NCSX
National Compact Stellarator Experiment

Onsite Fabrication Overview

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Outline

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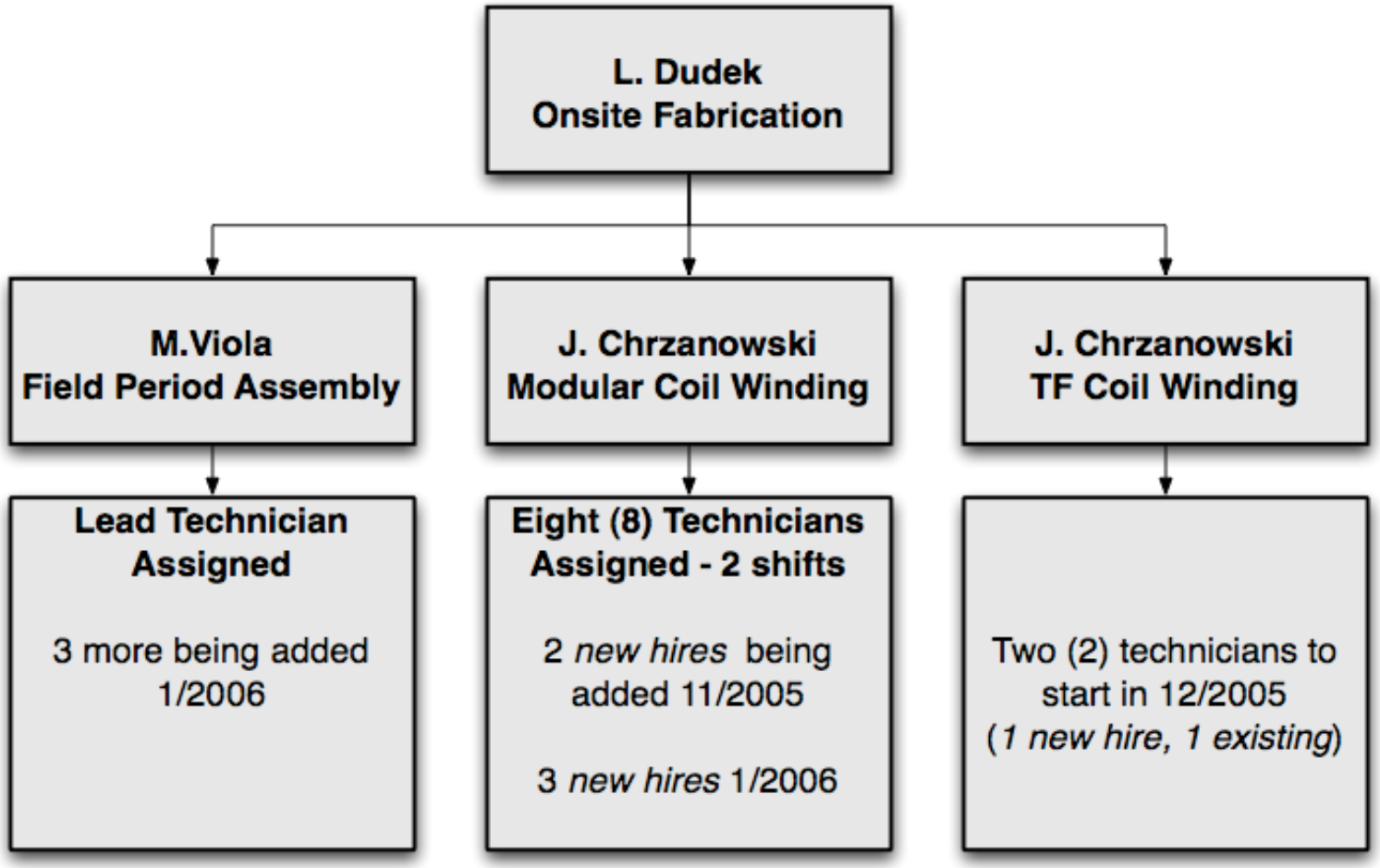
- Organization
- NCSX Manufacturing Facility Status
- Plans for FY06
- Facility Operations Plan
- Make Buy Decisions
- Summary

Fabrication Organization



Plus additional support from FOM Division Tech Pool

Fabrication Facility Floor Plan

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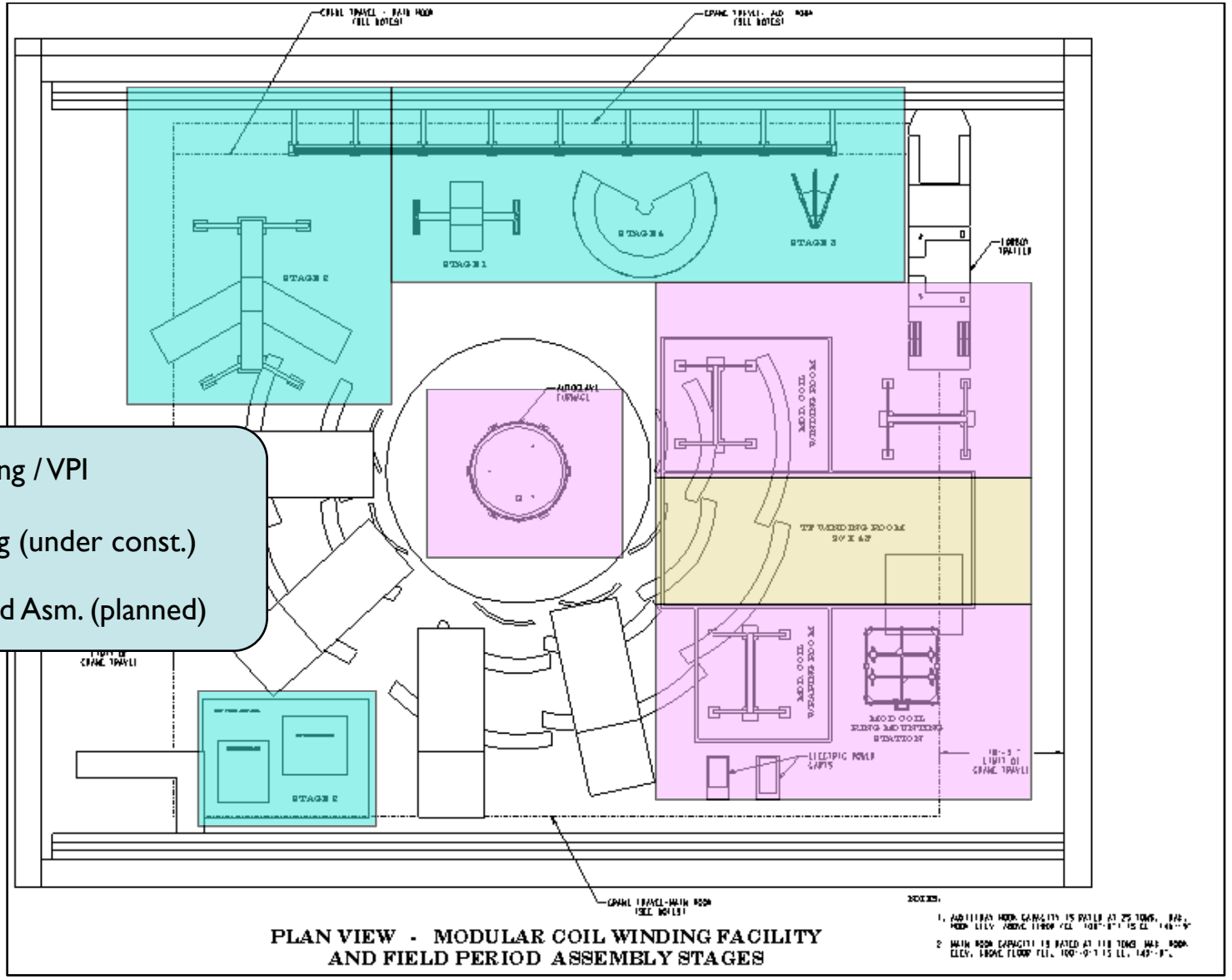

FPA Fixture Schedule

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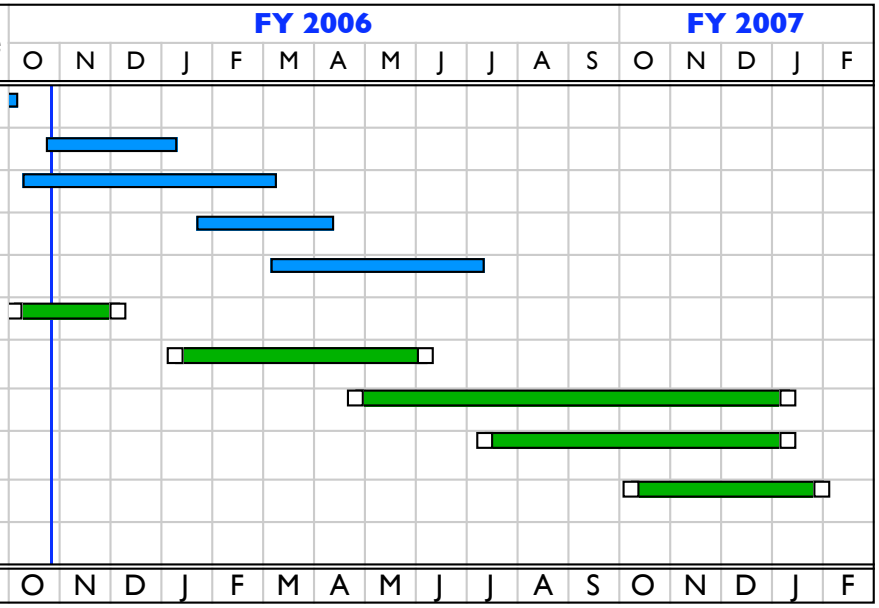
- 5 stations / fixtures are planned for FPA
- Stage 1 fixture to arrive in 12/2005

Activity Name	Start Date	Finish Date
VV Prep Fixture Design	05-Jul	05-Oct
Half Period Assembly Fixture Design	24-Oct	09-Jan
MC Installation Fixture Design	10-Oct	08-Mar
TF Half Period Assembly Design	23-Jan	11-Apr
Final FP Assembly Design	06-Mar	11-Jul
VV Prep Fixture Fab	05-Oct	05-Dec
Half Period Assembly Fixture Fab	10-Jan	06-Jun
MC Installation Fixture Fab	26-Apr	11-Jan
Final FP Assembly Fixture and Platform Fab	12-Jul	10-Jan
TF Half Period Assembly Fab	09-Oct	31-Jan



Facility Development Plans for FY06

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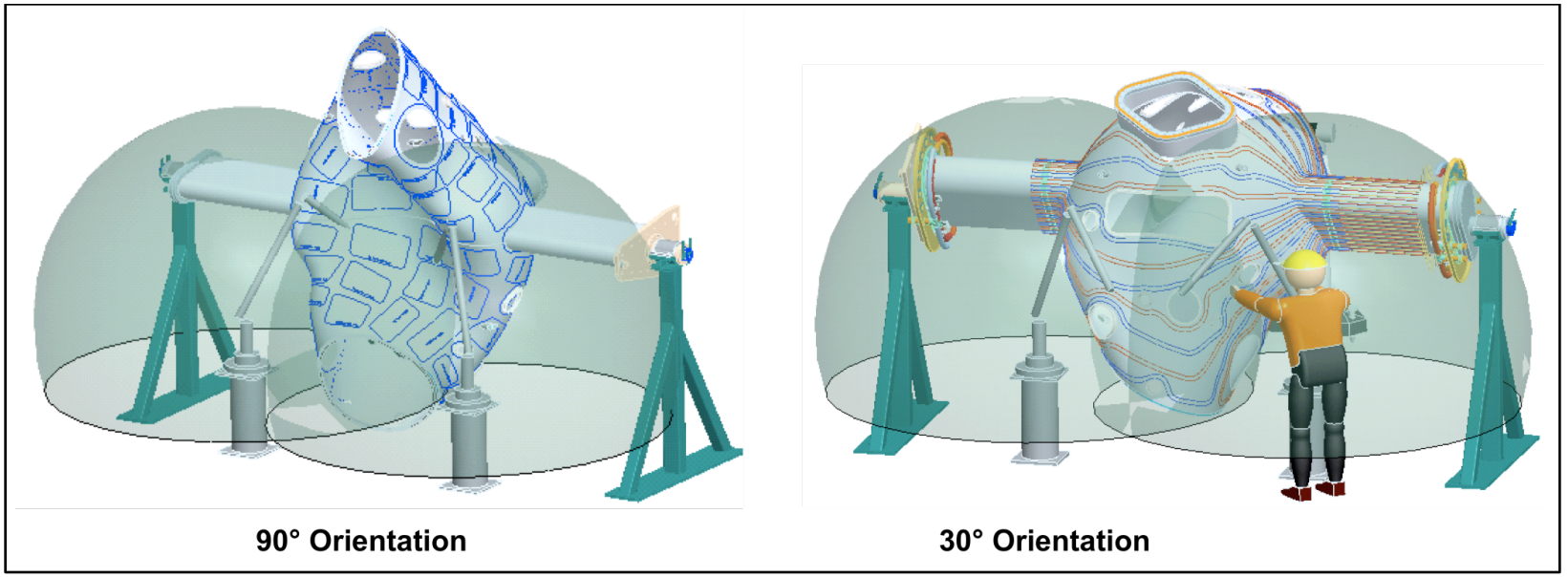
- Field Period Assembly:
  - Lead technician assigned to begin preparations, staffing to fill remaining positions identified
  - Complete Manufacturing Facility Operations Plan, FPA MIT/QA Plan, & VV Prep Procedure
  - Procure and install VV assembly Fixture by December
    - ✳ First VV segment scheduled to arrive 1/06



90° Orientation

30° Orientation

Facility Development Plans for FY06

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- Field Period Assembly (contd.):
  - Complete designs, begin procurements for
    - Half Period Asm Fixture
    - MC Installation Fixture
    - Final FP Assembly Fixture
  - Support Field Period Assembly Tooling design activities
    - Complex fixtures are expensive
    - Find a simpler / less expensive way to perform the same function
- Coil Winding
  - Complete TF Winding Fixture 12/05

Make vs Buy Decisions

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- The final make vs buy decision for smaller components and tooling is made at the time approved drawings are available
- Bias is to go outside to take advantage of the wealth of U.S. industrial capacity
- Factors affecting the decision are
  - Cost
  - Complexity of the work
  - Availability of people resources
  - Prior experience with industry on similar work
  - Level of documentation available
  - Lead time vs project schedule
  - *What's the best value*

Facility Operations

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- Safety is an integral part of every activity performed in the area
  - ACC review of facilities before operations
  - Job specific training (Hazard Awareness, GET, Rad Safety, Haz Comm, etc)
  - Job Hazard Analysis
  - Regular Safety Meetings
  - Daily Walkthrus by Industrial Hygiene
  - Daily Walkthrus by management
  - Prejob / Post Job Briefs

Facility Operations

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- Quality Assurance
  - Supervision maintains a close working relationship with QC
  - Procedures requiring independent review use QC approval
  - Welding operations are 100% inspected
  - Critical lifts require special procedures and 100% QC review
- Cost and Schedule Control
  - Project level schedules are broken down to daily work schedules with detailed work assignments
    - 2 week look ahead
    - Crew knows exactly what they're working on
    - Tuned further on a weekly / daily basis
      - Weekly rollover meetings
      - Start of shift meeting > 8 am Construction > 8:30 Meeting

Short Term Schedule

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Date	Description	Shft	Crew
	WEEK OF OCTOBER 17TH.		
17-Oct-05	Complete metrology measurements	1st.	S. Raftopoulos (lead); M. Hause; E. Gilsenan
	Cut TRC using Wach's saw [Job 1409]	1st.	E. Kearns; R. Tucker jr.
	Begin stud welding activities	2nd.	M. Anderson (lead); F. Terlitz; D. Mosier
18-Oct-05	Stud welding activitries	1st.	E. Kearns(lead); M. Hause; E. Gilsenan
	Cut TRC using Wach's saw [Job 1409]	1st.	R. Tucker jr.; J. Benchoff
	Stud welding activitries	2nd.	M. Anderson (lead); F. Terlitz; D. Mosier
19-Oct-05	Tig weld nuts and studs	1st.	M. Hause (Lead);F. Simmons; E. Gilsenan
	Cut TRC using Wach's saw	1st.	R. Tucker jr.; J. Benchoff
	Miscellaneous- Ground wrap preparation		E. Kearns
	Clean casting/ complete misc. activities	2nd.	M. Anderson (lead); F. Terlitz; D. Mosier
20-Oct-05	Transfer C1 from station 1b to station 2	1st.	E. Kearns; M. Hause; E. Gilsenan; M. Fernandez; F. Simmons
	Complete adjustments in the station 2 turning fixture	1st.	E. Kearns; M. Hause; E. Gilsenan
	Begin lead block and terminal installation	2nd.	M. Anderson (lead); F. Terlitz; D. Mosier
21-Oct-05	Complete lead block and terminal installation	1st.	E. Kearns; M. Hause; E. Gilsenan
	Begin installation of cladding	2nd.	M. Anderson (lead); F. Terlitz; D. Mosier

Facility Operations

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- Risk Management
  - Establishing "production mode" of operations. Working to achieve learning-curve efficiency improvements over 18 coils
    - ✳ Anticipate production problems
    - ✳ Daily debriefs and shift turnover meetings
    - ✳ Simplifying assembly tools, improve fixtures as need arises
    - ✳ Encourage "thinking" while working, keep them motivated, morale high
    - ✳ I will ensure that NCSX fabrication receives the appropriate priority relative to other lab work
  - Implement systematic lessons-learned process to improve from one cycle to the next

Process Improvement

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- *Value Improvement Proposals (VIP)*
  - Team members are encouraged to submit suggestions for process improvement
  - Suggestions are evaluated for improvement to the product, process, procedure, quality and safety
- *Spot Awards* have been given to winding techs for suggestions that resulted in significant cost savings to the project
- Examples of ideas adopted:
  - Stud Welding on both sides of the coil
  - Routing of the coil casting through the fabrication facility
  - Switch from "french toast" style VPI shell to "cotton candy"
    - ✳ 50% reduction in labor

Summary

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- The NCSX Winding Facility is up and running
- Plans for the start of the FPA Facility are in place
- First FPA fixture design completed > procurement
- Plans and methods to improve fabrication productivity have been developed