ENGINEERING DOCUMENTATION
AND
DATA CONTROL

by

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Mississippi Space Services (MSS), the facility services contractor for NASA's John C. Stennis Space Center (SSC), is utilizing technology to improve engineering documentation and data control. Two identified improvement areas, labor intensive documentation research and outdated drafting standards, were targeted as top priority.

MSS selected AutoManager® WorkFlow from Cyco software to manage engineering documentation. Existing databases were imported into AutoManager®, documentation was indexed to databases and the system deployed throughout the site. The software is currently installed on over 150 desktops, of which 55 are in the MSS Engineering and Construction Department and the remainder are customer desktops (NASA, Lockheed, Boeing, etc.)

The outdated SSC drafting standard was written for pre-CADD drafting methods, in other words, board drafting. In updating this document, MSS incorporated technology by utilizing hyperlinks to reference CADD drawings. The Table of Contents, the List of Figures and references in the text body all contain hyperlinks. This document is available to the Stennis community over the Stennis Intranet. Additionally, the document and all reference drawings are available on CD for use by outside firms providing A&E services to NASA.

Implementation of COTS software solutions to manage engineering documentation and update the drafting standard resulted in significant increases in productivity by reducing the time spent searching for documents.

PM Program Abstract

1. **Introduction: MSS evaluation of existing PM program and plans to migrate to new contract requirements.**
   A. Determine difference between MI and MTS requirements.
   B. Determine accuracy of equipment database.
   C. Identify equipment inadvertently left out of the contract.
   D. Closely interface with customer to clarify ambiguous contract requirements.
   E. Establish partnering rapport with customer.
   F. Determine schedule for new MAXIMO 4.03 installation.

2. **Time lines.**
   A. Contract start (8/29/99).
   B. Attempts at MAXIMO 4.03 installation.

3. **Problems at start up.**
   A. Labor issues
   B. Cultural issues
   C. NASA partnering
   D. Exposing MTS to meaningful sanity checks and effecting changes.
   E. Convincing MSS incumbent technical staff to abandon MIs in favor of MTS.
   F. Developing meaningful labor reports establishing PM program progress relative to contract requirements.
   G. Establishing reachable short-term goals to keep the staff motivated without losing sight of the seemingly impossible long-term goals.
   H. How to educate the work force on current contract requirements, MSS policies and philosophies, and the technical complexities of MAXIMO 4.03.

4. **Problem solutions:**
   A. Agreement with union to temporarily remove work from Work Control until processes developed.
   B. Weekly meetings with shop leads to develop dialog.
   C. Many partnering sessions with NASA eventually gained their confidence in our abilities and also mitigated many technical issues.
   D. Many MTS were added, deleted, and otherwise modified as a result of partnering with NASA to allow successful transition into meaningful preventive maintenance activities.
   E. Incumbent technical staff was slowly transitioned into the new way of doing business.
   F. Active CMMS management

5. **Current Status**

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Slide 2

Business Systems Integration
Stennis Space Center
Craig Bramley
Presented by: **Craig Bramley**

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Philadelphia, Pennsylvania
March 29 - 31 2001

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Slide 3

Systems Integration at SSC

- Work Control
- Computerized Maintenance Management
- Project Metrics
- Project Accounting
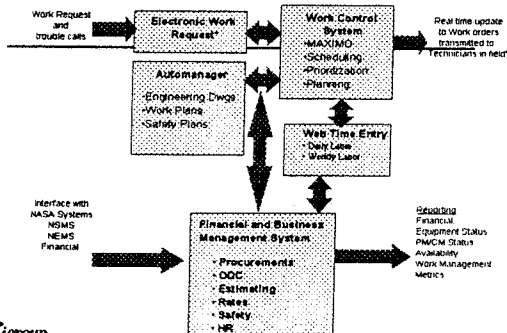- Web Based Time Keeping
- Purchasing
- Engineering Drawings
- Human Resources

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Slide 4

Introduction

- 10,000 equipment/system items managed in database
- 2 million square feet of floor space maintained
- 170 Facilities
- 14,000 Acre work site
- 9,000 Preventive Maintenance tasks performed annually
- Process over 40,000 Purchases annually
- Process and manage over 30,000 work orders annually
- System provides control and status to NASA and 30 Resident Agencies

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FIS

Work Request and trouble calls → Electronic Work Request ↔ Work Control System •MAXIMO •Scheduling •Prioritization •Planning → Real time update to Work orders transmitted to Technicians in field

Automanager •Engineering Dwgs •Work Plans •Safety Plans

Web Time Entry •Daily Labor •Weekly Labor

Interface with NASA Systems NSMS NEMS Financial → Financial and Business Management System •Procurements •OOC •Estimating •Rates •Safety •HR → Reporting Financial Equipment Status PM/CM Status Availability Work Management Metrics

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Financial Management

- Government Off the Shelf (GOTS) Package customized for Stennis Space Center
- Oracle Based (Currently version 8I)
- Payroll, Accounting, HR, and Purchasing are contained in system
- Data Warehouse functionality established between:
  - Computerized Maintenance Management System (CMMS)
  - Web Based Timekeeping
  - NASA Supply System and
  - NASA Financial Systems

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FOS Information System (FIS)

- Customers provided read-only access to query select Financial and CMMS elements of FIS
- Data in FIS refreshed regularly for reports and queries
- Customers have access to same reports as MSS personnel
- Have developed Internal Web Pages for reports and status of common reporting items (e.g. PM and CM performance, work schedules)

Work Control

On Line Reports

Accounts Payable Status

Reports

Purchase Order Analysis

Purchase Requisition
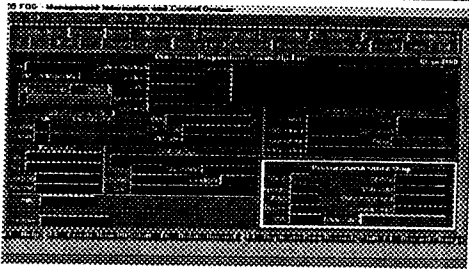
Work Control and CMMS

- Operate MAXIMO version 4.03
- All work requests and maintenance activities are processed through Work Control system
- Work Order information in CMMS updated in Web based Time Keeping System every 15 minutes
- Actual labor information (time and material) updated daily in CMMS and validated weekly
- Enhancements made to functionality of MAXIMO to support our contractual requirements

Work Control and CMMS

- Screens added for our Multimedia, Engineering and Fluid Component Processing Operations to support their specific requirements.
- Through our Data Warehouse, information is fed into our central reporting and financial systems
- CMMS functionality augmented by numerous reports developed in Crystal Reports
- E-mail notification of funding status (85% and 100%)

Engineering
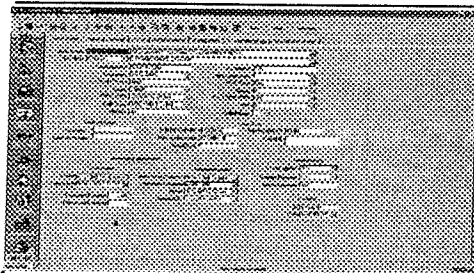
Multimedia Services
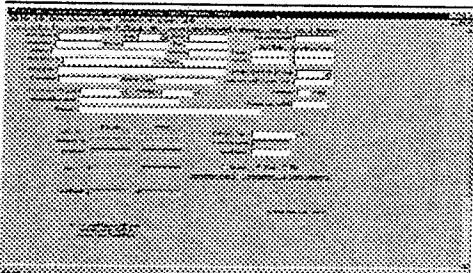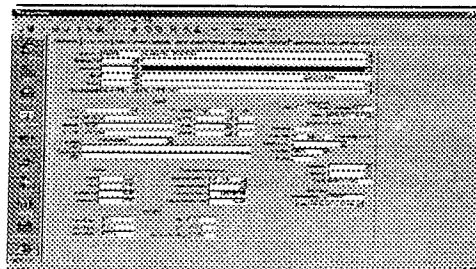
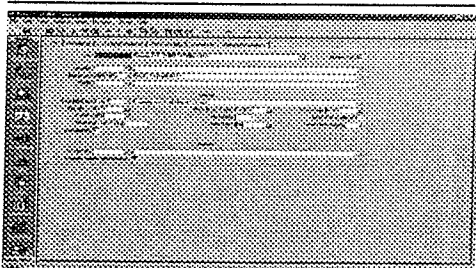## Fluid Component Processing
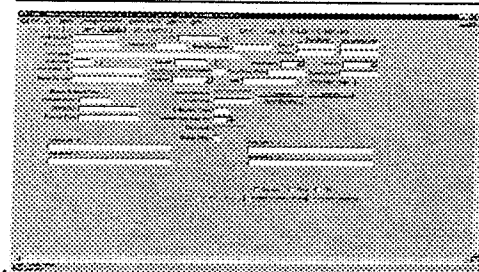
Work Order Entry
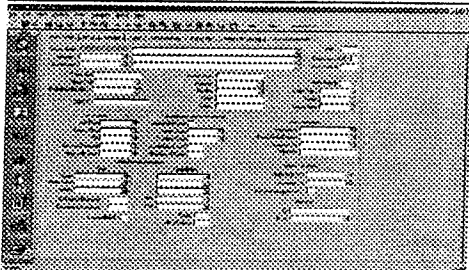
Actuals
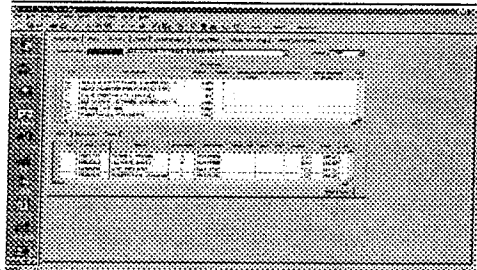
## Work Order Cost Tracking
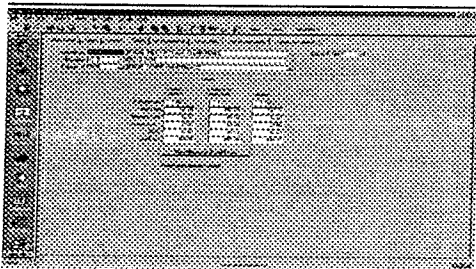
Equipment

Preventive Maintenance

Performance Metrics

- Over 90 measures of performance
- Updated Monthly based on self reporting and customer input
- Many metrics are derived from FOS Information System data (cost, schedule, performance)
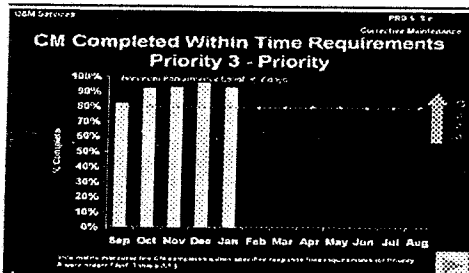- Metrics are hosted on internal server and are available to customer for review

Metrics Home Page

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Metrics (Preventive Maintenance)

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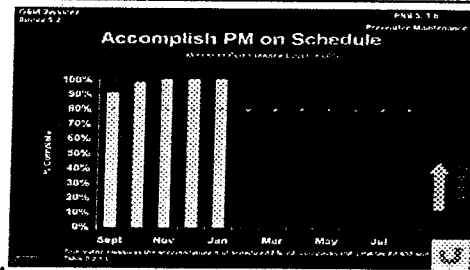
Metric (Corrective Maintenance)

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Web Based Timekeeping

- Only approved work orders appear
- Refreshed every 15 minutes
- Work orders assigned by crew
- Pay differentials in system
- Locked out from change at weeks end
- Entry Password protected
- Daily timecard exception reports

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Web Based Timesheet

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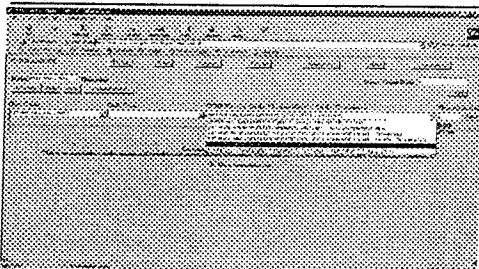
Conclusion
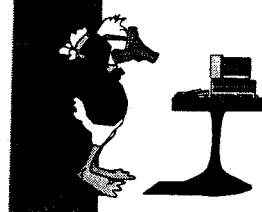
- Significant improvements in visibility and management control
- Improved processes
- Increased information for employees
- Customer visibility increased
- Improved performance

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Control

March 30, 2001

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- Can't be fixed
  - By 1993, NASA and the contractor had given up

- Fix it or get rid of it
  - Deputy Center Director

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kground and History
oblem
t Cause
aking Documentation Important
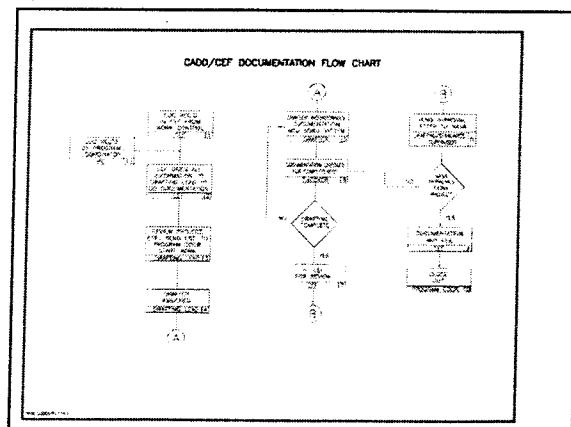umentation Today
lutions
ieving Documentation
emonstration

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rtant

- Making it happen
  - Documentation given highest priority
  - All stake holders informed
  - Developed Flow chart and Work Instruction
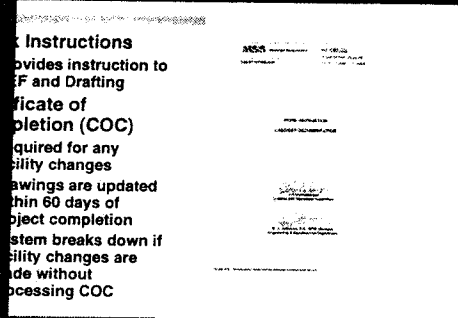 - Set up tracking system

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fters preferred "real work"
rafters worked design projects and
alled on documentation assignments
umentation Backlog Grows
s backlog grows, motivation declines
cklog reaches a high of 30 m-yrs
ore drafters are hired (25 total)

CADD/CEF DOCUMENTATION FLOW CHART

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Instructions
- vides instruction to F and Drafting
- icate of letion (COC)
- quired for any ility changes
- awings are updated hin 60 days of ject completion
- stem breaks down if ility changes are de without cessing COC
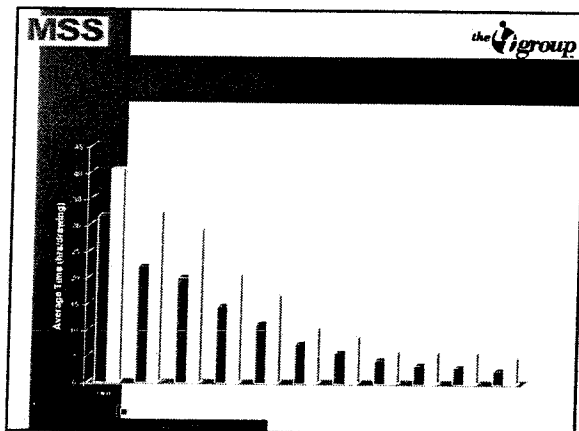
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- **Implementing Technology**
  - AutoManager reduces document retrieval time to less than 30 minutes
  - Drafting Standard linked to AutoCADD drawings

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umentation Tracking
- estimate is prepared for every job
- ack actual hours expended
- view data with CADD drafters
- ess button to view tracking system ults
- erage Document update time is amatically reduced

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e Documentation Important

Technology

stions

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	5c. PROGRAM ELEMENT NUMBER

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