# Latest updates on IULIUS 4.0 - the Properzi program supporting the transition of Users' facilities to digital factories

**Continuus-Properzi has always been investing in innovations to provide increases in quality and improvements for significantly responding to the end user's needs.**
**For some time in the Industry 4.0 field, the company has developed a specific package of Automation and Information-Technology features to support and facilitate the transition of the end users' factories into digital factories, in order to achieve much higher performances from many points of view, like quality, consistency, OEE, savings, and reactivity to new market's challenges.**
**Here we will present the functionalities offered by the current IULIUS 4.0 package and the latest additions and updates, valid for new plants, and for existing ones as well, through upgrading solutions.**

## Industry 4.0 in essence

Before outlining the IULIUS 4.0 package, here is a brief introduction on several essential concepts regarding **Industry 4.0**.

Industry 4.0 is the process of introducing the latest Automation and Information Technologies in the producers' factories, to transform them into completely digitalized entities. To achieve this in the factories they are essentially introducing INTRA-facility and INTER-facility digital communications and functionalities, where:

- INTRA-facility pertains to fully interfacing the Automation of the production processes' with the Information system of the facility where they operate,
- INTER-facility is when the Information system of the end user facility is fully capable of performing various tasks with the Information systems of external factories (i.e. customers, suppliers, sister companies, public authorities, etc.).

The producers' factories transformation into completely digitalized factories has a high potential value because it allows achieving very consistent benefits in various forms, such as improved performances, cost reduction, etc. Therefore we can say that these benefits are most welcome regardless of the particular Industry sector. Naturally, at the same time, any sector has some specificities to address in order to succeed in the transition to digital factories.

## IULIUS 4.0 - *the I4.0 package specific for the Properzi metals producers*

In the particular industry sector of non-ferrous metals producers, the factories' digitalization requires the introduction of new Automation and IT (Information Technology) functionalities, designed to address the specificities inherent of the Properzi technology / equipment, and the ones of their end users (i.e. example rod producers, welding wire producers, ingot casters, etc.).

The **IULIUS 4.0** package complies exactly with the purpose of resolving all the above specificities, providing a complete set of functionalities fully integrated and ready-to-use, which greatly eases the non-ferrous metals producers' journey in the digital transition of their facilities. We can say that the package is advantageous for the Properzi end user since:

- it drastically reduces the engineering hours and tuning period needed by the end user's IT Department to integrate the Line-specific process operations/controls in the factory procedures,
- the Automation is specifically designed and engineered based on Properzi's intimate knowledge of the Properzi equipment, process and technology,
- all of the actuators, sensors, programming, etc. are already implemented in order to capture and record all the information essential to the Properzi process, and to provide ready-made KPIs, dashboards and data to the end users managers,
- it provides ready-to-use data to implement business-intelligence functionalities in the IT system of the end users.

As a result, the end users obtain ready-made functionalities that are directly applicable without any effort or uncertainty, at a modest cost compared to the realized savings.

Further, this allows the IT Department of the end users to focus and concentrate resources on their core tasks, such as the aggregation of production/process information at the Factory Level, as well as the implementation of digitalized services across other factories such as sister companies, customers, suppliers, public authorities, etc.

As previously mentioned IULIUS 4.0 can also be applied to existing plants through selective upgrading of the equipment/automation in order to implement all the features/functionalities, or just a part of them depending upon the end users' goals.

The **IULIUS 4.0** program consists of functionalities divided in two major sets: **IULIUS 4.0 Ready** and **IULIUS 4.0**.

**IULIUS 4.0 Ready - *the basic infrastructure essential for the I4.0***

The IULIUS 4.0 Ready consists of the the basilar and indispensable functionalities, summarized in the next three topics, from **a.** to **c.**

**a. Wireless visibility of plant's data through the automation LAN**

The first functionality is the ability to access the Local Area Network (LAN) of the automation system via WiFi, and to provide visibility of the plant's data through those systems.

For this purpose, the Line's automation system is equipped with a Wi-Fi Access Point, and with PLCs, HMIs, controllers, etc. provided with digital network cards in order to constitute the LAN.

The main purpose of this ability is to provide access to the programming of PLCs, HMIs, drives, and to other programmable devices present on the LAN, in order to monitor the program in execution, make minor changes / integrations, or to adjust parameters, through the programming software of the device that is preinstalled in the connected external Laptop.

Being this connection wireless, it gives to the external Laptop the possibility to reach more easily any programmable device on the LAN from the most convenient position.

**b. Access to HMIs from on-site mobiles**

This functionality provides real-time access to the pages of all supplied HMIs from on-site mobile devices of the end user through the Wi-Fi wireless access point regardless of position within the plant. It purposely provides the **operators** with the freedom to monitor the line from anywhere within the plant at any time.

*HMI pages on Tablet*

On the operator's mobile, the HMI pages become accessible in reading mode, so any changes that are made to the HMI screen are reflected on the mobile tablet connected wirelessly through the Wi-Fi access point. In this case the tablet is simply being used to monitor in real-time what is occurring on the Line.

**c. Remote Technical Assistance via Internet**

Through dedicated network components and a connection to an Internet provider, the automation LAN of the plant is attainable also via Internet.

This is the last of the IULIUS 4.0 "Ready" functionalities, which mainly facilitates the ability to carry out Technical Assistance from any Remote location via the Internet, and also allows the two previously described functionalities, **a.** and **b.,** to be executed remotely.

The Remote Technical Assistance consists in gaining the possibility to access via Internet the programmable devices of the Line, to monitor the program in execution for diagnostic purposes and to adjust the operating parameters. It also allows engineers, duly authorized by the end

user, to make changes or add features when requested.

Upon the end user's demand and its enabling of the internet connection, Properzi Service Technicians, regardless whether they are in house at Properzi HQ or off-site, connect to the end user's Line through a dedicated server in order to provide remote technical assistance. This all takes place through secure communication methods protected by firewalls, VPNs, and modern security systems. Indeed any personnel, only if authorized, can accomplish this from any remote location.

The hardware package for the Remote Assistance also includes a set of video cameras and related audio-visual accessories to support in a much more comfortable and effective way the interaction among the on-site and off-site technicians. With this audio-visual package, all the technicians can stay in live session while sharing on their monitors the multiple views of the various areas of interest of the Line, such as machinery parts, HMI pages, PLC programming, windows of video conference attendees, etc. In this manner, they are able to carry out, in virtual mode practically the same activities as traditionally carried out in person at the end user site.

The image here below shows Assistance Engineers during a commissioning session from remote. Two of them are at Properzi HQ, while one of the end user (at bottom right) is on-site at his factory. Note that, for an effective interaction, all of the participants are connected to one another in video conference, see the same various depicted windows, and, at any time, can share from their respective PCs or mobile devices additional images of interest.


*Remote assistance engineers in live session*

Compared to the direct intervention of a Properzi technician on-site at the customer's plant location, remote assistance grants decidedly superior timeliness at lower costs, tanks to shorter lead-time for availability of a service engineer and travel time eliminated.

## IULIUS 4.0 - *the most valuable advanced package for the I4.0*

The IULIUS 4.0 package, more and more frequently requested as the market realizes the benefits I4.0 can provide, consists of the additional most advanced set of functionalities summarized in the next five topics, from **d.** to **h.**

These have the purpose of acting as a powerful tool, making the control and optimization of the Line easier, more effective, and more efficient for the quality, production, and maintenance operators. To implement these advanced functionalities, it is necessary to have a SCADA system.

### d. SCADA System

SCADA stands for "Supervisory Control And Data Acquisition" system; it is the IULIUS 4.0 platform for the relevant data management and storage. It generally has the purpose to provide monitoring and control functionalities to continuously improve and maintain the process performances of the Line.

It consists of a set of industrial PCs, in one or multiple stations, which interface through an Ethernet network two parts: the LAN of the Properzi Line, and the IT system of the end user facility.

As examples of SCADA functions, we can mention:

- generation of traceability data, like metal codes, cast numbers, production lots, product numbers, weights, etc.
- production and quality reports,
- process set points controls,
- data acquisition in trends and logs.

The SCADA is the most frequently preferred solution by the end users since it allows them to own the data collected in their facility. As an alternative, edge computing solutions can be implemented but the collected data in this case reside in a cloud.

Now, one may ask "Why does IULIUS 4.0 use a SCADA system as its supporting platform?"

This is essentially because it provides a ready-to-use IT system part directly available for the end user's IT, with all the automation-related specificities already embedded and operational.

This is achieved thanks to the following main characteristics:

1. computing at automation level, of all necessary I4.0 data,
2. computing at SCADA level, of all necessary I4.0 data that is fully coordinated with the data coming from the automation,
3. internal data storage capacity, in performant relational databases,
4. database export and data exchanging interface ready-to-use by the end user's IT system.

**e. SCADA pages on end user's mobiles.**

The working principle of this functionality is that it brings the content of the SCADA pages also on the end user's mobile devices. This works either locally through the on-site Wi-Fi connection, or remotely through the Internet connection from any off-site location.

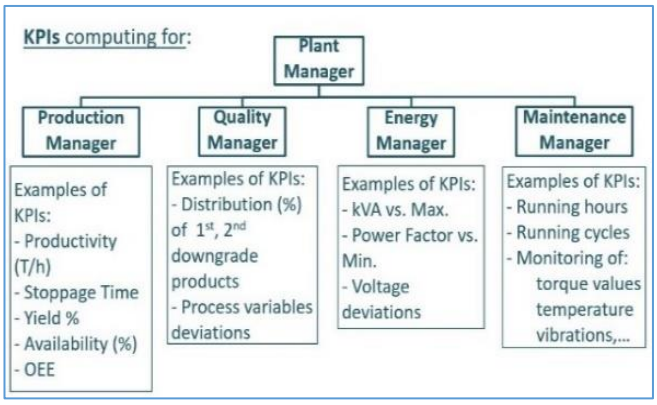
In this way the operator can consult at any time and from anywhere the status of the Line by navigating the SCADA pages of interest (synoptics, recipes, trends, reports, etc.) as if he would be on site, just with a slightly longer latency in the data refreshing time, as per Internet connection's speed, practically with the same effectiveness.

This function **e.** is designed for Managers of the Line, with the aim of providing them with a simple, objective and agile tool to be always up-to-date on what is happening in the plant at any time and from any place, thus making them much more at ease knowing they have everything under control.

Furthermore, to be of even more effective support, the information brought to mobile devices is specifically tailored for each of them in a few highly effective dashboard pages. This introduces the next functionality.

**f. KPIs dashboards - for the Managers of the end user.**

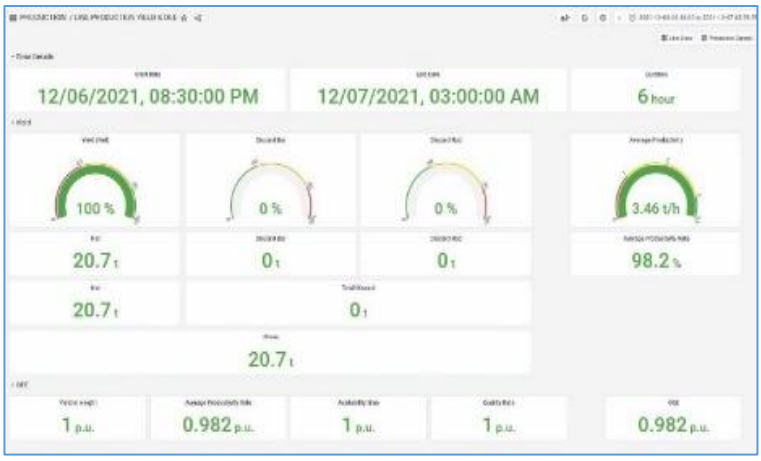
The plant's management team, in order to make quick and effective decisions, needs to know, in real time, the KPIs (Key Performance Indicators): the set of most important process variables and parameters significant to the Line's status and performances, in relation to their specific role within the organization. Indeed, the KPIs are computed for each of the Managers' roles, which most frequently are the five ones shown in the image here below.




*KPIs for the Line's Managers*

In the previous image, below each individual Manager is an example of the types of data and information that most frequently are summarized for the plant management team in order to support their individual decision-making processes. For each type of Line, there will be specific corresponding KPIs depending on the type of production made.

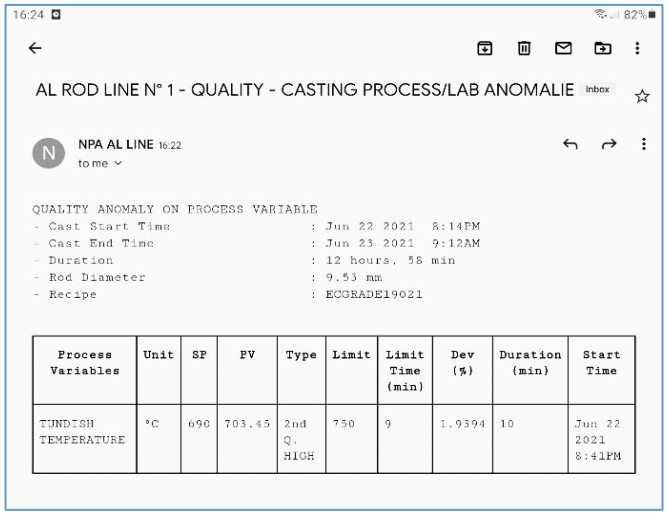
To summarize the desired KPIs the automation system acquires the instruments' data from the LAN, stores them into the SCADA database, which then processes, re-aggregates, and presents them with values and graphs to each of the managers. The resulting KPIs are grouped in specific dashboard pages, individually accessible to each of the managers by the respective PC for a continuous availability.




*I.e. a dashboard page for the Production Manager*

To complete this functionality and make it as timely and effective as possible, two (2) further features are added to the aforementioned dashboard pages, allowing managers to no longer have to continually monitor site operations to make sure everything is proceeding smoothly. In this way, they can benefit from time saved in monitoring the plant, and gain time to address other more important and challenging activities. The IULIUS 4.0 system itself will monitor the process for them and provide alerts when something deviates from the pre-established limits, through the following features.

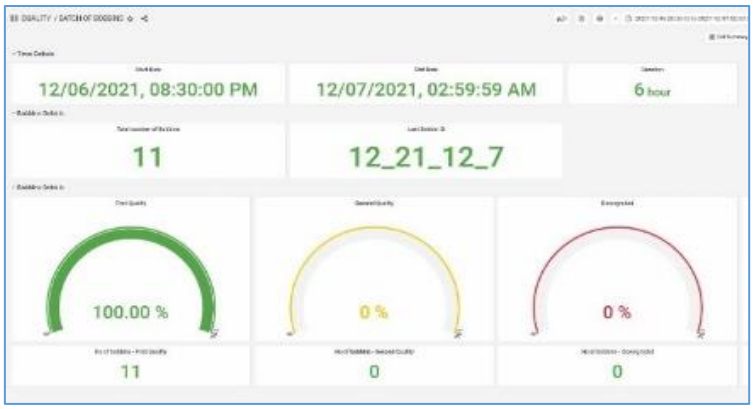
1. Automatic transmission of an **email message**, automatically generated when a process variable, selected among the most significant ones of the production process, exceeds a pre-set limit threshold. In the example below, an email alerts the QA Manager on his Tablet in real-time of a molten metal over-temperature condition.




*Email on Tablet*

Furthermore, they are also foreseen emails containing reports. For instance, every time a cast ends a new Casting Report can automatically be issued.

2. Transfer of **KPIs dashboards to end user's mobile devices.** For instance in the image below, the QA Manager selects the production period of a coils' batch of interest, touches a button to update the dashboard, and the specific KPIs regarding the quality of these coils appears. The green, yellow, and red needle indicators show the number of 1st quality coils, 2nd quality coils, and downgraded coils.




*I.e. Quality dashboard page on mobile*

As a further instance, the image here below shows a dashboard with the KPIs for a Plant Manager.


*I.e. dashboard page for the Line Manager*

As can be guessed from the two previous examples, the elaboration of the indicators for each of the managers can only take place taking into account the specificities of the type of plant/process concerned. This is made through the digital acquisition of the data read from sensors and installed devices by the automation, their processing, and their exchange/transmission via LAN and Internet.

This task is so dependent from the specificities of the Properzi Lines, that in order to be efficient it must be performed in an environment where the functions of automation and those of SCADA are deeply coordinated with each other.

In this way, the SCADA becomes the first element of the IT system, with the computed data ready to be utilized by the end user, with all the automation and IT specificities already addressed into its programming.

### f.1. NEW FEATURES of the KPI Dashboards

As the previous images have shown, one of the latest updates consists in the completely renewed dashboard pages with:

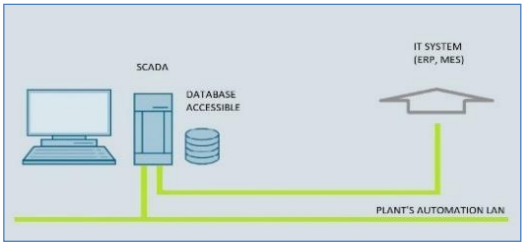
- **new enhanced graphics**, with a wider range of graphic elements to show the data, featured by the capability of being automatically scaled to the screen size of the mobile device in use,
- **new searching and filtering functions**, making it much simpler and immediate to search or filter data according to an assigned criterion, and with added features to compare different production periods, castings, shifts, type of products, etc.

### g. Database for the end user's IT system

The function **g.** consists in generating an additional database to export and share data with the IT system of the end users.

Mainly the data in this database provide the end user with the possibility to combine, at factory level, the Properzi Line data with the data coming from other Lines or Systems present in the same production site, for a general grouping of KPIs, or for implementing other new supervision or previously unforeseen functionalities.

The access to these Databases in the SCADA is done through an Ethernet port dedicated to data exchange with the end user's IT system.




*Interface between SCADA and user's IT*

To populate the new database, the SCADA takes data from its internal database, and writes them in a well-diffused and effective standard, such as SQL Server, for an easy interfacing by the IT system of the end users. The database contains essentially two groups of data:

- the ones containing the most significant Line's process variables, just scaled and on time basis, and
- the ones where the Line's KPIs have been computed and stored.

The two above databases provide the end user with not only the possibility of implementing supervision functionalities at factory level, as mentioned above, but also with other more advanced ones, for instance in the fields of factory's KPIs, big data analysis and artificial intelligence.

### h. NEW INTERFACE with the end user's MES SYSTEM

The function **h.** consists of a new interface, ready made with a set of ready-to-use data, which IULIUS 4.0 instantaneously exchanges with the MES, the Manufacturing Execution System program that runs in the end user's IT. The MES has the main task of planning the Line's production, improving and optimizing the overall facility's one.

The data exchange between the IULIUS 4.0 and the MES through this interface are of specific interest for the end users in order to digitally integrate their Properzi Line with the logistic system, or with the supply chain in their factory, and/or with other lines present in the same production site.

Without entering into detail, you can consider that these data exchanges mainly concern production plans, order plans, orders completion, etc.

Through them, in combination with the KPIs, the email alerts, and reports computed by the IULIUS 4.0 system, the production planning, tuning and control by the factory managers becomes much easier, more flexible and performant.

The data exchanges of this MES interface are made through a very common and effective protocols (such as OPC), which simplify the implementation at the end user side. Furthermore, the interface also makes use of several stored data to keep track of the exchanges with the MES system, and this is done with added extended tables (in the context of the previous function **g.**).

Naturally, this is a standardized solution to be ready-to-use for the end users. But if requested it can also be customized (i.e. for additional data to be included, for different database standards, or different communication protocols).

## Conclusions.

We have presented here the complete program of the IULIUS 4.0 system, with its full set of currently available functionalities.

With the **latest updates**, the package now also includes two (2) new features:

- completely redesigned KPIs dashboard pages, with new highly improved graphics and searching/filtering capabilities, and
- a new interface with the MES system ready-to-use for an easy and immediate integration in the end user's factory.

Along with the IULIUS 4.0 description the **advantages** for the Properzi end users have been highlighted. As most significant we might recall that:

- IULIUS 4.0 is specifically designed, engineered and realized for the non-ferrous metal market in which Properzi has been active for more than 70 years
- together with the IT functions provided, it also includes all the concerned automation advantages,
- It captures and records all of the data that are essential to the concerned process, to provide ready-made KPIs and dashboards to the end users' managers, on to their PCs and mobile devices

- It automatically generates emails containing alerts and reports on the managers' mobile devices, alleviating them from having to monitor the plant to make sure everything is operating smoothly
- It provides a set of database and interfaces ready made for the end user's IT to drastically reduce resources, costs, and time to integrate the Properzi Line in their digital factory

All of this then, in cascade fashion, produces benefits on various performance aspects such as: product's quality on a more consistent basis, increased Overall Equipment Efficiency, easier and more timely identification of corrective actions, better yielding, more timely decisions, etc.

For additional information visit our website at **www.properzi.com** or contact us at **sales@properzi.it.**

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