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Los Alamos National Laboratory Prototype Fabrication Division CNM Briefing

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PF Mission Statement



■ Mission Statement

Prototype Fabrication Division designs, programs, manufactures, and inspects on-site high quality, diverse material parts and components that can be delivered at the pace the customer needs to meet their mission. Our goal is to bring vision to reality in the name of science.

The Most Important Thing We do

We work safely & securely

Part of everything we do everyday

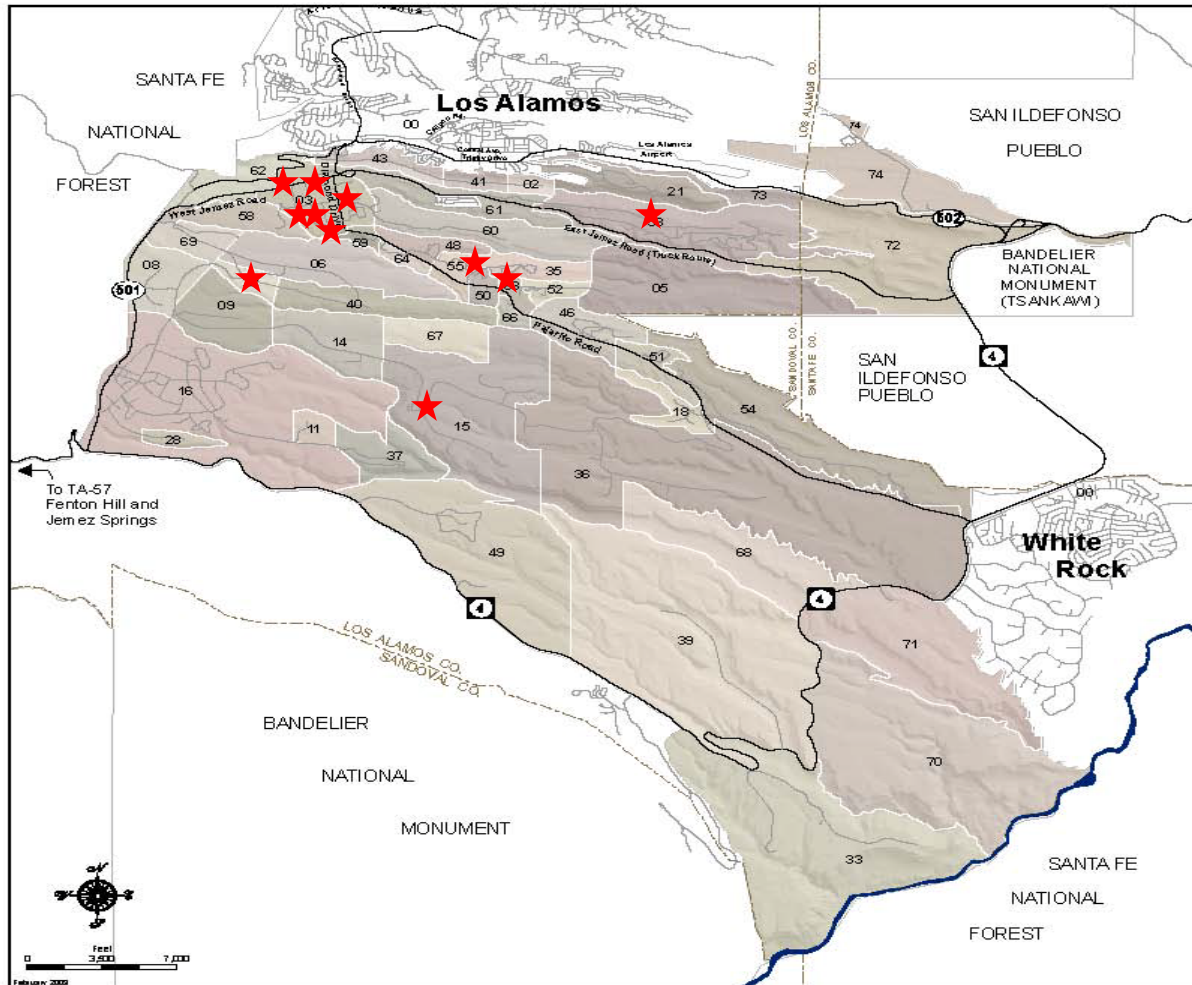
- Management Observation & Verification (MOV)
- Worker Safety and Security Team (WSST)
- Integrated Work Documents (IWD)
- Personal Protective Equipment (PPE)
- Machine interlocks and guarding
- Institutional and Organizational policies
- Industrial Hygienist (IH)
- Radiological Control Technician (RCT)

PF Overview

- **PF has 10 shops located throughout the laboratory boundaries**
 - Ensure that the capability is available and convenient (a deployed philosophy)
 - Move work and/or personnel to ensure customer deliverables are met
 - Exception-Specialty shops
 - Beryllium, Uranium, classified, large work



PF Deployed Philosophy



PF Overview

■ Staffed with over 50 Journeyman Machinists



- Limited resource pool, currently talking to outside institutions to recruit potential machinists.
- Inspection Labs
- In House Maintenance
- Programming Department

PF Overview

■ 300 machine tool assets



- 90+multi axis CNC machines
 - Simultaneous 4 and 5 axis machining capability
- Laser marking
- Rapid Prototyping
- EDM Wires and Sinkers
- Furnace and Heat Treat capabilities
- High precision machining

CNC Machine platforms

■ Mills

- Analam
- Cincinnati (5 axis)
- Fadal
- HAAS (3-5 axis)
- Hardinge
- Hurco
- Mazak
- Romi
- Servo

■ Lathes

- Excello
- Hardinge (Live tooling)
- HESS
- Hyundai
- Mazak
- Moore
- Okuma
- Romi
- Victor/Centroid

■ Multi-Axis Machining Center

- 4 Mazak Intigrex platforms



EDM Platforms

- **Wire**
 - Charmilles
 - Hansvedt
 - Mitsubishi
- **Sinker**
 - Charmilles
 - Hansvedt
 - Mitek
- **Hole Poppers**
 - Mitsubishi



Welding Capability

- Ferrous and Non-ferrous material joining process includes;
- Shielded Metal Arc Welding
- Gas Metal Arc Welding
- Gas Tungsten Arc Welding
- Flux-Cored Arc Welding
- Oxy-Fuel Welding
- Torch Brazing
- Laser Welding

Welders work to AWS and ASME welding specifications.



Fabrication Capability

- CNC Press brake
- Numerous Rolls
- Large capacity shears
- Laser cutting with CAD programming



Maintenance Capability

- Internal mechanical and electronic maintenance support
- Laser alignment and correction
- Preventative maintenance
- Machine moves



Quality Control

LANL-PF Quality Control utilizes time proven inspection techniques and modern measurement systems to acquire the highest accuracy data on LANL-PF fabricated or customer provided parts.

Our highly skilled and ASQ certified mechanical inspectors provide the quality control assurance requested by customers and feedback to fabrication for process improvement.

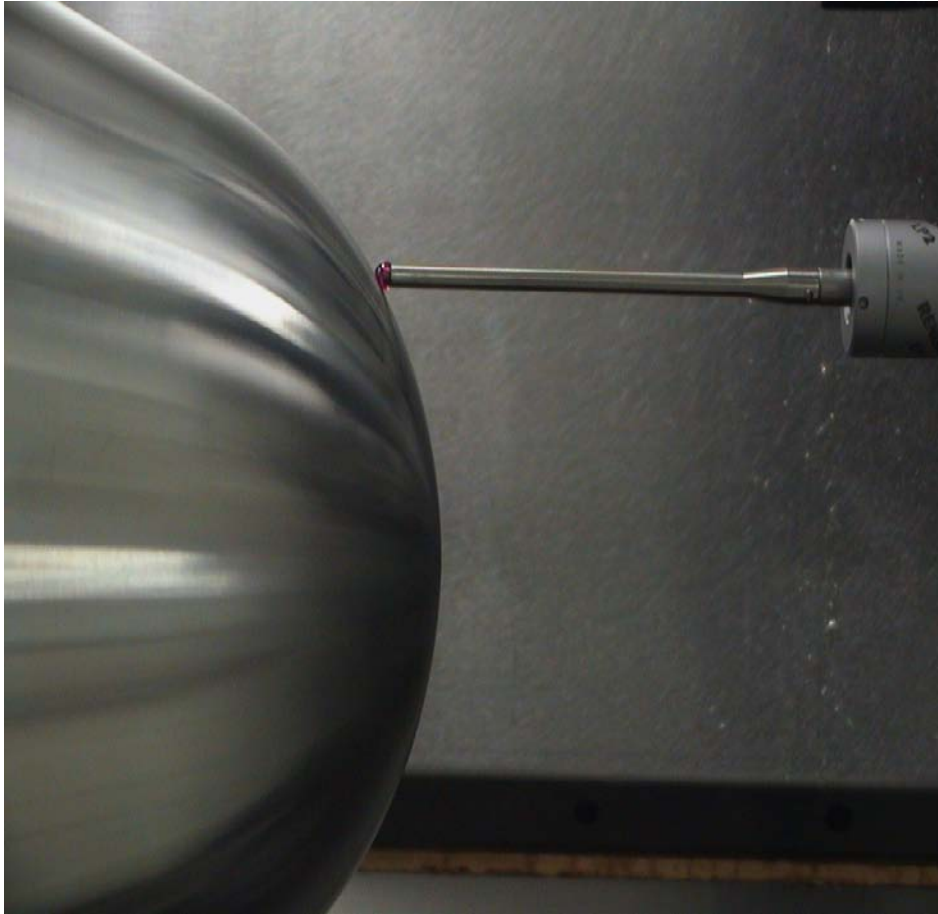


Quality Control

- **Temperature controlled Inspection labs (20 +/-1 deg C) and NIST traceable equipment calibrations**
- **Major equipment**
 - Eight Quindos based Hexagon Coordinate Measuring Machines (CMMs)
 - OGP Quest 300 Multi-sensor measuring systems
 - Three Mahr MarSurf texture Measuring systems
- **R&D inspection with inspection method discretion generally left to the Inspector**
- **Inspection complexity from simple parts to extremely complex geometries**



High Precision Machining



.Very tight tolerance $\pm 0.0002''$

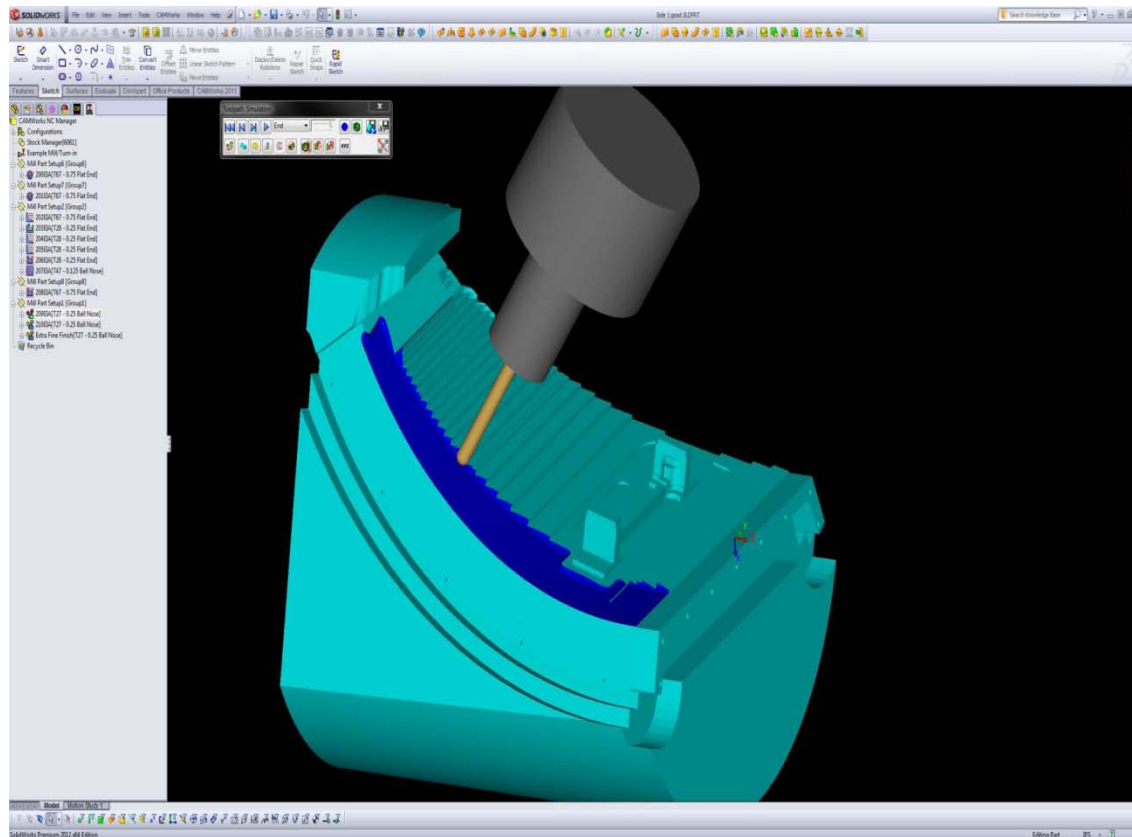
- Dedicated high precision platforms

- On Machine Gauging (OMG)

- Exotic materials



Model Based Manufacturing



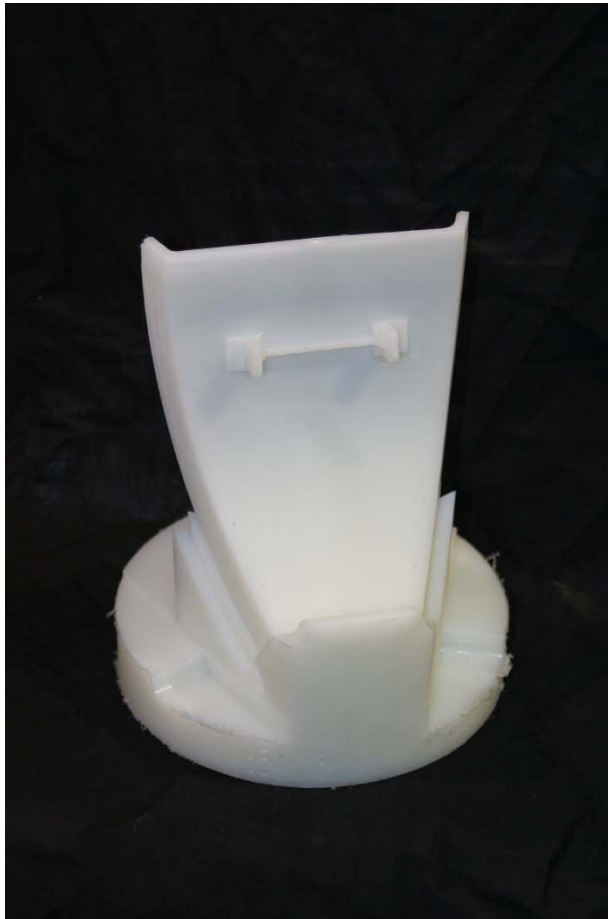
■ Pro-e/Pro-M

- Mostly used on classified parts w/ complex geometry
- Posts for machines that are classified
- All pro-e work done by programming department

■ Solid Works/Cam Works

- Used on unclassified parts and machines
- Programming completed by machinists
- Significant investment in training
- Significant investment in post development

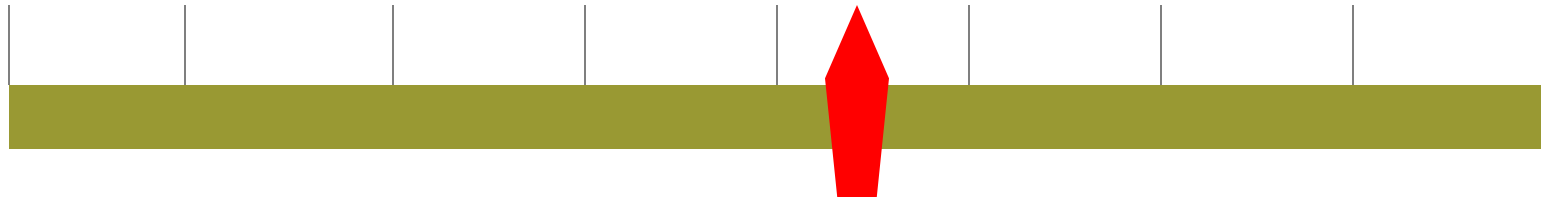
Model Based Manufacturing



Formality of Jobs In PF Shops

Informal

Formal



- Verbal instructions w/ desired result.
- Rough sketch (napkin/placemat)
- Design is left up to machinist
- Minimal material requirements
- Processing choice is open
- No inspection – “As long as it works”

- War Reserve (WR) Production
- Formal mature drawings
- Workers must be qualified to work on product and must follow specific “Work Instructions”
- Production travelers
- Must use provided material
- Full Inspection- formal customer acceptance

Technical qualities we want in a PF machinist

- **Versatility – 95% of the time a PF machinist is responsible for completing the entire job “from cradle to grave”**
- **Must be proficient in set up and operation of manual machines**
 - Extensive knowledge of machine tool operation and capabilities
 - A large portion of LANL work requires compound fixtures and/or complex setups-Requires knowing how to use tools like tilting rotary tables, sine tables/plates, gauge and angle blocks stacks, etc
- **CNC experience**
 - EIA and conversational programming knowledge
 - Our best CNC machinists have excelled because of solid manual foundation
- **CAD/CAM experience**
 - Knowledge of Solid Works/Cam Works preferable, Pro-e background is a plus
- **Inspection experience is a plus, at a minimum open bench top setups**

Personal qualities we want in a PF machinist

- Follows safety and security practices and policies
- Versatility – Available and willing to move to the location where work is needed
 - Someone who does not want to stay in one location or on one machine their entire career
- Team player, works well with others
- A desire to learn and grow
- Is a positive professional representative of his/her organization
- Takes ownership of his/her actions
- Must be able to obtain and hold a Q clearance

Example of LANL parts



Example of LANL parts



Example of LANL parts



Example of LANL parts



Example of LANL parts



Example of LANL parts



Questions?