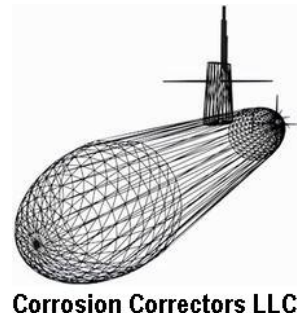


# Graduated Coating and Surface Preparation QA/QC Processes

Project Update

NSRP SP-3 Panel Meeting

October 17-18, 2007





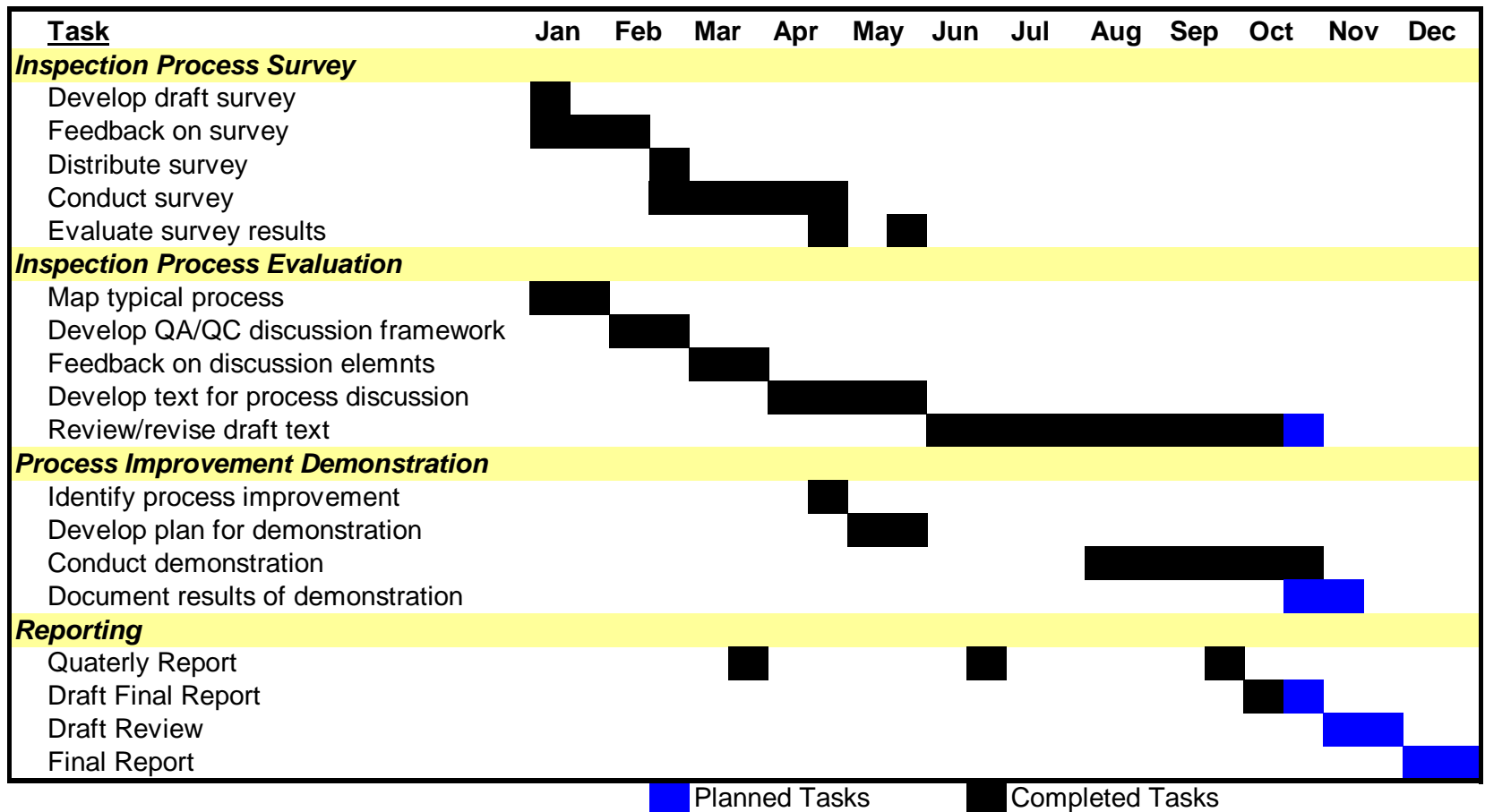
# Project Goal

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- Improve Coating Inspection Process
  - Produce a *guidance document* which identifies/demonstrates technologies and processes which may *reduce the cost of QA/QC* without impacting the quality of workmanship or the risk associated with achieving that quality

# Project Schedule

## *NSRP Coating Inspection Improvement Project Schedule and Milestone*





# QA/QC Inspection Process Survey

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- Purpose – to determine popular opinion
  - What ***non-conformities***
    - Are most likely to occur
    - Have the greatest impact on coating life
    - Are most expensive to repair
  - What ***inspection processes*** are
    - Most expensive
    - Most ambiguous
    - Least effective



# Key Take-aways

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- For the most part, there is agreement that inspection processes are effective, appropriately priced, and not ambiguous
  - Visual criteria will lead to more disputes and may be less effective at detecting non-conformities
  - Inspections for small areas drive cost
  - Bressle, Testex, and Electrical Holiday inspection are most expensive
  - UV inspection for missed areas is deemed a potential benefit
- Automatic data collection and storage has the potential to significantly impact inspection processes
  - Requires electronic means of measurement



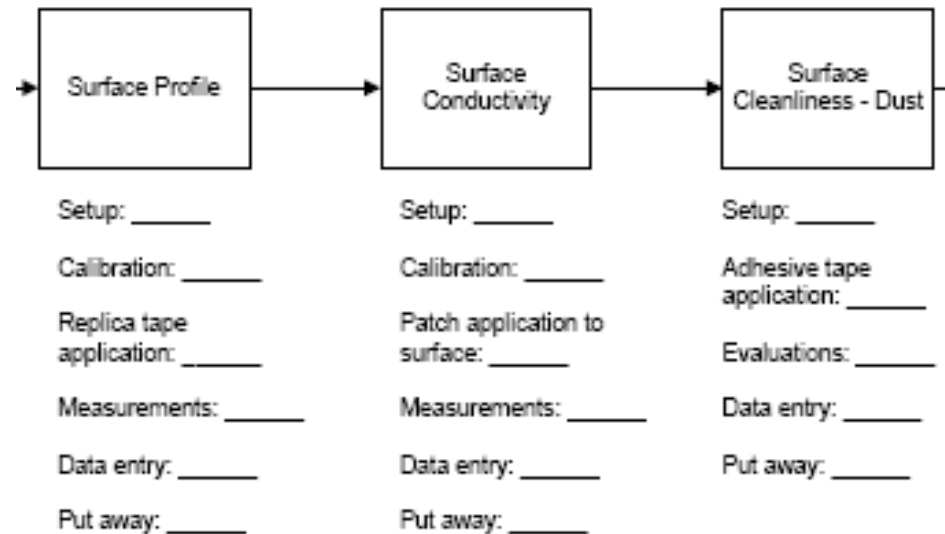
# Process Analysis

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- Evaluate each inspection process
  - Purpose
  - Alternative methods
    - Advantages/disadvantages
  - Detailed process evaluation
  - Data/Results analysis
- Put into context of project
  - Value Stream Map
- Provide rubrics for shipyards to use
  - Detail is shipyard specific
  - Final report will include “lean” guidance

# Value Stream Mapping

- Focus on QA Steps
- Delineate Process time from Production Time
- Guideline for Shipyards to use
- Possible development of a spreadsheet model





# Process Analysis Conclusions

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- Inspection is not a value-creating activity
  - Inspections which could be carried out during value-creating activities would reduce overall costs
    - Collecting inspection data during production
    - Inspecting paint during “drying”
- Time required to access structure may be the dominant component of “inspection time”
  - Wait time after notification
  - Security checkpoints, etc



# Demonstration Project

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- Completed August thru October at Todd
  - Detailed process evaluation of 009-32 practices versus more automated processes
  - Focus on time measurements

# Demonstration Project

- Ambient condition monitoring
  - DPM Datalogger
- Dry Film Thickness
  - Positector 6000
- Surface Profile
  - Elcometer 224 Digital Profile Meter



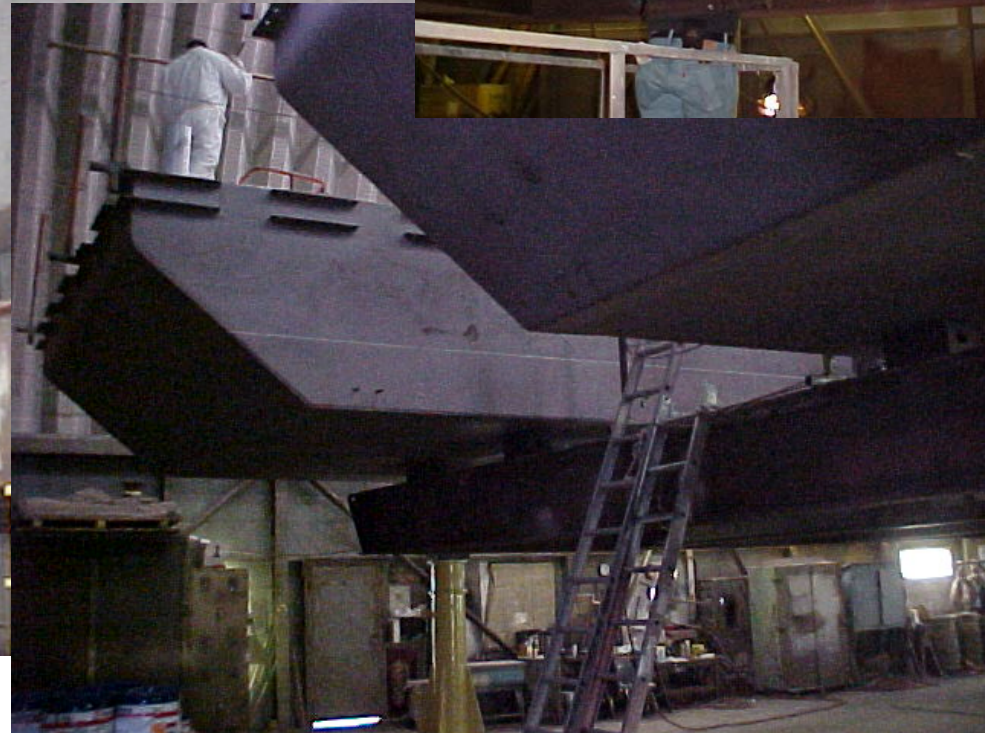
# Excavation Barge



# Excavation Barge



# Navy UF 28 and UF 53 Hulls



# Typical Demonstration Data

		Used scissor lift to access: UF 53 hull		UF 28 hull	
Surface profile / preparation method (5 minimum; 3 tape readings = 1)		critical ↑ 3.10.5	(l) (G)	test ex App. 3	elcometer data logger
				Test ex tape	elcometer 224
				<b>manual</b>	<b>automatic</b>
10/2/2007	Set up ft <sup>2</sup> to determine number of readings. 1500 ft <sup>2</sup> .			2 min 13.8 sec	2 min 13.8 sec
10/2/2007	Prepare & fill out Appendix 3, 2 pages			3 min 9.8 sec	
10/2/2007	Verify calibration			30 sec	30 sec
10/2/2007	Place, burnish, measure, & stick to App. 3; 7 readings, 21 tapes			15 min 6 sec	
10/2/2007	Average / calculation & notation to App. 3			2 min 23.1 sec	
10/2/2007	Measure 7 spots, 10 readings ea.				7 min 45.6 sec
10/2/2007	Upload & print from elcometer program				included above
Total touch time:				23 min 22.7 sec	10 min 29.4 sec

Note: elcometer 224 is ASTM D 4417, Method B and is not allowed to be use per NSI specificaitons untill FY-09.. maybe.

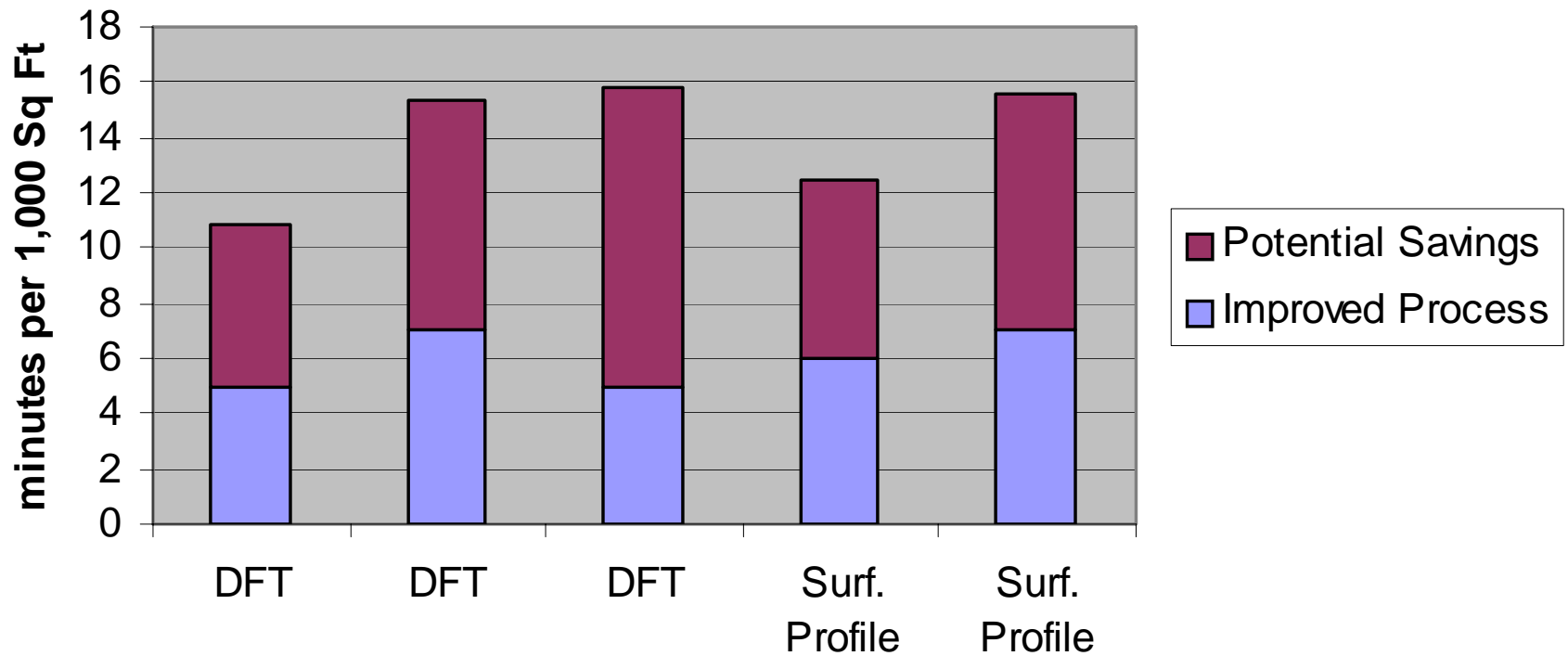
1402.7 sec

629.4 sec

auto is 2.2 x faster

# Results Summary

## Inspection Process Time



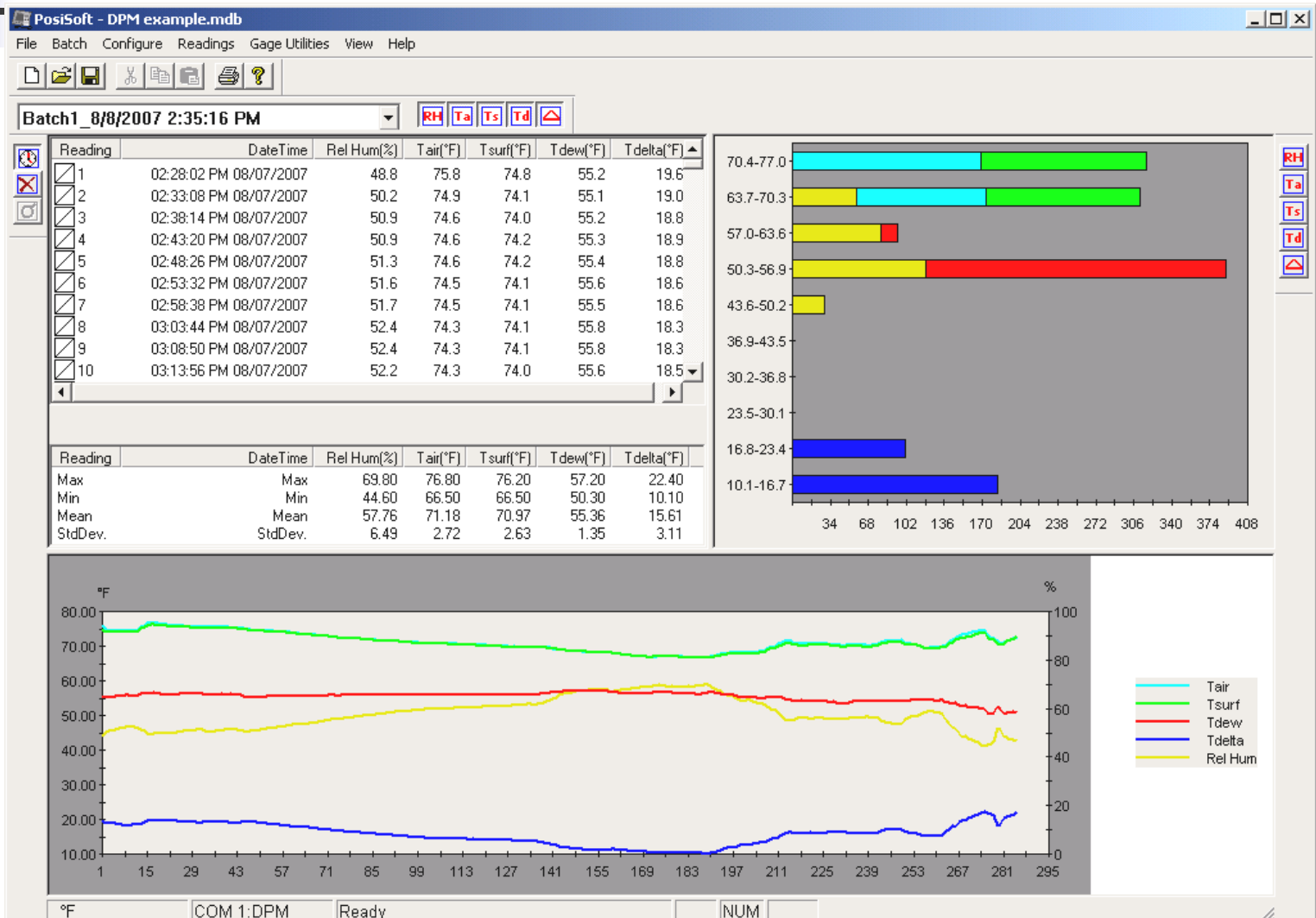


# Demonstration Issues

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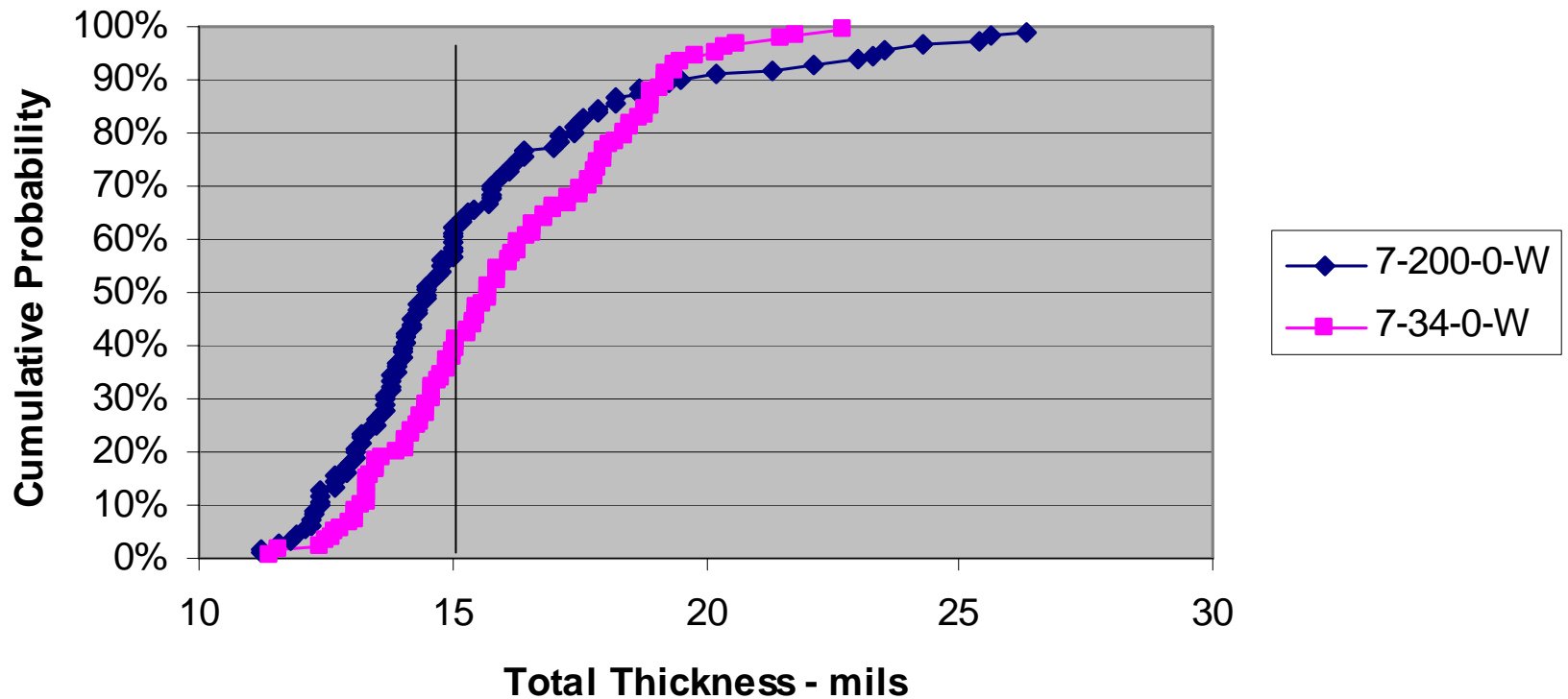
- Times are operation-specific
  - NSRP member survey of “typical” operation times?
- Issues to adopting automated data acquisition
  - Analysis issues (averages versus data distribution)
  - Formatting issues (recording individual readings viz spot average)
  - Transcription of data to traditional forms
  - Revised standard procedures (PA-2 vis statistical analysis of DFT data)

# Process Control Charts



# DFT Distribution

## 3rd Coat Thickness Distribution





# Summary

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- Completed Survey
- Completed process analysis
- Completed process improvement demonstration
- Working on Final Report
- Anticipate December 31, 2007 completion



Questions or Comments?

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