Staying Lean with Electronic Work Instructions
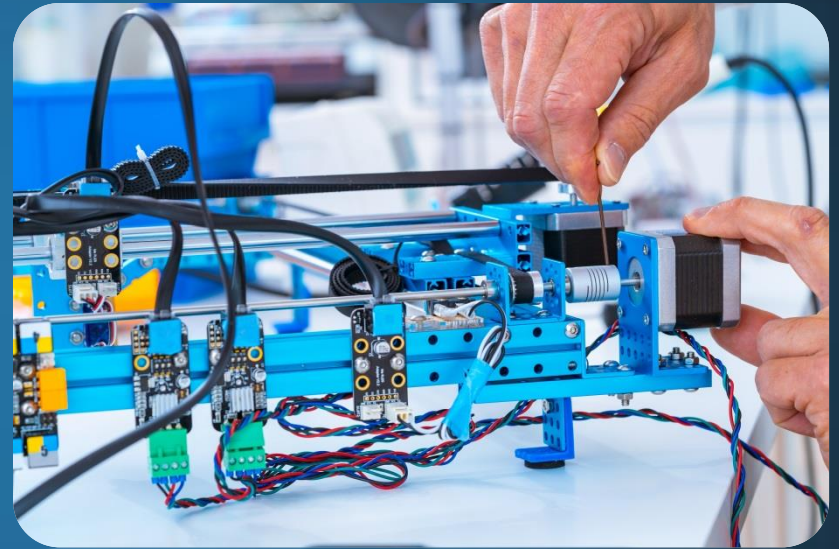
Jack Hay

Sequence Software

www.sequencesoftware.com

Staying Lean with Work Instructions

- Definition/Function of the work instruction
- Survey of what we see at customer sites
- Shift the way we think about WI's
- Methods of creating work instructions
- Glean gold from your work instructions

Function of the WI

- Many vernaculars
- Systems to schedule resources: parts, people, work center, tools, and machines
- The work instruction is a description of what the operator needs to do

Anecdotal Survey

- What I have seen at customer sites over 15 years…
- Every company has information for manual assembly processes
  - Tribal knowledge
  - 'Ask Phil' when tribal knowledge fails
  - Engineering drawings or exploded views
  - Paper work instruction: binders, hanging, job packet
  - Electronic access: 4 or 5 documents via Lotus Notes or SharePoint
- May have single managed document for the entire routing, or it may be broken down by operation
- Often WI's are managed in Word, Excel, or PowerPoint

How's that Working Out for You?

When I ask, "How is your current method working," what is the response?

- PAIN!
- Authoring is ineffective with MS Office Products
- Office tools do not integrate to other systems to share data
- Excessive time for version control and management
- Impossible to do quick changes due to ECR or redline
- How to get to a paperless environment
- How to achieve a common format
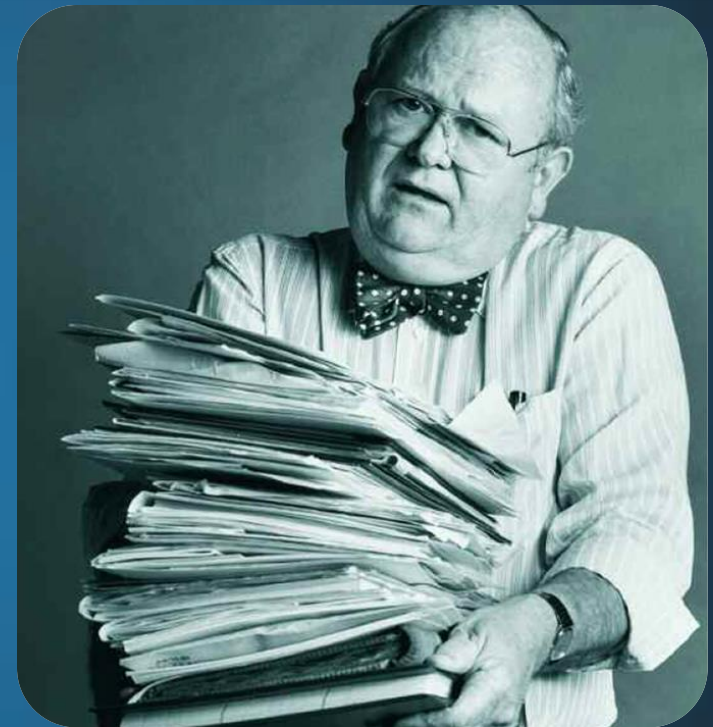
Work Instructions Make My Brain Hurt

- Q: Why should we spend money improving work instruction methodology?
  - It will save me a lot of time
  - We had a fire drill that cost the company money
  - I'm new at the company and organization of work instructions is confusing
  - Redlines are a hassle
  - ME's are pulled too much into manufacturing
  - Speed up the NC process
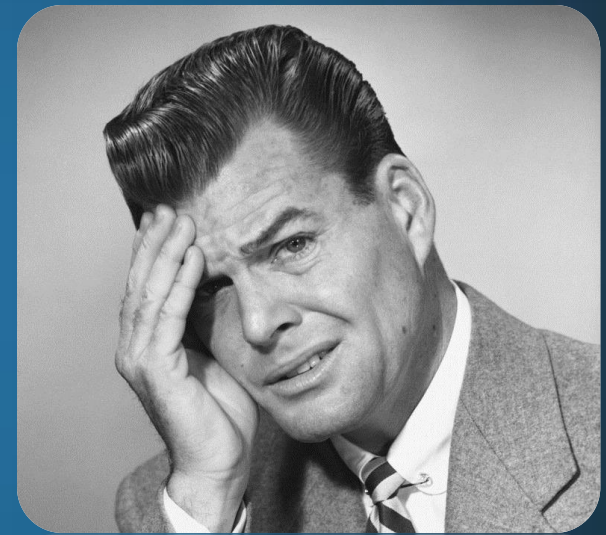
Work Instructions Make Money

- A: Company makes money when product leaves the loading dock with an invoice
- Anything that slows that down is bad
- Anything that speeds that up is good

- …but, this has to happen at the price point and quality acceptable to the customer

One More Thing, Mr. Columbo
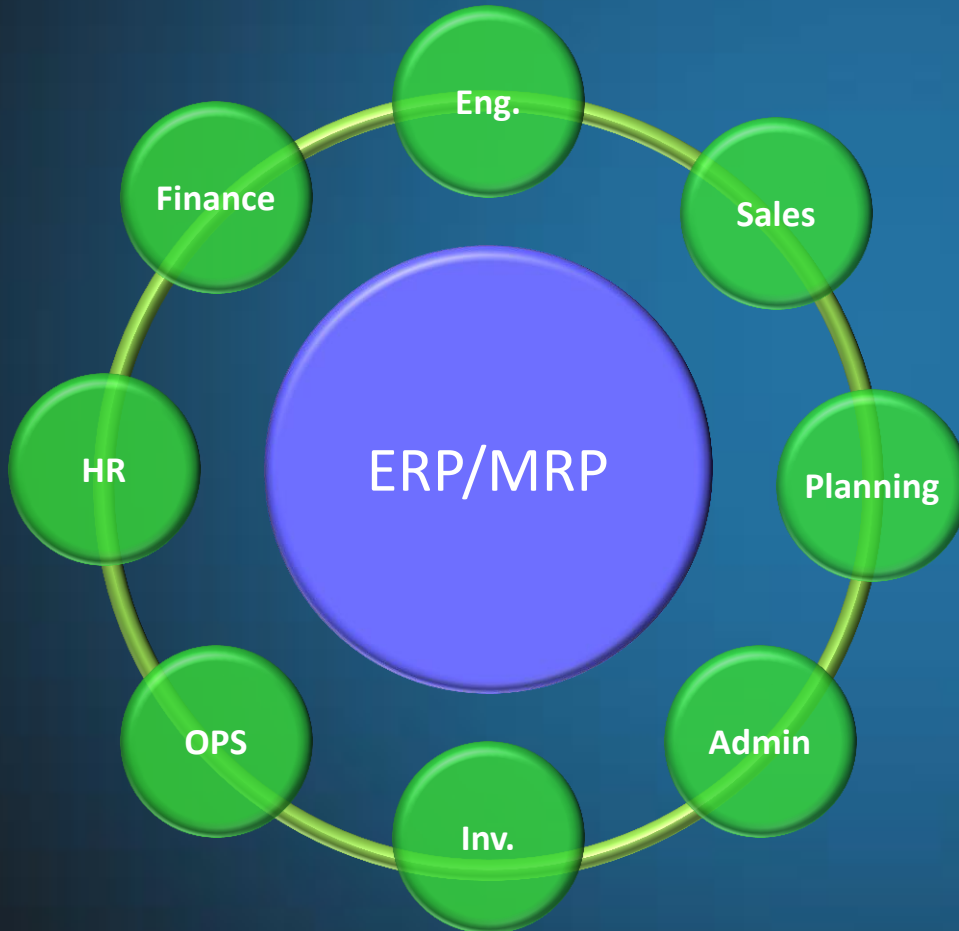
Visible

Not-so
Visible

Problem with Traditional Methods

One customer had to send a service tech to China to install a $2 spring on a $250,000 instrument

Problem: Wrong Tool

ERP/MRP

- Eng.
- Sales
- Planning
- Admin
- Inv.
- OPS
- HR
- Finance

Work Instruction

- Bill of Materials
- Bill of Tools
- Routing Operations
- Configurations
- Steps
- Media

- *Dual Entry*
- *Formatting*
- *Media annotation*
- *MRP Changes*

What Goes into a Work Instruction

- Novick and Morse, *Memory & Cognition 2000, 28 (7), 1242-1256*
- Studied importance of media in learning a process
- Text only, text with final picture, or picture at each step?
- Accuracy, time, and recollection were studied

Solution: New Tools for 21st Century

1. New tools significantly reduce time to author and maintain work instructions (50-90%)
2. Encourage extensive use of pictures and video
3. Consider work instructions that can auto configure to WIP routers and BoMs.
4. Consider work instructions that automatically open via automatic guided carts or vehicles, or from a call in the MES system, or a barcode scan
5. Global instructions

Data Model

- Data for WI fits a model that can be stored in a relational database
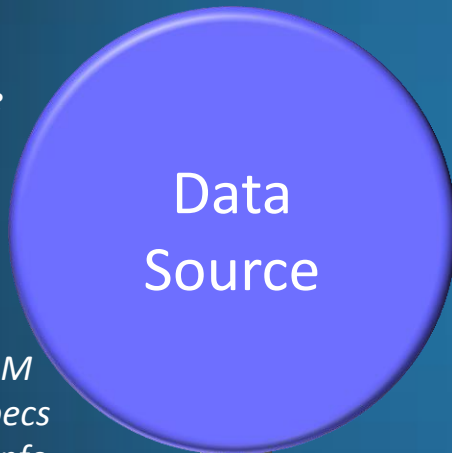- Leverage data from other systems
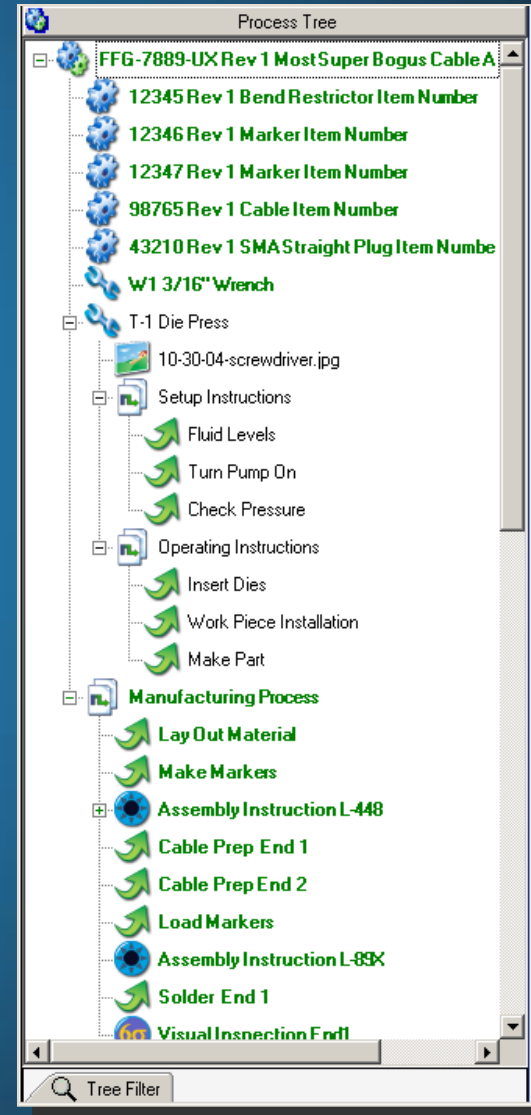
Systems Approach

Graphical tool for authoring

Production Environment

Sources include
- ERP
- MRP
- PLM
- MES

... Item Info
... Routings, BOM
... Drawings, Specs
... Work Order Info
... Vendor Info

Data Source

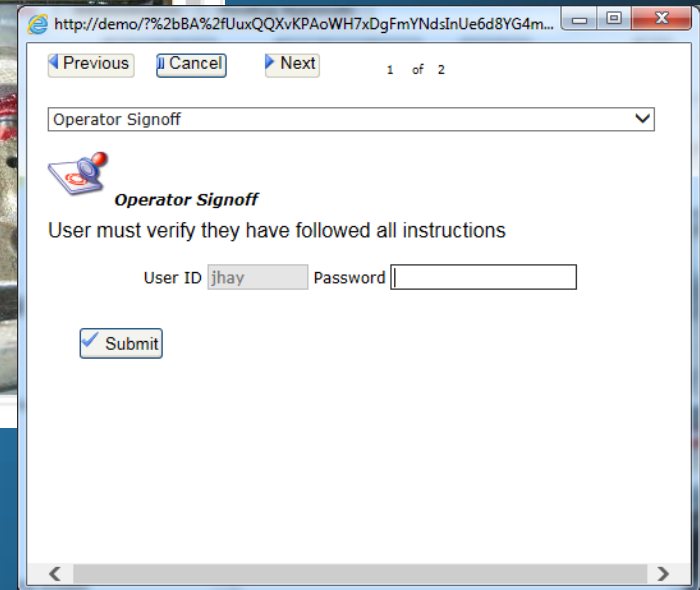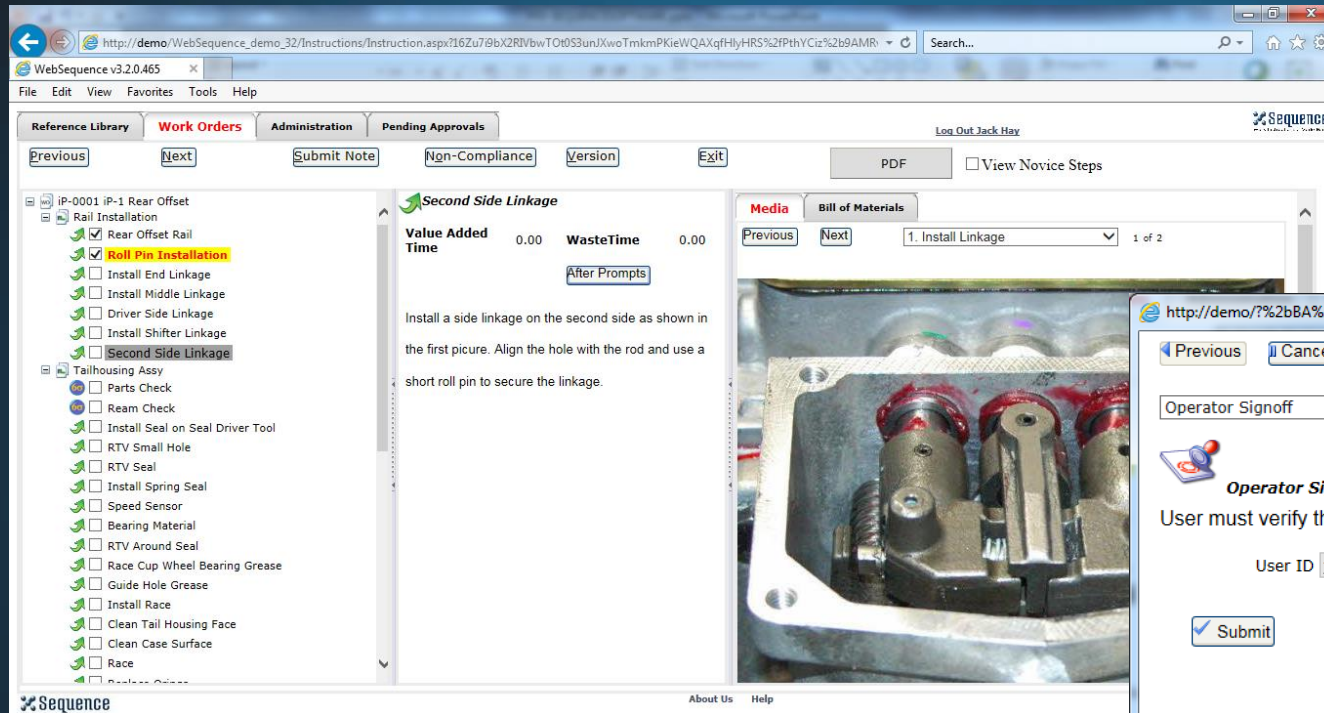Sequence Database

Electronic Deployment

Other Benefits

- Electronic feedback to engineering if a process step is incorrect
- Electronic redlines
- Electronic rework work instructions on non-complying product
- Electronic signatures for work performed
- Track electronic data
- Automatic, electronic DHR or PRB

Case Study I: Hubbardton Forge

- In 2009 the product line included more than 1,000 base items
- Printed instructions (17,000) filled 12 large file cabinets (46 drawers)
- 30 man hours each day locating, pulling, and creating shop packets
- 10 reams of paper per week
- In 2013 rework goal was 7.2%
  - Achieved 4.3% that same year
- Completely electronic with Sequence
- Still a customer today and talking about next steps with MES integration

Case Study II: AS&E

- Data capture for production record book for the customer.
- 15% reduction in new product deployment and engineering time
- As much as 2 week reduction in time between design and manufacturing
- 240+ man hours per month reduction in administrative labor (1.5 people per 8 hour shift)

"Revenue per employee, an efficiency metric, reached $590,000 in FY 2010, $45,000 more than the previous year." –2010 Annual Report

Testimonial of a Technical Writer

- A customer that manufactured three product families had never successfully documented one family.
- The customer hired an experienced technical writer that had never seen Sequence and was tasked with documenting one product line.
- This work was performed in 2005. The division has been through a number of acquisitions and is still a customer today

thus offers opportunities for technical communicators. There are other database-driven applications that help streamline the documentation process, such as AuthorIT, but as far as I know, Sequence is the first software specifically designed to document assembly instructions and work directly with a company's inventory-control system, so that changes in parts and assemblies are automatically updated in the output—written, pictorial instructions in HTML or PDF format. The software enabled me to document 539 pages of instructions—with 1407 images and 530 parts—in 24 days.

In this article, I discuss using this software to transform "tribal knowledge" into written instructions by observing production workers as they assemble parts, recording in words what they do, and taking photographs to illustrate those words. I discuss the reasons for conducting such a project to arm technical communicators in manufacturing facilities with language that enables them to convince their employers to undertake the transformation.

Tribal Knowledge in a Manufacturing Environment

(see Brad Connatser article "Transforming Tribal Knowledge into Written Instructions," Intercom, April 2006, pp. 20–23)

Summary

- Work instructions are used to mitigate internal costs of failure or meet customer requirements

- Many companies view work instructions as a cost center, but really they should be considered a tangible asset

- Think about how improved flow on work instruction creation, management, and deployment can affect shipping product

- Encourage you to come by booth 2609 and see how we *Make Work Instructions EASY!*