INPIRIO®
ADVANCED SYSTEMS
Electronic Engineering Services

Intelligent Monitoring System for Amusement Parks

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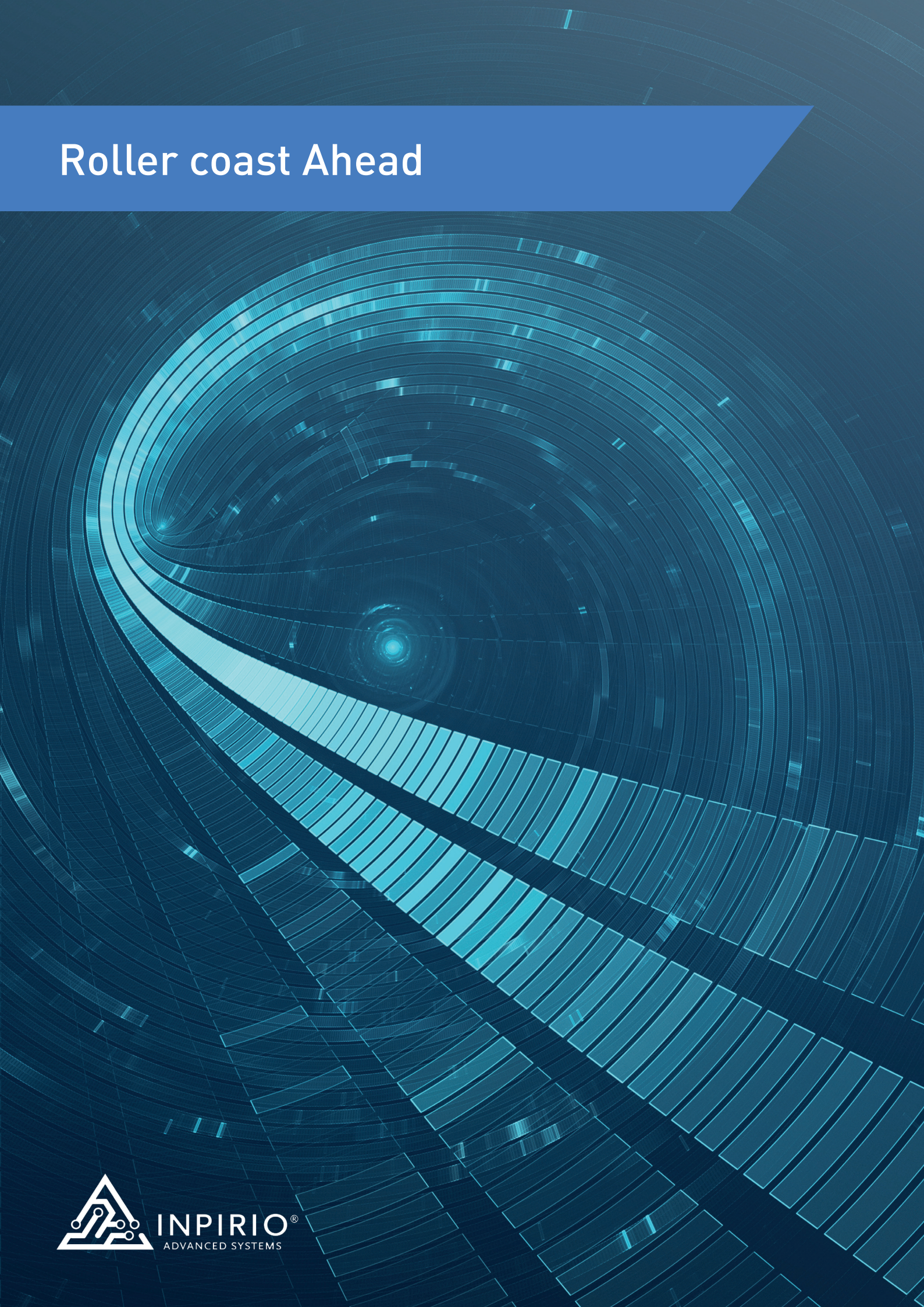
Intelligent Monitoring iMS from **INPIRIO AS** is the process of monitoring a parameter of condition in machinery (vibration, temperature, relative displacement, air gap, etc.), in order to identify a significant change which is indicative of a developing fault. It is a major component of Predictive maintenance.

The use of **INPIRIO Intelligent Monitoring (iMS)** allows maintenance to be scheduled, with a clear vision of developing trends in condition before a failure occurs.

Allowing planned actions to be taken to prevent failure and avoid its consequences. **Intelligent Monitoring iMS** has a unique benefit in that conditions that would shorten the normal lifespan can be addressed before they develop into a major failure, Maintenance planning can be Intelligent.

Speciality to predict

Roller coast Ahead



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Intelligent Monitoring iMS techniques are normally used on rotating equipment and other machinery.

While periodic Inspection using Non destructive techniques and fit for service (FFS) evaluation is used for stationary plant equipment. However, today the need to also address the equipment with **INPIRIO iMS** is key to the whole plant operation.

That's why many of the worlds leading companies, trust **INPIRIO's iMS.**

Applications Of Intelligent Monitoring System

It is so capable and simple, unique that can apply to **ALL** kinds of amusement ride such as: Pendulum ride, Drop tower, Water ride, Train ride, Swing ride and Roller Coasters.

- **Solutions for processes**
- **Easy integration with an variety of sensors**
- **High – performance of system**
- **Processing real time analysys**
- **Wide diagnostics real time (vibrations, etc.)**
- **iMS integration (vibration, temperature, winding, etc.)**

Capabilities for all kinds of systems, increased user reliability to manage industry profitability constrains.

Solutions for processes, IMS integration such as:
Vibrations, Temperature, Winding, etc., and variety clarifications for IMS critical equipment integration.

"Quality is never an accident;
It is always the result of Intelligent effort"

“The main purpose of Intelligent monitoring analysis is to provide you a Risk Mitigation.”

Intelligent Monitoring System Characteristics

- Prediction of life expectancy
- Perform diagnostic work at all time
- Intense and detailed **REAL TIME PROCESSING** of the system
- Prevent Various scales of RISKS - WE CONSTANTLY HELP YOU MEASURE THE RISK EXPOSURE OF YOUR SYSTEMS.
- Database storage
- Data Analysis from our side **24/7**

Intelligent Monitoring Systems have three different kinds of levels, each of them is simple, capable, strong, and unique with special characteristics.

Names of the three systems are: **Castor, Dom, Zermatt**

Castor - basic building block of the iMS system, processing unit with an embedded Web Application for machine state monitoring, and digital outputs for alarm/danger notifications.

Dom - clustering into one secure hub for easy-to-Access machine state monitoring of all machines with basic predictive monitoring capabilities.

Zermatt - clustering into one highly secured hub for easy-to-Access to machine state monitoring of all machines on one or more geographically separate DOM locations with advanced monitoring capabilities.

Intelligent Monitoring System Features

- Expert on-line monitoring system for amusement rides of all powers and sizes
- Applicable for various types of amusement rides (water, height, speed, etc.)
- Modular and upgradeable system for new, as well as for existing rides

- Long-term data storage and important events tracking
- Restrictive class based data archiving (smart/real trending)
- Local and remote system access
- Reporting based on real trending
- Detection of problems

- Unique approach for all integrated equipment
- Preventive maintenance of key equipment
- Longer life expectancy
- Support in decision making through remote access
- Reduction of cost due the unplanned stops caused by machine faults
- Participation of users in the creation of unique system based on custom requests

Prevention Risks Through Intelligent Monitoring System

Gradation is applied through the levels, in order to manage the crisis of management. **iMS is reducing taking chance of risks**, especially for the Risk management.

Massive need of Risk mitigation to reduce systems, machines, industries, etc. exposures and to protect your property, solution is iMS. iMS can prevent upcoming risks, with iMS you have time to affect on them.

Prevent various types of risks on a any type:

- Every kind of amusement rides, all powers and sizes
- Applicable for any kind of ride
- Modular and upgradeable system for new, as well as for existing rides etc.

The **modularity** of the iMS system **allows customization of all critical user information** for optimized asset management. We are constantly helping you measure the RISK EXPOSURE of your systems. Accountability for risks and, most importantly, for controls and the monitoring and assurance of the controls is clear and not doubtful.

The risk management framework should not attempt to replace the natural capability of people to manage risk; rather it should enhance best practices so that the process is reliable, comprehensive and consistent. For this to occur and for the required capability to be achieved, the organization requires:

A set of suitable 'tools' – INTELLIGENT MONITORING SYSTEM

A **coherent approach to training and communicating with people so that they can use those tools in a competent and consistent manner** – INPIRO TRAINING AND EDUCATION

Risk Mitigation (control the Risk) - reducing the risk:
Our system uniqueness can IDENTIFY various types of Risks, in synergy INPIRIO and the customer can make steps to prevent Risks.

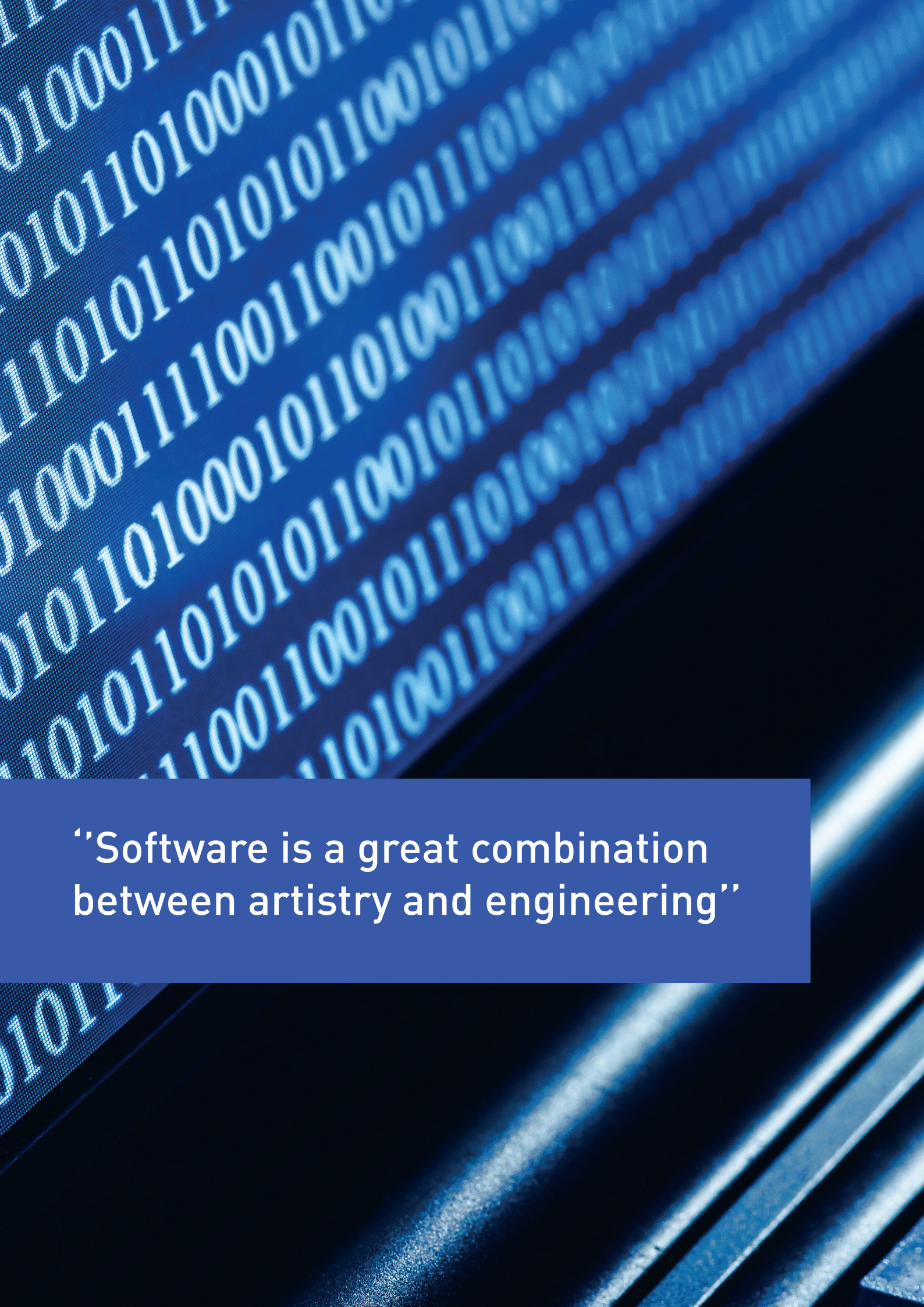
iMS Systems allows to minimize the Risks while constantly monitoring the situations and minimizing the ''shrinking'' of the problems and at the same time setting the steps for REDUCING THE RISKS.

Through Risk management, we can control Risks and Outgoings reliable to them. If we want to reduce Outgoings we don't want too put to many parts in stock, it will increase the costs. As we know, we want to reduce the costs, to have minimum costs.

Why have replaceable parts on stock when you don't need them?
INTELLIGENT MONITORING SYSTEM allows you to predict in real time what YOU need.

An example for Power Plant, all time you need to purchase parts and putting them in the stock, or you need additional examinations of the machine to have time react. **IMS allows you to reduce stock creation, which automatically is reducing costs**, and allows you to have a plenty of time to react.

‘’There are risks and costs to action. But they are far less than the long range risks of comfortable inaction.’’


''Software is a great combination between artistry and engineering''

Software of Intelligent Monitoring System

Software on our monitoring system is **designed in novel environments so it is highly functional and user friendly**. It provides local insight into the machine, pumps, or any other products and also remote access which is great importance for remote assistance. **User friendly reports can be analyzed from our side, any time, exactly to say 24/7.**

Competition systems takes millions of measurements , our Intelligent monitoring system take measurements **only when it detects changes** in system operation, and biggest advantage, our Software Is **User – Frinedly.**

Software has multiple information levels where levels give the basic stats of equipment monitored which is easy to follow and use. Information that monitoring soft - WARE warns you before

(this is important, trending gives you warning before something is incorrect, so the parts can be acquired on time) damage, gives you expected time to next service equipment (which we can provide), it can be asked how long before service if you change operation mode

(this is where software learning comes into play and where our software is analyzing your specific operation mode and with more measurements it has better and better accuracy to Phenomenally predict how will inspection interval change by changing operation mode).

Concept and Setup of Intelligent Monitoring System

PPU - Processing/Protection unit (real time processing, inputs/outputs, [embedded database storage and an embedded Web Application – Castor only)

State of the art processing unit with a very high sampling rate, enormous precision and fast response time to critical changes of the signals RMS value or a specific harmonic(s) value. With digital output the PPU can immediately notify an external system of the occurred alarm or danger.

OPERATOR PANEL - HMI (real time data, trends, spectrums, alarms) – Dom and Zermatt only

Multi-finger touch screen in eight different display sizes (from 11.6" to 24"), with an IP65 rating and with a user-friendly graphical interface showing the current machine state as well as real-time trend, current alarms and/or spectrums.

Concept and Setup of Intelligent Monitoring System

SECURE CONNECTION – Dom and Zermatt only

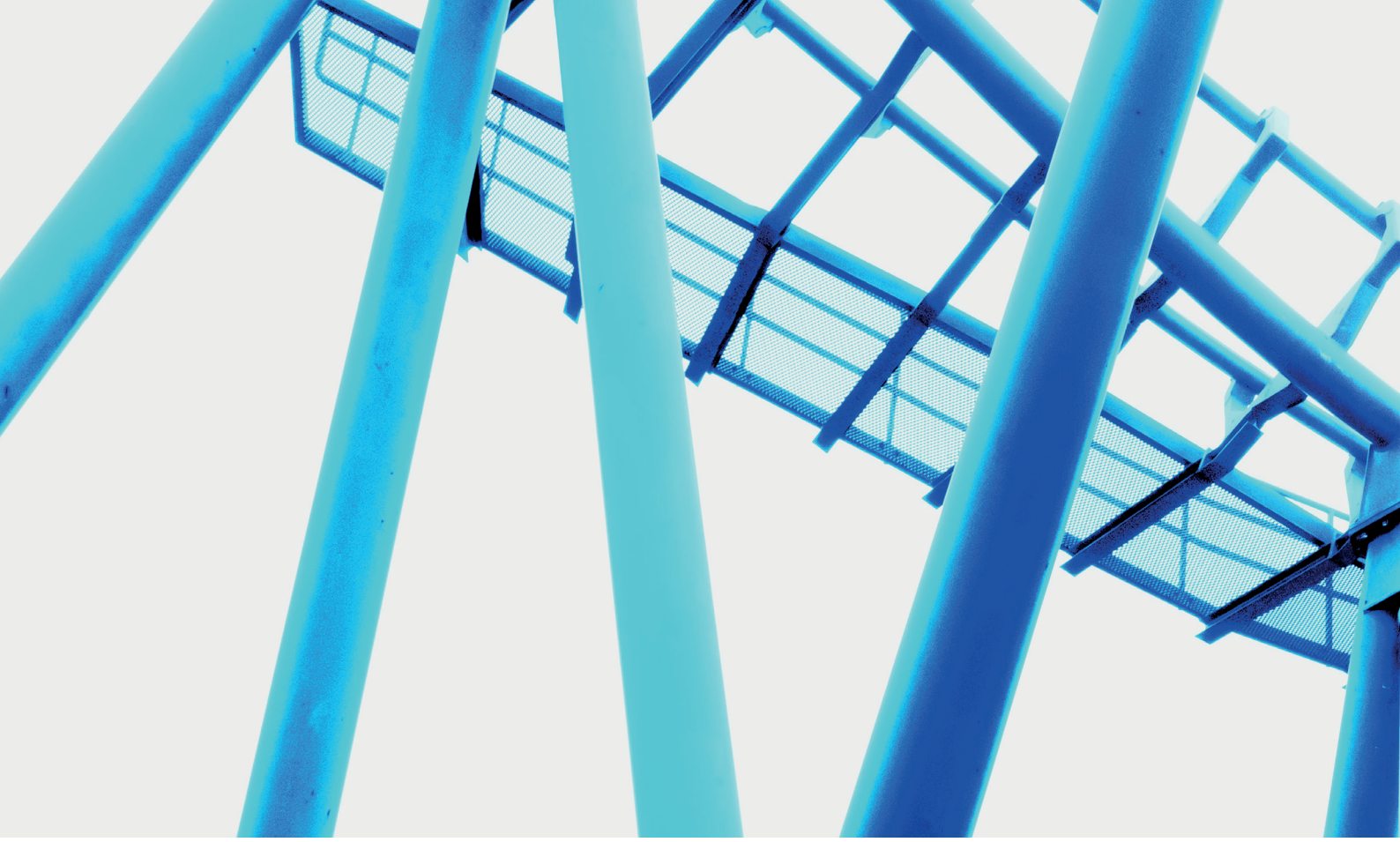
With a **TLS 1.2** cryptographic protocol using the minimum of **2048 bit key certificate** the connection is intrusion safe. The secure connection is used for technical support or data communication over the Internet to our secure server (Zermatt only – the best security option for the client)

WEB HMI

We have a user-friendly Web Application on every iMS level that shows the real time and stored data along with many other useful and smart tools.

Data Security

- Modern, tested and highly secure cryptographic algorithms (tls 1.2) and fully end-end encryption we ensure the complete privacy for our clients
- Secure connection does not lower speed, still depends on the bandwidth provided by the ISP
- HTTPS for our Web Application does not only mean though security, but also an increase in speed



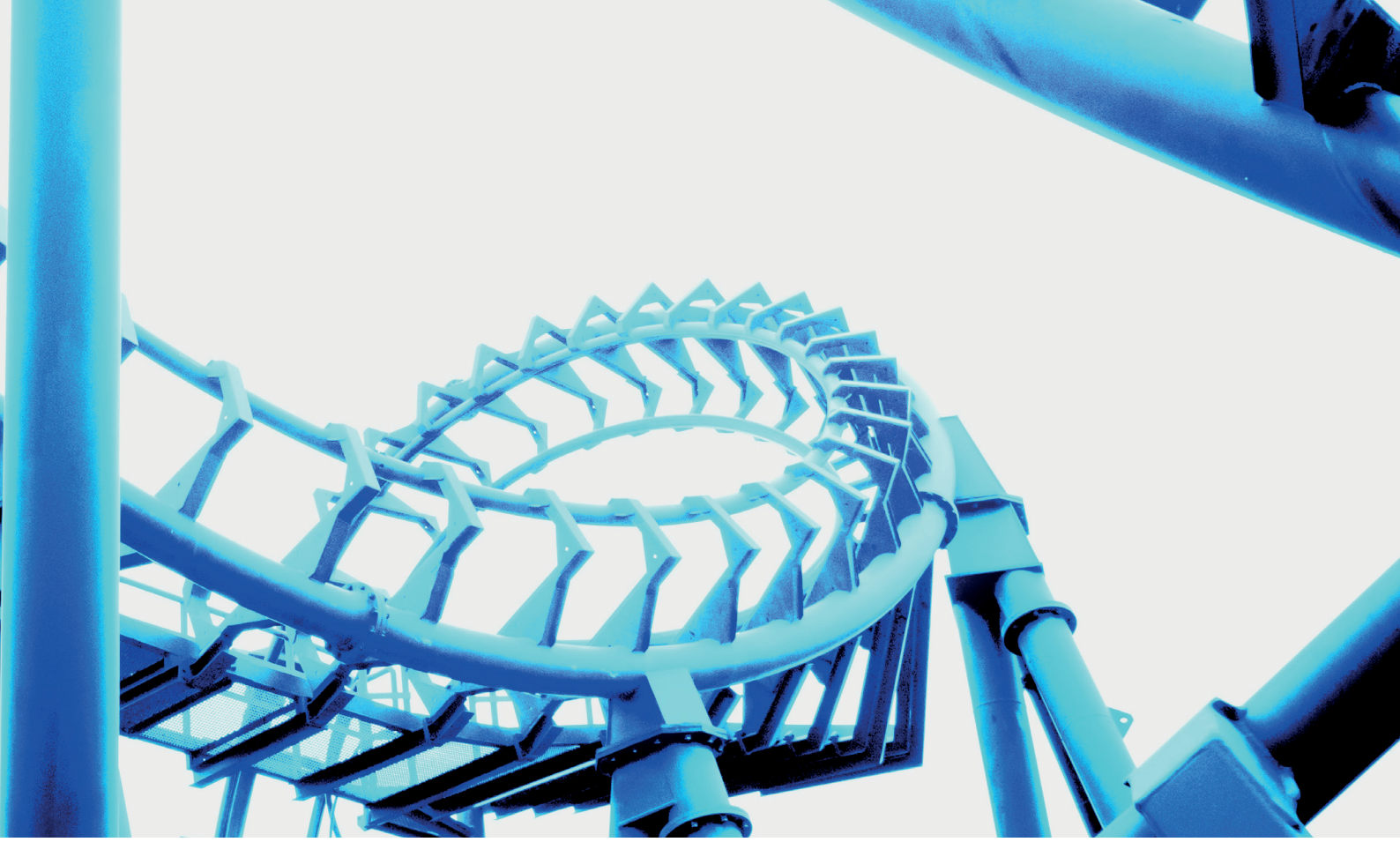
Concept of Intelligent Monitoring System

Our system uses **more than a hundred sensors for various measurements and can be adapted to meet customer specific requirements and situations.**

The hardware is made to meet the strictest standard depending on operating environment (dust, humidity, magnetic, field protection, water, etc.) and **most of the hardware can be adapted to meet visual requirements of customer.**

SENSORS:

- **vibrations**
- **relative displacement sensor**
- **temperature**
- **process parameters (current, voltage)**
- **key phasor (speed)**



Summary of Intelligent Monitoring System

Performance:
We are using our broad experience to support customers efforts to maximize availability and reliability, and optimize process performance and maintenance planning.

Assured QUALLITY:
Our equipment is built to last as we provide units with extended temperature range and IP range up to IP69.

Modularity:
Our system is completely modular, so new measurements can be easily added without system downtime, or with as little downtime as possible.

User friendly:
Web interface with our system is completely user-friendly, and can be tailor-made to the clients specific wishes.

Integration:
Integration can be made easily at any time (grouping Castors into one Dom, or one or multiple Doms to Zermatt level).

Easy implementation:
Implementation of our system is made to be easy and with as little downtime as possible.

Smart trending:
For the highest level of the system (Zermatt) - smart trending is offered - trending of all data with a specific, or multiple restrictive classes in mind.

Contacts

ADMINISTRATION AND SALES UAE
Inpirio Middle East
Electronic Engineering
Services LCC
304A Centurion Star
Ittihad RoadDeira
Dubai, United Arab Emirates
Email: sales@inpirioas.com
Phone: +41 (0)44 787 15 68

ADMINISTRATION AND SALES EUROPE
INPIRIO International PLC
Kolodvorska 80
40320 Donji Kraljevec
Croatia
Email: sales@inpirioas.com
Phone: +385 (0)40 360 888

ADMINISTRATION AND SALES SWITZERLAND
Inpirio International AG
Sihleggstrasse 23
8832 Wollerau
Switzerland
Email: sales@inpirioas.com
Phone: +41 (0)44 787 15 68

PICKHAN ENGINEERING is representative of INPIRIO AS for monitoring systems.

PICKHAN ENGINEERING
Am Heiligen 4
57078 Siegen
Germany
Email: pickhan@inpirioas.com
Phone: +49 (0)273 258 28 11

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