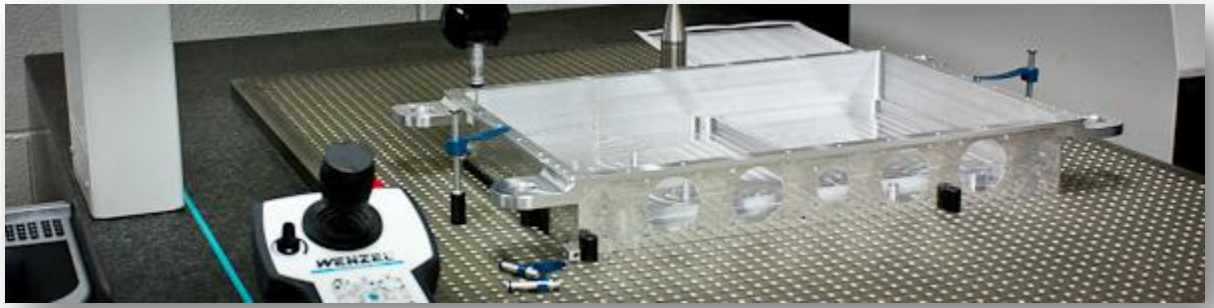
As always – management buy-in, if improvement in data handling is not a management priority, it will not improve

- Use the lean tools that you already know and apply it to data and information
- Find the wastes
- Use the standards
  - Emailing a file? Think pdf
  - Data exchange? .csv of .xml
  - There are standards for just about every type of file
  - File transfers: encrypted email, ftp, dropbox, lots of options
  - Use fast communication methods when possible
  - Email instead of faxing
  - Create fillable forms
  - Use digital signatures

How to Improve?

Data Collection

- What do we need to collect?
- Minimize Data Collection – don't track unnecessary metrics
- Always ask
  - "How does this help me?"
  - "What would I lose if I don't have this information"



Philosophy: Data must serve the company, the company never serves the Data

- Data should always reflect what *really* happened.
- Where do we need to collect it?
- Collection works best when it needs the least thought.
    - Employees clock in to the same terminal they work from, clocking-in automatically opens their assignments for the day and gives them their job information.
    - At the bench where employees count their pieces produced each shift, the information station is sitting within arm's reach of the part container
    - Examine time, movement, and other wastes when looking at data collection
    - Data that is difficult to enter:
        - Will frequently just be skipped
        - May cause the employees may enter incorrect information to save time

The Paperless Shop…

Can the paperless shop exist?

- Our job packets have changed from 40+ pages (specs, routers, drawings, setup sheets, inspection reports, etc.) to 2 pages – cover page and drawing copy for reference at the machine.
- We have eliminated around 95% of all printed reports and papers that we used 10 years ago.
- What are the benefits of the paperless shop?
- Changes to production can be transmitted instantly
- Everyone works off of the same information
- Document control is automated – great for ISO and AS standards
- Feedback reaches appropriate staff quickly

Data Visualizations…

How data looks affects how it is used

- The Grid:
    - Screenshot of excel grid
    - all information is present
    - where are the problems?
    - Very common view
- The chart
- Excel has great, nearly automatic charting
    - Problem areas can be found very quickly
- How to aid understanding through visualizations
    - Use size
    - Use Color
    - Use Position
    - Use the appropriate visualization for the need at hand.
    - Show three views of a schedule – a grid, a chart and a visual schedule -

Success stories…

Customer Order Process

The problem

- Customer sent us daily need requirements that covered a variety of different reports
- We did not ship daily, the information was often redundant and could lead to over/under shipping a part if it was not done correctly
- Information, once understood, needed to be looked up inside the ERP on a part by part basis to get current status.
- Time taken was approx 1.5 hours every day

Solution

- Standardize their un-standardized format
- Use Notepad ++, free advanced text editor to convert their file to delimitated standard file
- Import Data to Excel Sheet created for the process
- Sheet connects to Job Manager and draws current inventory and production status for each part requested.
- Refresh data connections

Results

- Formatted report that shows status of each job
- Automated shipping labels printed for the packaging
- Total time taken 5 minutes every day
- Time Savings: 283 Hours / Year
- Secondary benefit, process can now be completed by someone other than plant manager.

Success stories…

Monthly Accounting Review

The problem

- Our bank did not use a standardized reporting format, all information from the bank had to be manually reconciled with our internal accounting system
- Our accountants took 1 day on site and 2 days off site to reconcile our accounting system each month.

Solution

- Create standardized report from bank information that they do give
- I needed to research banking standards to find ofx standard file
- Make account reconciliation an internal task

Results

- Account reconciliation takes around 1 hour per month, down from 3 days.
- Total Savings: 276 hours / year ($26,000 approximate savings)

Success stories…

Accounting system is outside of ERP system

The problem

- Our invoices needed to be double entered – once in ERP and once in the accounting software
    - Duplicate entry:
        - Made it more likely to have a mistake
        - Took significantly longer than necessary
        - Created a need to add monthly reconciliation process to ensure that our ERP and accounting software matched up

Solution

- Custom module in ERP that organizes invoices that have not been sent to customers
- ERP system creates invoices to send to our customers
- ERP system creates standardized accounting report to import into accounting system
- ERP system sends emails to all customers that allow non-printed invoices to be sent to them

Results

- Manual Data Entry eliminated from accounting system
- Reconciliation step eliminated
- Errors from miss-invoicing significantly reduced
- Approximate time savings: 300 hours / year
- Additional savings: 1 less overhead position

Success stories…

Purchasing

The problem

- Purchasing process was deemed to be inefficient
- Plant manager reviews schedule and creates batches
- Plant manager printed a report and highlighted job numbers to order
- Purchaser would look up parts required for highlighted jobs
- Purchaser adds all items to excel sheet and compares for similar parts
- Purchaser enters information back into ERP to get RFQ's
- Purchaser gets quotes and enters prices into Excel
- Purchaser re-enters best prices into ERP to order
- A single material order could take 7-8 hours
- Items that need purchased are effectively re-entered 3-4 times

Solution

- Completely re-do purchasing
- New process:
- Plant manager reviews schedule and creates batches
- Batch information and parts required are passed onto purchaser including due dates and grouped by similar product
- Purchaser sends items to Vendors for quote
- Purchaser enters quoted prices into ERP
- Purchaser selects vendor to buy from and sends PO
- New process is self-contained and requires no duplicate entry
- Material process takes 1 hour typically.

Success stories…

Purchasing - continued…

Results

- When our purchaser left the company, we did not replace her, instead another office staff was able to take on purchasing as a task in addition to their existing work (which had recently undergone it's own automation pass)
- Purchasing dropped from 40+ hours per week to 10-15 hours depending on volume
- Time Savings: 1300 Hours / year
- Additional savings: 1 less overhead position

Success stories…

Pull System Tracking

The problem

- Managing 150 part numbers on a fully JIT manufacturing process for a customer
- Any inefficiencies in production or batch size could cause tremendous difficulties as we keep up with heavy demand on their parts.

Solution

- Multiple interfaces to gather and display Pull System information
- Reports written to give our customer up to date information on all of their parts at any given time.

Results

- Customer increased their work with us 300% and has recently said they would like t to potentially double that amount, and *“you guys make my job a lot easier”*
- Customer has gone from 3 purchasers in their mechanical division to a single purchaser who also handles other duties.
- Other purchasers were reassigned not fired
- AS Certification

Success stories…

AS Certification

The problem

- AS 9100 contains many stringent requirements that are difficult for a company our size (35 at the time of certification) to enact in a cost effective manor
- We are unable to afford dedicated staffing to ensure AS compliance – it must be done part time, as we have time
- All parts produced have strict traceability requirements among other issues

Solution

- Custom written ERP system handles all document management and compliance related issues
- Many modules and changes to the ERP system allow for full traceability without requiring increased data collection or staffing

Results

- Passed AS certification with only 2 minor findings, both patched within 3 days.
- Certification successfully upgraded and renewed this year with only minor modifications to the system since our first Cert

Conclusion

If we view data as a tool, like any other we can make our businesses more competitive and handle the increasing demands of our customers without breaking the bank

Data and data collection are a means to an end – all information collected and reviewed should be useful and add to the company's bottom line.

About CNC Industries, Inc.

Located in Fort Wayne, Indiana, CNC Industries, Inc. is an AS9100 certified Job-shop specializing in high-speed CNC Machining, Rapid Product Development, Fabrication, and Assembly of component parts.

Serving the Aerospace, Defense, Medical and Industrial markets, CNC Industries is committed to providing exceptional value through Competitive Pricing, Superior Quality, Dependable On-Time Deliveries, and Exceptional Customer Service.

Not only has CNC Industries applied proven Lean Manufacturing principles throughout the company, we have innovated numerous Lean initiatives specific to machine Shops.

Every year CNC Industries, Inc. provides hundreds of thousands of precision machined and fabricated parts to companies of all sizes – many of whom single source their parts to us.

Our brochure can be downloaded [here], or click [here] to contact us now.

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