



CASE STUDY

KENNEDY SPACE CENTER CM SYSTEM SET TO ACHIEVE FULL ROI IN JUST OVER ONE YEAR

CENTRA 2000® System Helps KSC Automate Processes and Will Save \$345,000 In First Year of Operation

(CENTRA 2000 now named KONFIG CM)

THE BUSINESS ISSUE

NASA's Kennedy Space Center CLCS (Checkout & Launch Control System) needed a modern, flexible, off-the-shelf configuration management (CM) solution to manage the thousands of documents, parts, and processes required for each Space Shuttle launch.

THE BUSINESS SOLUTION

The Kennedy Space Center (KSC) chose Auto-trol's CENTRA 2000 as its CM solution. Up and running for several months now, KSC projects minimum savings of \$345,000 per year on their Engineering Service Request (ESR) process alone.

THE CHALLENGE

Maintaining, preparing, and launching NASA's Shuttle fleet requires months, if not years, of work, dedication, and attention to massive amounts of detail. Managing and tracking the equipment, parts, documents, and processes involved plays a vital role in that effort. And, like many other business organizations today, NASA has to be able to accomplish more tasks, in less time, with fewer people—all while reducing costs and maintaining the highest levels of reliability and quality. Given all this, it was easy to identify the need for an off-the-shelf, comprehensive Configuration Management solution. But matching software capabilities to the current and future mission of the CLCS was not as clear a picture.

The current Launch Processing System (LPS) handles checkout, control, and processing of Shuttle flight systems, payload, and ground support equipment and facilities. It is based on a customized design dating back to the 1970s. The software architecture is not flexible enough to allow expansion and Shuttle system upgrades. The LPS is composed of twelve sets of equipment—550 racks—in eight control rooms, in three locations, and occupying nearly 78,000 square feet of space. The system is in operational use around the clock nearly every day of the year. A custom language is used to develop application software and unique training is required for the specialized software and applications. Availability of parts for a growing number of system components is becoming problematic. Add all this to the mission critical need to ensure the highest levels of quality and reliability, and you have operations and maintenance (O&M) costs that now exceed \$50 million per year, and climbing.

THE SITUATION

The CLCS organization at Kennedy Space Center is in the midst of a major project to upgrade the Launch Processing System. The Firing Rooms, the nerve center of the checkout and launch process, are the focal point of the project. Currently there are three firing rooms, with rooms 1 and 2 now in use for Shuttle operations. Firing Room 3 is where the upgrade project is underway. At the heart of this upgrade is the management of thousands of documents, parts, and processes involved in maintaining, preparing, and launching NASA's fleet of four Space Shuttles.

The CLCS can be thought of as three entities:

1. An Organization
2. A System
3. A Project

The Organization

The CLCS organization comprises nearly 600 users, including NASA, contractor, and subcontractor personnel. CLCS is responsible for thousands of parts, documents, and information such as design and engineering drawings; technical schematics; user guides; and hardware and software requirements, specifications, test plans, procedures, and source code.

Ready access to the most current and up-to-date information was one of the primary issues driving the organization's decision to acquire a COTS (Commercial Off-the-Shelf) configuration management system, such as CENTRA 2000. With CENTRA 2000, a project manager can quickly bring up a project workflow and see if milestones are being met—and can automatically generate a query or reassign a task to another team member. A test engineer can see the latest results of a simulation and quickly proceed to the next step. O&M staff can easily check on the location, repair history, and maintenance schedules of equipment and facilities.

The System

The CLCS system is a large, real-time computerized checkout system that is used throughout the Shuttle processing flow to control and monitor test operations and launch. The CLCS is composed of four major systems:

1. Simulation System
 - Multiple orbiters in any facility can be controlled from a single control room
 - A single control room can be divided into multiple flow zones, each linked to a different orbiter under test
2. Business and Support Information Service
 - Interface with other KSC systems and the World Wide Web
3. Real-time Processing System
 - Control measurements and commands
4. Shuttle Data Center
 - Integrate data currently residing in three locations across eight control room platforms
 - Implement common interfaces to variety of data sources

Within these four major systems exist various software and hardware subsystems:

1. Applications Software:
 - User displays
 - Automated applications
 - Web-based data analysis tools
2. System Software:
 - Functionality to acquire and distribute data and commands

- Interface application programs and displays to operating systems and network architecture
 - System configuration
 - Health Operations & Maintenance features
3. Hardware and Networks:
- Data distribution processors
 - Command & Control processors
 - Command & Control workstations
 - Gateways
 - Data recording processors
 - Support workstations
4. Support Systems:
- Build software loads
 - Model support for simulation
 - Retrieve and record data

The current system is not built on a secure database that provides version and revision control, workflow monitoring, and an audit trail. These capabilities, and more, are vital to both the current upgrade project and for future missions at CLCS, KSC, and NASA.

The Project

The CLCS upgrade project includes all the efforts to define requirements and to design, build, install, and test all computers, networks, system software, and applications software that comprise the new system. Items down to the smallest detail—such as a PC board, or on which rack a particular piece of hardware is located and how it is connected to the network, to when it was installed, moved, or last serviced, and from whom parts are available—are all items to be tracked and managed in the CENTRA 2000 configuration management system. All of this data, whether it is scanned in from hard copy or already exists in electronic format, becomes part of the secure CENTRA 2000 database.

THE RESPONSE

NASA reviewed several CM systems, including CENTRA 2000, which was already in use within NASA as part of the Consolidated Space Operations Contract (CSOC).

Based on the CLCS assessment and the CENTRA 2000 track record at NASA, CENTRA 2000 was selected. Then the real work began. CLCS received training on CENTRA 2000 and then developed their own CENTRA 2000 solution. The intuitive user interface, flexible out-of-the-box functionality, and robust APIs, make CENTRA 2000 easy to use and enable organizations like CLCS to configure and implement a CENTRA 2000 solution to fit their enterprise requirements.

THE RESULT

One of the primary goals of the KSC CLCS was to reduce and automate many of the steps involved in their processes. Implementation of the CENTRA 2000 system is achieving this goal. KSC estimates that using CENTRA 2000 to automate their Engineering Service Request process alone will save \$345,000 in its first full year of operation. This is the first of several processes slated for automation using CENTRA 2000. The projected cost savings from automating this one process represent more than 85% of the total cost of the initial system. Given this, the total return on the initial investment will occur in just over one year.

CLCS is also achieving another of their objectives—to readily access the most accurate and up-to-date information. CENTRA 2000's full text search and retrieval capability makes this as easy as the click of a mouse.

THE TECHNOLOGY

CLCS is currently running their CENTRA 2000 CM solution on a Microsoft (MS) Windows 2000 web server using IIS. Web access is through both Internet Explorer and Netscape Communicator. Their network supports a mix of MS Windows NT 4.0, MetaFrame® and Sun Microsystems workstations. In addition, some Apple Macintosh PCs access the network through the Web via Netscape. CLCS also uses Microsoft Office productivity applications and MicroStation® for engineering drawings.

THE FUTURE

The CLCS CENTRA 2000 system has been operational for several months to manage parts, documents, and product structures. The next phase of the project involves engineering service processes and integration of third party configuration management tools that handle the LPS system requirements (DOORS) and software source code (RAZOR).

ABOUT AUTO-TROL TECHNOLOGY CORPORATION & KONFIG CM

Established in 1962, Auto-trol® is an international developer and integrator of configuration management, documentation, information, process, and network asset management software for a wide range of business, industry, and government enterprises. KONFIG CM—a CMII®-certified product—provides many standard forms for data input, but the system is also very flexible and can be tailored to fit the needs of a particular enterprise or organization. There is an impressive list of APIs, and Auto-trol provides a full range of professional services to assist in solution tailoring, as well as product training, which can also be tailored for a client's specific implementation.

Auto-trol is headquartered in Denver, Colorado. Its products are sold and supported in North America by eight U.S. and one Canadian sales office. The Company operates two wholly owned subsidiaries in Europe and a branch office in Australia. Auto-trol also maintains distributor agreements in Europe and the Pacific Rim.