

Computer-aided Optimization of Setup on a Forging Press

PROBLEM

Many Lean/Six Sigma projects being executed today are significantly hindered by the reliance on manual tools that are outdated and incapable of solving complex problems.

SOLUTION

Use computer software to replace or enhance Lean/Six Sigma tools

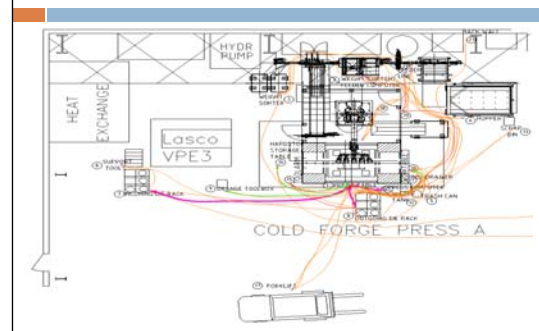
1. **Develop a flowchart-like methodology** (Smart Chart™) to observe, document, visualize and analyze a process for waste elimination.
2. **Enhance the manual Lean/Six Sigma Tools** using Industrial Engineering (IE) science, algorithms and optimization methods.
3. **Leverage COTS** (commercial off the shelf) software to implement the Smart Chart™ methodology.
4. **Validate** the ideas and **tools** of the Smart Chart™ methodology on an actual production process.
5. **Document and disseminate** the knowledge gained to the forging industry via technical reports, webinars, and workshops.

IMPLEMENTATION

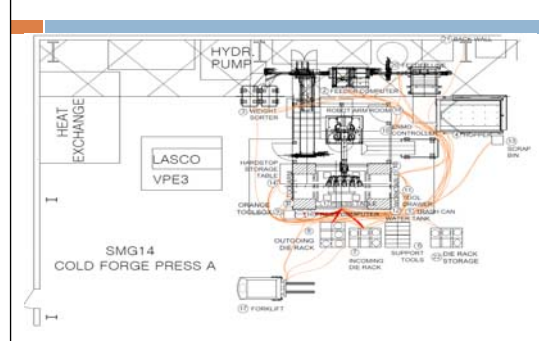
The first major project under Step #4 above to validate the Smart Chart™ methodology was undertaken at the Columbus, OH, division of Hirschvogel Inc., following these steps:

- **Chose process:** setup procedures for two identical cold forging presses, one was manually loaded & unloaded, the other used a robotic arm.
- Videotaped complete setup from start-to-finish.
- Created a spreadsheet, by analyzing video, with the detailed step-by-step timeline for all the sub-processes that comprised the setup procedures.
- Converted data on the spreadsheet into various IE charts that were analyzed using suitable algorithms in PFAST (Production Flow Analysis and Simplification Toolkit) and optimization models for Methods Analysis and Work Design.
- Finally, **improved the sequencing and scheduling** of the entire setup process using MS Project.

Spaghetti Diagram (Current)



Spaghetti Diagram (Future)



The Spaghetti Diagrams for Current and Future states of the work cell revealing a reduction in product & worker travel times

BENEFITS

- 25% reduction in the machine setup cycle time, start-to-finish, from 125 to 94 minutes.
- An estimated increase in capacity allowing up to an additional \$300,000 in annual sales.
- 32% reduction in total distance travelled by the operator, from 1167 to 797 steps (walking).
- 17% reduction in the average number of steps required for machine setup, from 456 to 382.

PROJECT TIMELINE

Start Date: September 2009

End Date: January 2011

OVERALL FUNDING

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Cost Share \$163,682

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