



PREDICTIVE ANALYTICS PER INDUSTRY 4.0

THE CONTEXT

The Industry 4.0 (i4.0) paradigm is changing manufacturing companies through the digitalization and automation of their processes, interconnecting critical resources (plants, personnel, data) both inside the factory and along the supply chain, shortening times for information availability, consolidation, processing and interpretation, maximising effectiveness and efficiency of processes and devices and improving the quality of the finished products.

Leonardo interprets i4.0 from its privileged position as both a leading manufacturing company in the Aerospace, Defence and Security sectors and a supplier of industry solutions and services. This dual expertise makes Leonardo the right partner for Customers that have to start a transformation process for their design, production and maintenance processes and for their supply chain as well.

THE LEONARDO APPROACH TO PREDICTIVE ANALYTICS

The new industry analytics platforms guarantee, in full synergy with the Industry requirements implied by i4.0, real-time and in-memory processing of the data coming from field sub-systems and sensors. The acquired data (even through machine-to-machine platforms) are handled by means of advanced environments that make possible the development of business logic components for advanced decision support, predictive analysis and feedback. Within this area, Leonardo proposal includes a suite of Predictive Analytics solutions and services capable of correlating and processing the huge amount of data - Big Data - coming from production facilities and operating plants, to turn them into information helpful to guide the Customer tactical and strategic decisions, drawing on a deep-rooted process culture achieved through technologies, methodologies and field experiences.

PREDICTIVE ANALYTICS



SOLUTIONS AND SERVICES

Leonardo Predictive Analytics solutions and services are based on an innovative “predict and prevent” methodology, to create a competitive advantage increasingly based on preventive, rather than corrective, actions.

The **Big Data Design & Implementation** approach proposed by Leonardo envisages the centrality of data analysis, starting from the definition of the domain of intervention, continuing through the development of the solution and finally arriving to continuous service management.

A typical project is structured in two stages:

- During the **Design** stage, a multi-disciplinary team involving device operation experts, statistics experts and computer experts co-operates to the generation of one or more predictive models in accordance with the CRISP-DM (CRoss Industry Standard Process for Data Mining) methodology.
- In the Deployment stage, the predictive model defined at the Design stage is applied to the operating devices to obtain information useful for the maintenance of devices/plants from the real-time operating data of the same.

The process is iterative, so as to allow continuous permeability and adaptability of the model to changing operational conditions.

This approach is applicable to many industrial processes, from quality management to production and maintenance.

Quality Management Predictive Analytics solutions and services collect, structure and normalise the information concerning product manufacturing and correlate them with historical data about “non-conformities”. The objective is to reduce the historical issues discovered during the test stage, to improve the quality of the Customer end-to-end process and, as a consequence, the quality of the finished product.

Plant Predictive Maintenance solutions and services allow improving the knowledge of the dynamics that may generate criticalities to increase the efficiency of internal productive processes, to reduce the maintenance costs of the plants and to maximise their operational availability.

After Sales Predictive Maintenance solutions and services make use of predictive analysis to support traditional maintenance planning systems (i.e. systems based on MTBF - Mean Time Between Failures or “on condition” parameters). They allow planning and performing maintenance activities for the devices used by the Customers only when this is actually required, optimising service costs.

Leonardo Predictive Analytics solutions and services may be implemented and used through various supply models: through the proprietary Software Defined Datacenter, in public cloud, “on site” at the Customer premises or in a hybrid form.

FUNCTIONALITIES

Quality Management Predictive Analysis

- **Quality Issue Modelling:** for statistical modelling of the quality ecosystem.
- **Root Cause Analysis:** for the correlation of the detected events resting within the product ecosystem, in order to assess which are the conditions leading to the onset of a non-conformity.
- **Quality Issue Detection:** to minimise the number of non-conformities that may occur during the productive cycle through a forecasting model supporting the production performance and determining the non-quality causes.
- **Quality Test Helper:** to evaluate, at the onset of a conformity issue on a production object, other objects beset with the same issue through the identification of data patterns.
- **Quality Warning Dashboard:** to monitor the various quality aspects of the product.

Plant e After Sales Predictive Maintenance

- **Asset Environment Modeling:** to define the statistical modelling of assets and devices.
- **Remaining Useful Life Estimation:** to estimate the residual life of the asset before the attainment of the breakdown point or, anyway, of an operational level requiring a maintenance intervention and then, as such, unacceptable.
- **Root Cause Analysis:** to correlate the detected events resting within the asset ecosystem and to assess which conditions may generate an operational fault.
- **Fault Probability estimation:** to estimate the probability of a given fault.
- **Asset Performance Classification:** to estimate the probability that an asset, in the future, degrades its operation in accordance with a pre-determined performances classification.
- **Alert List:** to monitor all potential alerts from a centralised control and to start the intervention process on the potential fault.

BENEFITS

- Higher availability of information aimed at the continuous improvement of the product.
- Definition of maintenance plans matching actual operational conditions
- Higher availability of operating plants
- Optimisation of maintenance interventions and of “on-site” spare part stocks
- Reduction of the costs associated with faults

LEONARDO FOR INDUSTRY 4.0

The Predictive Analytics solutions and services are part of the Leonardo proposals to address i4.0 issues in the manufacturing companies, guaranteeing:

- higher process reactivity against market changes and/or disrupting conditions
- optimised supply chain in relation with actual company requirements
- capability of providing better quality levels in relation with more competitive prices and lower risks.



PREDICTIVE ANALYTICS

The Leonardo proposal portfolio for Industry 4.0 is structured in three families of solutions and services:

Evolve i4.0

Solutions and services enabling the transformation of the manufacturing industry production processes through the conversion/migration towards world-class digital technologies.

Transform i4.0

For manufacturing companies, this represents the core of their transformation into “high-velocity hyper-connected enterprises”, since it operates on the industry core processes:

- **Planning**, solutions and services that enable the planning, transversally through company processes, of production, quality control and integrated supply chain activities, to address the Customer operational activities.
- **Production & Logistics**, solutions and services

that, through emerging enabling technologies such as IoT, what if and & predictive analysis, allow real-time adaptation of plant operation in case of unplanned events, create a strong link between the business level and the factory level and improve the continuity and reliability of operations for the purpose of optimising the production process

- **.After Sales**, predictive maintenance services and solutions aimed at performing preventive and targeted interventions, maximising plant availability.

Enhance i4.0

Solutions and services that, downstream or along the company transformation course, improve and synchronise the Customer processes, performances and operations through simulations and scenario analyses, providing support for strategic decisions.

The same portfolio also includes the specific Cyber Security solutions for data protection as well as the new Software Defined Data Center.

