



# THE MOST ADVANCED CONTROL SYSTEM FOR NUCLEAR POWER PLANTS >>

**THE N4 INSTRUMENTATION AND CONTROL SYSTEM (I&C), DESIGNED AND DEVELOPED BY ATOS ORIGIN FOR EDF, THE FRENCH ELECTRICAL UTILITY, IS A MAJOR TECHNOLOGICAL BREAKTHROUGH IN THE WORLD WIDE POWER INDUSTRY: INTRODUCTION OF FULLY COMPUTER-AIDED CONTROL INTO 1450 MW NUCLEAR POWER PLANTS. ADACS™, THE HEART OF THE TECHNOLOGY, IS THE BEST ANSWER TO SUCH A CHALLENGE.**

## IMPROVED SAFETY, RELIABILITY AND EFFICIENCY.

In a nuclear power plant (NPP), a minor incident can lead to a critical situation if the operator is not able to sort relevant information rapidly from a saturated Man-Machine Interface. This is the reason why EDF decided to design a new control room concept for improving safety, reliability and efficiency in each plant situation. Apart the usual features fulfilled by the I&C system, the new control room concept is based on:

- > Modular software architecture,
- > Parallel processing system,
- > Performance compatible with emergency situations,
- > Efficient alarm processing and synthetic presentation of information,

- > Diagnosis aided operation in case of incident.

To reach these targets and at the same time to follow the French Safety Authorities' constraints and recommendations, Atos Origin has implemented an integrated digital I&C system for the four French N4 NPP units.

## A UNIQUE EMERGENCY RECOVERY

The 99,99% requested availability is due to the original ADACS™ design based on the parallel running of two processing computers and a specific process synchronization task: computers control each other through a dedicated, duplicated high-speed link.

## ATOS ORIGIN IN THE NUCLEAR GENERATION INDUSTRY

With more than 30 years experience serving the energy and utilities industries, Atos Origin is one of the very few recognized integrators able to provide customized best of breed information solutions across the entire nuclear generation chain.

Atos Origin's extensive solutions combine the power of real-time control information systems and proven client process knowledge.

The company has a unique track record in the realization and delivery of systems to worldwide electricity generating companies.

Atos Origin has delivered systems in France, China, Russia and UK for more than 60 nuclear power plants which represent more than 65,000 MW.

# The most advanced control system for nuclear power plants

## SHORT RESPONSE TIME DUE TO AN EFFICIENT DATA BROADCAST SYSTEM

A subset of the real-time database is distributed to each operator station server in order to have the shortest response time in display and operator actions. The distributed databases are updated through an efficient broadcast system limiting the data flow on the Local Area Network.

## SYNTHETIC ANALYSIS OF ALARMS

A basic analysis is performed permanently in ADACS™ in order to determine the current situation: normal, abnormal or emergency. Alarms are filtered on this basis and synthesized. As an advantage, only relevant alarms for a dedicated situation are displayed to the operator.

## COMPUTERIZED PROCEDURES

In case of problems, decisions must be adapted to the current situation, which is permanently fast-moving. With computerized procedures, the operator receives reliable and adapted information. He can also easily access all of the background information for each situation and its development. He is guided during an incident or an accident by procedures tolerating diagnosis errors (Status Oriented Approach). They are designed to return the system to a stable and safe situation.

The N4 computerized control system creates a major technological step in the I&C systems for the nuclear industry.

## N4 KEY FIGURES

The N4 control system is able to handle 55,000 devices and features.

- > 8,400 on/off outputs
- > 300 analogical outputs
- > 65,000 on/off inputs
- > 3,500 analogical inputs
- > 800 control displays
- > 10,000 technical data sheets
- > 4,800 operating procedure screen images
- > 5,300 alarm sheets

## ADACS™ (Advanced Data processing And Control System)

It is a well-known fact in industry that main risks come from human errors. The main advantage of this real-time technical platform is to assist operators to take faster and proper actions and therefore to greatly reduce risks in case of cascade of alarms. Improved safety mainly comes from an intelligent highly efficient alarm processing based on plant conditions and from operating procedures in normal, incidental and accidental unit conditions. Operators are computer guided and stressrelieved in a consistent environment to investigate problems and plan recovery actions. ADACS™ is the solution to build a safe and reliable control system in continuous industries, with full hot redundancy, openness and high performances. ADACS™ is already running in different industry sectors, such as Nuclear Power Generation, Electrical Network and Water Treatment, in France and abroad.

## CONTACTS

### ATOS ORIGIN

36, chemin du Vieux Chêne  
BP 104  
38243 Meylan Cedex  
France

Tel: +33 (0)4 76 41 46 00  
Fax: +33 (0)4 76 41 47 47

[www.atosorigin.com](http://www.atosorigin.com)

Atos Origin is an international information technology services company. Its business is turning client vision into results through the application of consulting, systems integration and managed operations.

The company's annual revenues are EUR 5.8 billion and it employs over 50,000 people in 40 countries.

Atos Origin is the Worldwide Information Technology Partner for the Olympic Games and has a client base of international blue-chip companies across all sectors.

Atos Origin is quoted on the Paris Eurolist Market and trades as Atos Origin, Atos Worldline and Atos Consulting.