



Safer.Smarter.RTP



RTP 3000 TAS N⁺

Advanced Modular Redundant Technology
For Critical Control and Safety applications
ESD/ F&G/ BNS/ ITCC/ DCS/ PLC



RTP is a customer led and technology driven organization that is passionate about providing its customers with critical solutions designed to the highest levels of safety and integrity. RTP is now at the forefront in the supply of Critical Safety and Control Systems to the Oil & Gas and Energy industries.

For its first twenty-seven years in business, RTP provided high performance data acquisition systems to the worldwide nuclear market and I/O front-end subsystems for minicomputer driven data acquisition and control systems at some of the world's largest industrial companies.

With a solid foundation of field-proven, high-proven, high-performance, and high reliable I/O hardware, RTP decided, in 1995, to expand its product offering, and added control software and a control processor to its I/O front-end subsystems and introduced its Hybrid Control System.

In 2002, the company entered the safety market with its SIS product offering. The decision was not to develop just another safety system but to have a **"BEST IN CLASS"** systems.

The company continues its traditions today with innovative technology with leading mission critical products and solutions meeting the industry digitalization world with integrated controls, enterprise solutions to meet the growing cloud and industrial digitalization world.

//What are the Capital and Operating Costs?

Despite the sophistication of the RTP 3000 architecture and its highest speed, integrity and availability features, it has one of the lowest capital and operating costs in its class. The demonstrated field experience of longevity of prior generations of hardware means that we can offer:

- 10 year hardware warranty as standard
- Life-time warranty on software as standard
- NO LIMITS on the number of installations, tags, or applications used in the life of your plant.

//Can the RTP3000 perform Online changes without system downtime?

The RTP 3000 supports **UNLIMITED** on-line Configuration and Program changes as there are no constraints of “download buffers”. **ANY CHANGE** in the application, regardless of size, can be actively-implemented without any interruption to the process.

//Product support is vital, what does RTP Corp offer?

Every product manufactured by RTP from first generation I/O cards to the latest fourth generation controllers such as RTP 3000 TAS are still produced and manufactured.

//Cyber Security has become critical, what security does RTP provide?

RTP recognized the importance of cyber security and in 2011 and became the first company to receive the **EDSA-300** certification and remains the only product to reach Level 2. Next the AES encryption algorithm was implemented on the communications ports of both the host applications and the controllers to further secure the product from cyber attacks.

//Does RTP Corp have a proven track record?

RTP products have established a 30 million I/O installed base spanning over 50 years. Installations range from Mining, Fossil Fuel Power Plants and Pipelines through to Petrochemical and Chemical Complexes, Refineries and Offshore Environments. However, for over 30 years RTP controllers have been the standard plant process solution in what might be the most stringent industry there is, Nuclear Power.

//Can the RTP3000 be expanded online?

In case of expanding the system the updated configuration is written to a second memory area, after which the system switches seamlessly to the update. This method of intelligent memory management ensures that the controller is always operational regardless of whether it is single or redundant. There is no limit to the number of times a program can be downloaded during operation. Even operating systems can be expanded during operation. I/O modules, their associated cables and termination modules can be added during operation. Online expandability of hardware and software guarantees maximum flexibility during the entire life cycle.

//Does RTP offer any custom design services?

RTP offers a wide range of custom engineering and design services, including hardware and software applications. customized to your individual needs. RTP will design special purpose I/O cards and termination modules to meet your requirements.

Dedicated design engineers and project management teams work in partnership to provide a fit for purpose solution.

A new breed of high performance controllers that takes Integrity, Availability and Flexibility into a whole new dimension. RTP 3000 offers unrivalled flexibility in how it can be applied (single, dual or TMR CPU's and I/O structure) meaning you can create an application that best benefits your plant requirements.

The RTP 3000 system is not bound by traditional hardware design limitations and constraints. At last, your system can have truly flexible redundancy from Single point up to TMR.

//RTP 3000 CPU's can be located in a single chassis or in a separate chassis

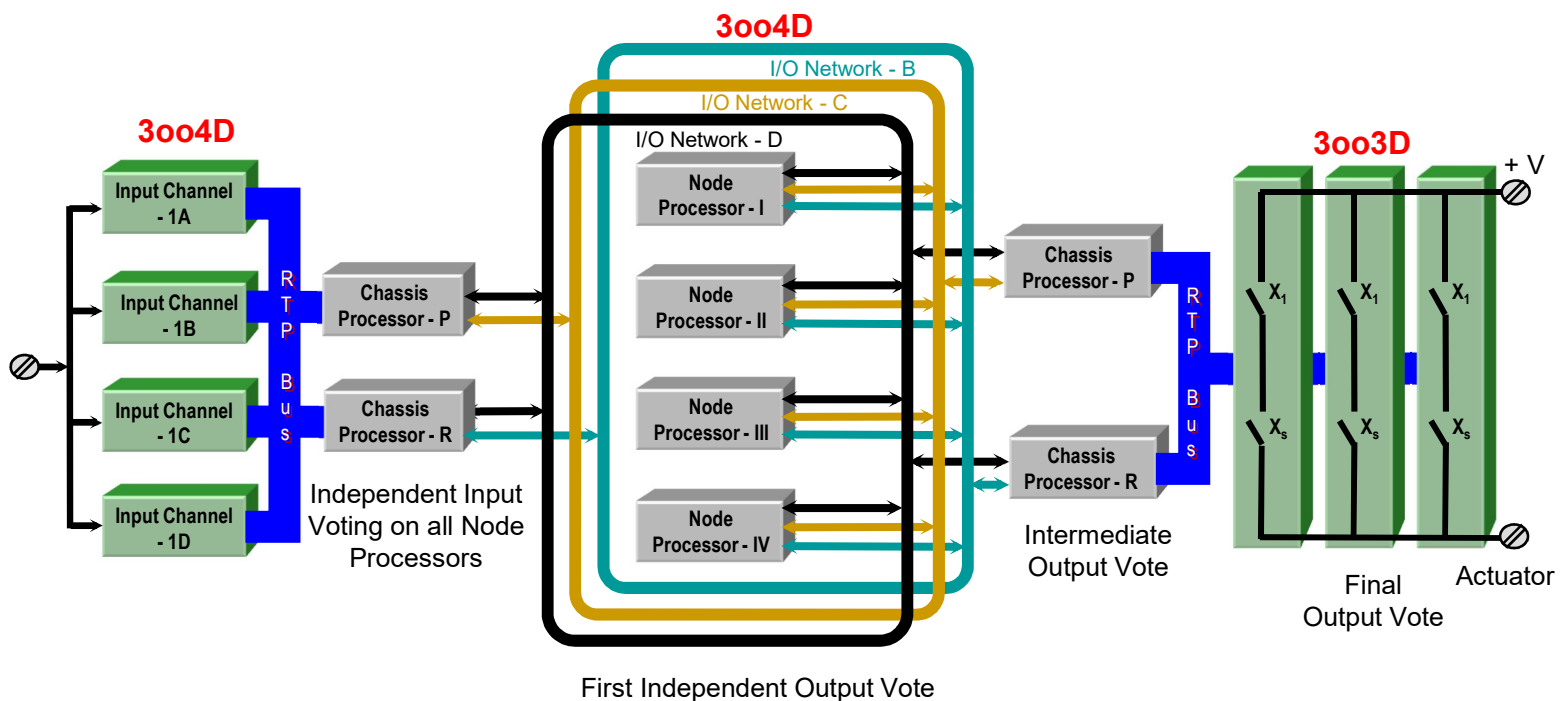
This prevents a physical accident causing a potential shutdown offering increased system availability

//Every slot in every chassis can be filled and utilized

- No 'spare slots' for redundancy and card swaps thus lower footprint
- Every module in the RTP 3000 is on-line and **HOT-SWAPPABLE** without interrupting the process.

//Distributed redundant I/O points ensure that I/O decisions are made at the point level and not at module level

- Three I/O points on the same module (standard)
- Three I/O points on three different modules in the same chassis (advanced)
- Three I/O points on three different modules in three different chassis' (unique)



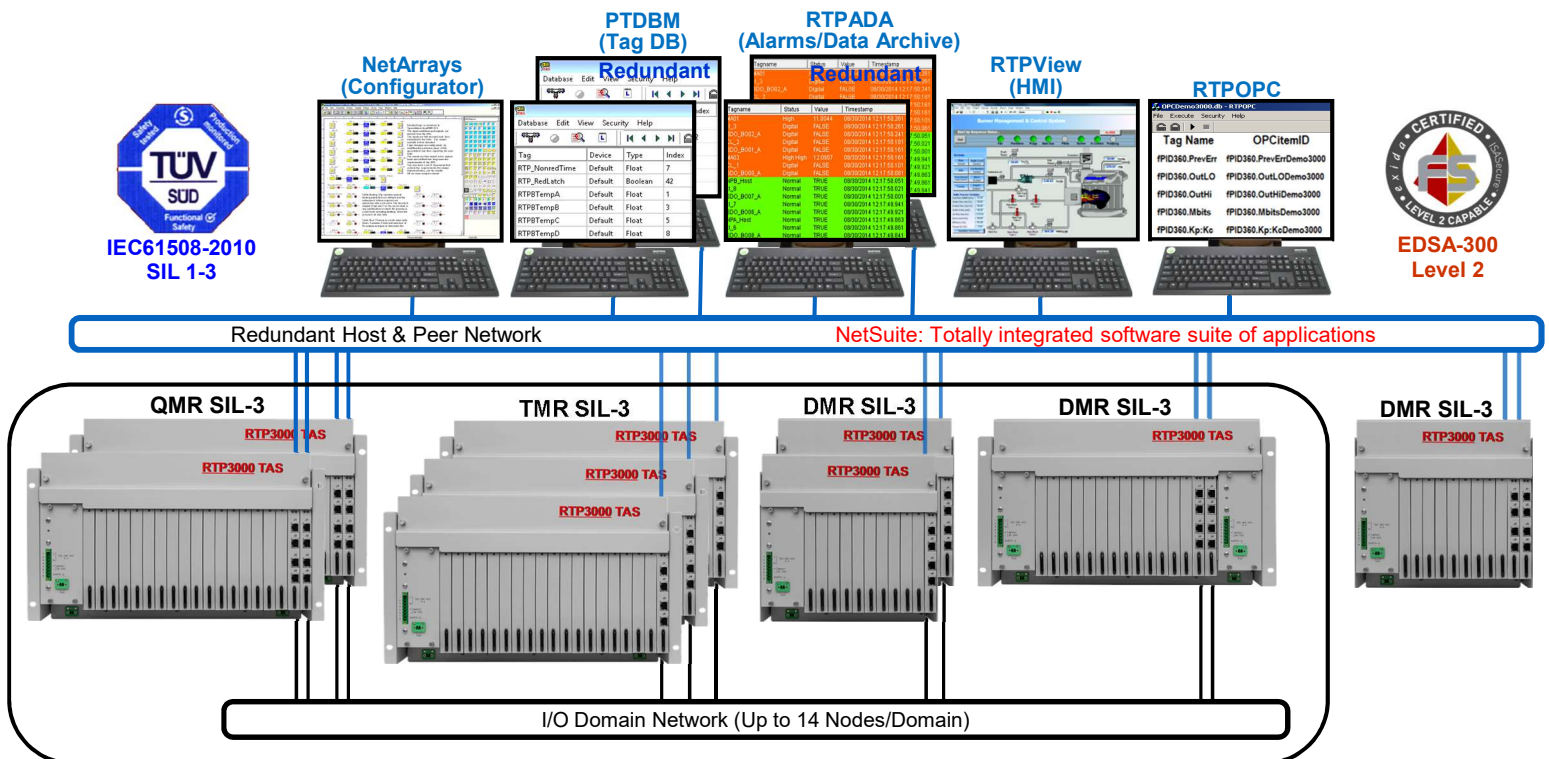
Up to 56 Intel 1.33GHz processors all working to solve the application and confirming that the result has been solved successfully

//Configurable Redundancy:

Traditional architectures impose limits on the user's ability to configure the system to meet their needs. Conventional TMR systems basically consist of three PLCs connected in parallel. In these TMR systems, the three processors must reside in the same chassis to utilize backplane speeds for synchronization and diagnostics. Also, selecting a triplicated I/O module means that all points on that module will need to be triplicated.

The RTP3000 system started with an entirely different architecture. First, the Node Processors can be mounted in one chassis or in **SEPARATE CHASSIS** preventing the possibility of a single physical event taking out the safety system.

Now with the introduction of the N+ architecture pictured below, RTP has extended the concept of a distributed architecture. The concept of this architecture is that every time you add a chassis you add another node processor and distribute the application to each chassis rather than a central node as traditional systems do. All systems start with at least one node processor. N+, so N equals 1 for the first chassis and for every additional chassis there is a new node processor and the number (N) increases, N=3 for the TMR below. Nodes inside a Domain can be single, dual, triple or quad redundant. Variables are passed between Nodes in a Domain using its private Domain I/O Network and between Nodes in other domains using Peer to Peer. There is no practical limit to the number of Domains in a system. The result is that as more logic and I/O are added to the system, more compute power is also added and the scan does not have to increase.



Can your system accommodate a full program change including unlimited I/O additions on-line?

//Unique Functionality

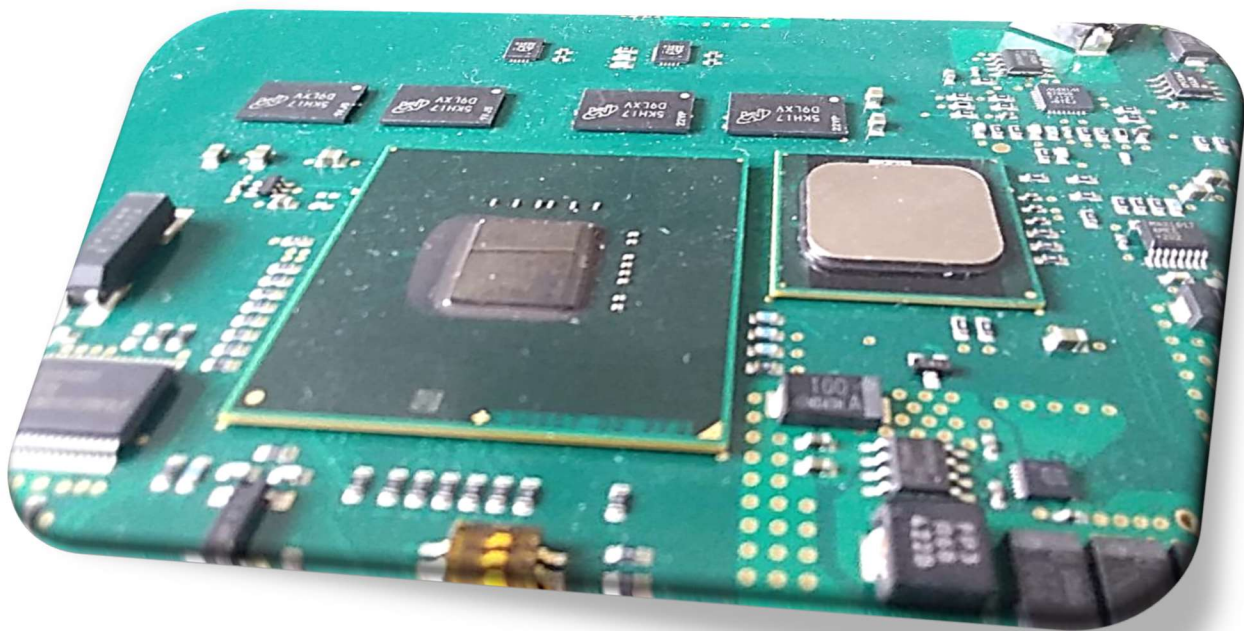
Parallel Processing

Recognized as being a third generation fault tolerant system, the RTP 3000 incorporates a unique multi-processor, parallel processing arrangement. Each chassis incorporates its own Node Processor. Each node processor incorporates multiple sets of CPU's to carry out specific functions. The node processor module utilizes a high speed, Intel **ATOM**® Processor backed by a floating-point math coprocessor for logic solving. Another CPU set is used for Host and Peer-to-Peer communications and finally a third CPU set for I/O and Inter-Processor communications. By running faster than any other system, the RTP 3000 achieves unrivalled scan times.

- 1msec I/O scan time (capture of all I/O points)
- 1msec Node scan time(logic solving)
- 5msec screw-to-screw (total response time, inclusive of full system diagnostics).

In an application where speed of response is critical to safety, having the fastest, TÜV approved controller in the world is comfortable to know.

Because it was designed in accordance with IEC 61508 regulations, SIL (safety) and Non-SIL (process) loops can coexist in the same application thus making it a **TRUE SAFETY & CONTROL SYSTEM**. The unique RTP design utilizes a common set of Hardware and Software components and a simple drag-and-drop philosophy for efficient programming making the RTP 3000 one of the most flexible controllers in the world.



Pictured is the RTP3000 core technology. It is an Intel Atom® Processor and a floating-point math coprocessor.

As system technology becomes increasingly complex, RTP provides comprehensive client support and training.

//Common Hardware Platform

As the RTP 3000 product is TÜV approved, it can be configured as a process or safety system (**DCS/ESD/F&G/ITCC**) utilizing the same hardware platform (no split of process and safety buses). This leads to less training, increased product familiarization, reduced spares, less engineering and contracting companies, improved technical support, less diversification of hardware, less interface concerns, consistent engineering, configuration and software tools from a single source.

//Automatic Configuration and Validation

Programming and configuration is identical whether the target is Simplex, Dual or TMR. Only one application program needs to be developed and validated using the built-in Simulator, the RTP 3000 takes care of the rest by **“AUTOMATICALLY”** transferring the image to the other redundant controllers who then run their own set of diagnostics to validate the program.

//Transparent Configuration

Designed around IEC 61508 regulations, the RTP 3000 is TÜV SIL 3 approved to allow safety and non-safety points to co-exist in the same hardware host utilizing a single set of Node Processors. This invaluable concept has been possible because the RTP 3000 is built using a common hardware platform and utilizes a common set of IEC 61131 compatible software languages and tools. The possibility of co-existence of safety and non-safety (process) points in the same SIL 3 rated environment means we can offer the Highest Availability and Integrity in Process Control (DCS) as well as Safety (ESD/F&G). This is TRULY a Seamless, Integrated ICSS solutionis yours??

NOTE: As with all things associated with the RTP 3000, this is a flexible “option” and single sets of Node Processors with dedicated I/O cards/points can be utilized if DCS and ESD/F&G segregation is still preferred.

Platform in the Gulf



Fossil power



Nuclear Power



Many processes that did not require a SIL rated controller now do. So why not use a SIL rated control system instead of having to upgrade in the future.



// RTP NetSuite

Unlike the traditional software programming tools, RTP provides one fully integrated suite of software applications that are used across all platforms and varying applications. The size of the system and number of points configured is not a concern. Utilizing a single database eliminates the complexity of configuring and managing tags. During logic development, why not insure the functionality of the logic and the expected results before the hardware is installed. Simply test and debug the application control logic using the PC based simulator. Simultaneously build the graphics to get a visual of the running process. Implementing a change in logic and even the hardware to the running process poses no problem. Easy access to meaningful diagnostic messages simplifies maintenance and reduces the mean time to isolate and repair faults.

//NetArrays:

The project program development software following the IEC 61131-3 standard. It's an easy to use graphical interface that provides:

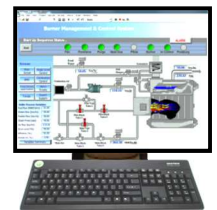
- **3 LEVELS OF SECURITY**
- Object-Oriented Programming
- Advanced Voting Algorithms
- Ladder Logic
- Batch/State Sequencing
- C++ and Structured Text
- Fuzzy Logic (MIMO)
- PC based Simulator



//RTPView:

RTPView allows the engineer to create and run the Human-Machine Interface (HMI) project to monitor and control the automated plant processes. Features include:

- **32 LEVELS OF SECURITY**
- Touch Screen Compatibility
- OPC enabled
- Scripting
- Alarm management
- System Error Reporting
- Video Streaming



//RTPADA:

RTP Alarm and Data Archive utility provides truly redundant alarm management, data archival, sequence-of-events and OPC-DA functions. Features include:

- Client Server to HMI
- Alarm Management
- System Logging/ History
- 100,000 Tags/Sec Archival
- 1ms Analog and Digital SOE recording
- Standard SQL queries



//PTDBM:

The Project Tag Database Manager (PTDBM) provides a central database for device configuration and alphanumeric tags to be used for applications involving a single or multiple nodes. Features include:

- Redundant Client-Serve
- Single Project Tag Database
- Program modification history
- Program archive and retrieval



RTP makes it is easy to ...Install, Integrate, Expand, Maintain, and Rely on no matter where our product is installed.

//Easy to Install:

The RTP3000 TAS arrives ready to rack mount and connect to your field wiring. Your order is fully preconfigured and factory tested prior to shipment, reducing your installation time. In addition, we offer customized product solutions, including special I/O cards and cabling terminations. The speed, accuracy, and stability of your control system can affect quality and throughput which, in turn, can impact product margins. With faster, more accurate measurements, you can reduce the costs with tighter process control.

//Easy to integrate with external plant systems:

The RTP3000 TAS incorporates numerous advances that reduce your cost of ownership both in terms of price/performance and lifecycle costs. Among the most important is the TAS open, industry-standard technology that reduces integration and hardware costs by supporting multiple communications standards to existing control and management execution systems. To facilitate open architecture and multi-vendor interoperability, communications standards including Ethernet, Modbus TCP/IP, Modbus Serial ASCII and RTU, and HART are supported. Third-party application software can interface with nodes via an OPC server.

//Easy to Expand and Modify:

Unlike proprietary DCS systems, the RTP3000's modular design lets you expand or reconfigure your application simply by adding cards and making a few quick setup changes. You can choose from a wide assortment of different I/O card configurations, ranging from standard analog and digital I/O cards to highly complex specialty-function cards. This "openness", coupled with laborsaving object-oriented programming tools eliminates time consuming and costly configuration changes and dependence on expensive non-standard interfaces, I/O cards, and software.

//Easy to maintain:

The RTP3000 incorporates local and remote diagnostics, built-in online diagnostics, and a hierarchical design that simplifies troubleshooting, all of which make it easy and less costly to maintain. The system also streamlines document access and storage, maintaining all configuration files, labels, comments and notes at the processor level a feature that lets operators upload and review configuration data quickly and easily.

**Will the control system
simplify programming,
speed up installation, and
reduce time-to-market?**

RTP makes it is easy to ...Install, Integrate, Expand, Maintain, and Rely on no matter where our product is installed. (Cont.)

//Highest Integrity

RTP's Fourth Generation, Multiple Fault Tolerant Hardware and critically acclaimed Advanced Diagnostics, ensures that the RTP 3000 achieves the Highest possible Integrity. The Advanced Diagnostics which are run on every scan pass (1msec at I/O level and 1msec at Node level), check, re-check, validate and re-validate that every decision made is correct before any implementation. The integrity is still further enhanced by carrying out a Multiple-Layered Voting that includes the Node Processors, and I/O Point Level. Calculated in accordance with IEC 61508/ 61511 regulations and Exida Markov Model, the RTP 3000 achieves an **MTTFS** of **50,000+** years.

//Easy to rely on:

Unlike host-based control systems, the RTP3000 distributes multiple control nodes over a wide area, assuring higher process availability. It provides a high common-mode-rejection design that eliminates electrical interference and other background noise. RTP30000 redundant target nodes provide continuous control of processes that demand high availability giving you a failsafe environment equaling the functionality of costly DCS systems. Plus, the reliability of RTP products is backed by the successful passing of rigorous standards list here that ensure that the RTP products you buy conform to the highest quality standards in the process control and Nuclear industry.

- | | | |
|--------------------|-----------------------------|-----------------------|
| • IEC61508-1 | • IEC60068-2-1 Test Ab, Ad | • IEC61131-2 11.5.3 |
| • IEC61508-2 | • IEC60068-2-2 Test Bb, Bd | • IEC61131-2 11.5.4 |
| • IEC61508-3 | • IEC60068-2-6 Test Fc | • IEC61131-2 11.5.5 |
| • IEC61508-4 | • IEC60068-2-14 Test Na | • IEC61131-2 11.6 |
| • IEC61511-1 | • IEC60068-2-14 Test Nb | • IEC61131-2 11.9.2 |
| • NFPA 72:2013 | • IEC60068-2-27 Test Ea | • IEC61131-2 11.10 |
| • NFPA 85:2011 | • IEC60068-2-30 Test Db | • IEC61131-2 11.11 |
| • EN 54-2:1997 | • IEC60068-2-32 Procedure I | • IEC61131-2 11.12 |
| • EDSA-300 Level 2 | • CISPR - 16-1-2, 16-2-1 | • IEC61131-2 11.13 |
| • IEC61000-3-2 | • IEC61131-2 7 | • IEC61131-2 11.14 |
| • IEC61000-3-3 | • IEC61131-2 10 | • IEC61131-2 11.15 |
| • IEC61000-4-2 | • IEC61131-2 11.2.2 | • IEC61131-2 12.1.5 |
| • IEC61000-4-3 | • IEC61131-2 11.2.4 | • IEC61131-2 12.1.8 |
| • IEC61000-4-4 | • IEC61131-2 11.2.5 | • IEC61131-2 12.1.9 |
| • IEC61000-4-5 | • IEC61131-2 11.2.6.3 | • IEC61131-2 12.2.1 |
| • IEC61000-4-6 | • IEC61131-2 11.4.1 | • IEC61131-2 12.2.3 |
| • IEC61000-4-9 | • IEC61131-2 11.4.3 | • IEC61131-2 12.3.2 |
| • IEC61000-4-11 | • IEC61131-2 11.4.4 | • IEC61131-2 13, 2 14 |
| • IEC61000-4-29 | • IEC61131-2 11.5.2 | • IEC61131-8 |

Why RTP?

RTP has become the world's leading specialist for safety-related automation solutions. RTP solutions provide maximum safety and maximum availability and can be integrated into any automation environment. More than 10,000 RTP systems have been installed in different countries, protecting the assets of the world's largest companies in the oil, gas, chemicals, pharmaceuticals, power generation (both Fossil and Nuclear) industries as well as rotating machinery for major OEMs for more than 50 years.

RTP solutions are leading the way to increased safety and profitability. RTP develops solutions that provide both maximum safety and availability for processes, plants and machinery – nonstop.

The RTP LIFECYCLE SERVICES concept gives customers an overview of all the requirements of 'functional safety' allowing them to always make the right decision at the appropriate time. RTP solutions therefore offer maximum safety, strengthen a plant's productivity and profitability while ensuring compliance to global statutory requirements. We believe continuous client engagement towards excellence is a major part of what customers expect from their vendors.

RTP was founded in Florida in 1968. Since 1970, the company has achieved numerous milestones in the field of safety related automation engineering. Through a steadily growing network of companies, sales and service centers, RTP products are implemented in projects of all sizes all over the world.



Rotating Machinery



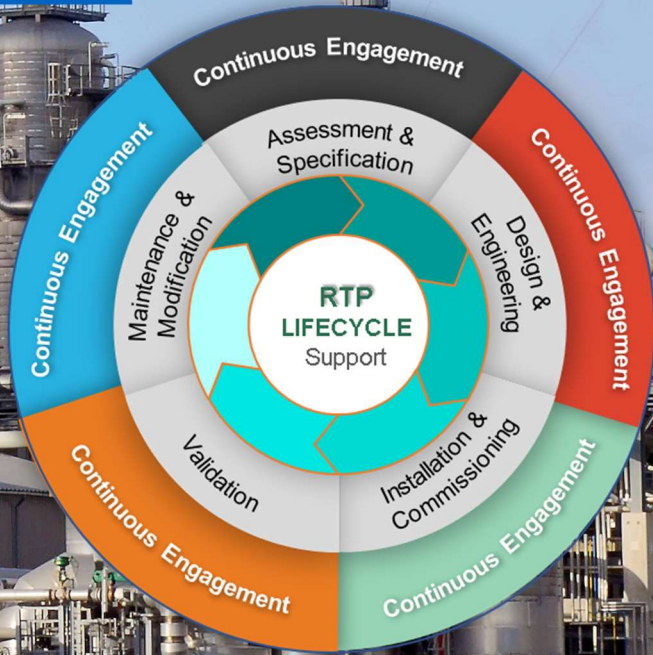
Platforms



Chemical



Power



With TAS, RTP provides you not only the world's leading nonstop safety system, but also supports you simultaneously with qualified and coordinated services for all phases of the safety lifecycles.

TAS systems are used in many Safety applications:

- Onshore/Offshore Facilities, Platforms
- Tank farms and Loading stations
- Power Plants
 - Nuclear
 - Fossil
- Pipelines
- Turbines and Compressors
- Refineries
- Chemical plant applications:
 - SBR - Styrene Butadiene Rubber
 - PBR - Poly Butadiene Rubber
 - PTA - Purified Terephthalic Acid
 - VCM - Vinyl Chloride Monomer
 - CKR - Gas Cracker
 - CPP – Captive Power Plant
- Others





1970 7400 series I/O
1995 RTP2000 Hybrid control system
1998 RTP2200 Hot-Standby Hybrid control system
2003 RTP2300 TMR control system
2006 RTP2500 SIL 3 TMR
2008 RTP3000 SIL 3 TMR
2009 RTP3000 SIL 3 QMR
2013 RTP3000 TAS SIL 3 QMR
2017 RTP3000 TAS N+ SIL 3 QMR

1968 Founded as CPI
1997 RTP Privatized
2005 RTP Korea formed
2007 RTP India formed
2012 RTP Mexico formed
2014 RTP Europe formed

A photograph of the Krummel Nuclear Plant, a large industrial facility with a prominent tall smokestack. The plant is situated near a body of water, with a forested hillside in the background. The sky is blue with scattered white clouds. The text "Krummel Nuclear Plant" is overlaid on the image in a bold, black, sans-serif font.

**Krummel
Nuclear Plant**

Plant has over 44,000 RTP I/O points installed

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