The Properzi Reality

Industry 4.0 has rapidly altered the manner in which companies go about procuring capital equipment; not so much from the pure acquisition perspective, but rather from automation, data collection, and digitalization perspectives. Prior to Industry 4.0 customers looking to purchase capital equipment were mainly interested in topics like: maximum performance parameters, production throughput per unit time, equipment efficiency, the cost to operate and maintain the equipment over time, etc. Rest assured customers are still interested in all of these areas and are asking these same questions! However, since the advent of Industry 4.0, customers have added an entire host of questions related to the equipment's automation system and how it can assist in the attainment of the above-mentioned topics. Properzi developed the IULIUS 4.0 System to ensure our automation system addresses these topics in response to the exigencies of Industry 4.0. However, what better way to understand than by asking questions about our system? Here are the most frequently asked questions from those who want to become our customers:

By **Giuseppe E. Marcantoni*** and **Giovanni Pirovano****

1. What does an Industry 4.0 system consist of?

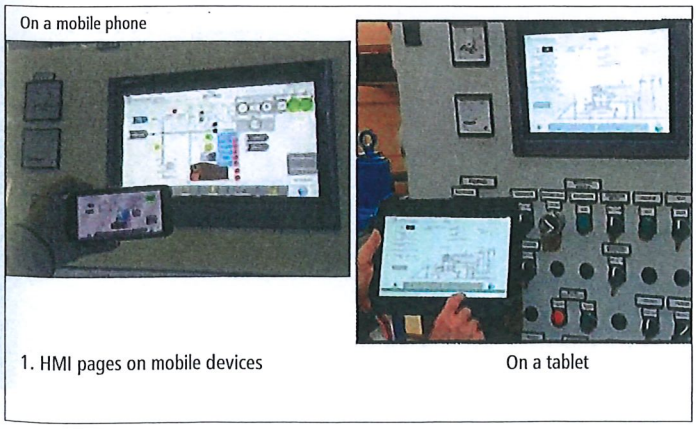
An Industry 4.0 package essentially consists of various functionalities to support the transition of the end users' factories into digital factories, through the automation, related sensors, actuators, and associated programming, in conjunction with the appropriate data exchange functionalities of the Information-Technology (IT) domain.

2. Why is IULIUS 4.0 the right choice for me as a Properzi user?

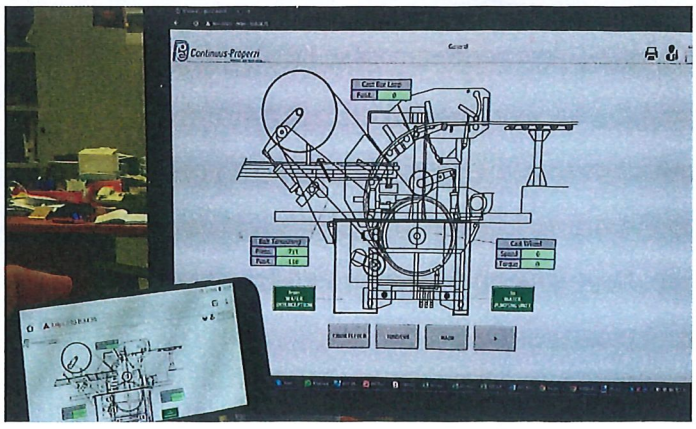
IULIUS 4.0 is an Industry 4.0 package specifically designed for our end-users, to support and facilitate their transition to digital factories. Its main objective is to achieve the best possible performance from their Properzi Line, in the most trouble-free way, in areas including production consistency, quality, OEE, savings, and timely reactivity to new market challenges.

This is done through data collection of the most important variables within your specific manufacturing process. IULIUS 4.0 is provided with Automation and IT functionalities designed and coordinated to address the specificities inherent of the Properzi technology & equipment, as well as those of our end-users such as rod producers, welding wire producers, ingot casters, etc. Furthermore, the IT functionalities included in the package are pre-implemented and ready to use for the quick and easy integration of the IULIUS 4.0 system with the end-user's IT system of the factory.

3. How does IULIUS 4.0 help improve my manufacturing process?



1. HMI pages on mobile devices



2. SCADA page on a mobile phone

*General Manager of Properzi International Inc **Automation Director of Continuus-Properzi S.p.A.

It improves your manufacturing process by providing the Line's Managers with:

- the ability to be more proactive based on data collection and trending,
- the ability to perceive and react to unforeseen situations,
- the ability to drive the plant/process tuning in a more structured and methodical way, thereby making it possible to reach greater performance and consistency in a timely manner.

The included functionalities provide support to the Managers responsible for the various areas such as production, quality, maintenance, and energy.

4. What does IULIUS 4.0 do to support the Line Managers in their quest to increase production, quality, performance, etc.?

a. It provides access to HMIs from on-site mobile devices.

i. Why is this important and how does it benefit my operation?

This is important because it 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. The operators can monitor, and if desired even command, the line from anywhere within the plant and at any time (**Image 1**).

b. IULIUS 4.0 also makes "Supervisory Control and Data Acquisition" (SCADA) pages available on end-user mobile devices, either through the on-site Wi-Fi connection or remotely through the internet **(Image 2).**

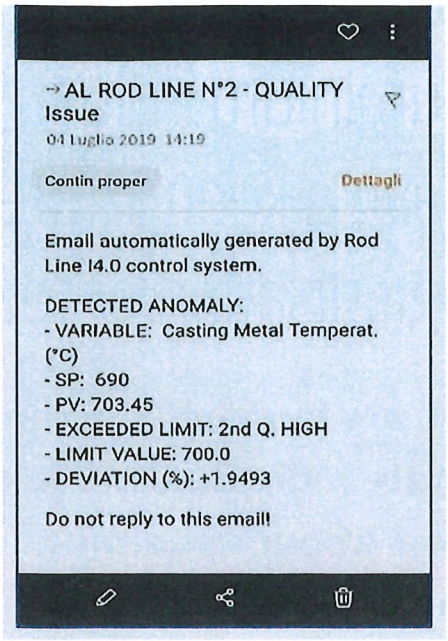
i. Why is this important?

This functionality is designed for the Managers of the Line and allows them to be fully updated on the operation of the Line at any time and from any location.

c. To be an even more effective support tool, the above information is also specifically tailored for and provided to the mobile devices of each designated Manager through highly effective pages which contain the Key Performance Indicators (KPIs) of the Line.

i. What are KPIs and how do they benefit my organisation?

The KPIs are the most important process variables and parameters significant to the Line's status and performance. In order to make quick and effective decisions, each Manager needs to know the KPIs that are specific to his role within the organisation. The resulting KPIs are grouped in specific dashboard pages, individually accessible by each of the Managers.



3. E-mail alert on mobile phone

ii. Do the managers need to continuously monitor the KPIs and associated dashboards in order to be well informed?

No, the IULIUS 4.0 system itself monitors the process for them and alerts the Manager, via an automatically generated e-mail, when a process variable deviates outside pre-set limits (**Image 3**).

iii. How does my personnel access this information?

The KPI dashboards are easily accessible from the end-user's mobile device(s). For example, the Production Manager selects the specific production period for a batch of coils, touches a button to update the dashboard, and the specific KPIs regarding the Production of these coils will appear on his mobile device (**Image 4**).

5. What does IULIUS 4.0 do to help fine tune the process and increase quality and consistency?

The IULIUS 4.0 System, through data acquisition by the SCADA across our automation, constantly monitors that selected process variables, most critical to quality, remain within their preset optimal ranges for the entire production time of a given product, for example a coil. Should one or more alarms get activated or not, the relevant coil is automatically classified as 1st quality or lower according to tolerance ranges preset by the end-user. Nonetheless, the final classification also takes into account the manual or automatic inputs related to the recipe being used and the mechanical/chemical laboratory test results. For each produced coil, the relevant data is then stored into a database, and the results are provided to the Managers through KPIs, reports, and e-mails.

i. Why this is important?

The freedom to establish the tolerances for each significant process variable is extremely useful to focus the tuning process on the more critical parameters, those requiring particular improvements in a certain period within the life of the Line.

ii. What happens if during the tuning process I realise that a variable is significant for the process but not currently acquired by the IULIUS 4.0 system?

The IULIUS 4.0 System is designed with open architecture; this means that it is possible, with minimal cost and time, to extend the automation system to monitor additional desired process variables simply by adding the appropriate sensor(s) or actuator(s) and making any required programming additions or modifications.

iii. Does the IULIUS 4.0 system resolve everything?

Unfortunately, the IULIUS 4.0 System is not a magic wand, but it does however provide the end-user with the ability to automatically monitor process variables through the automation system and be alerted accordingly when a process variable goes outside the preset limits.

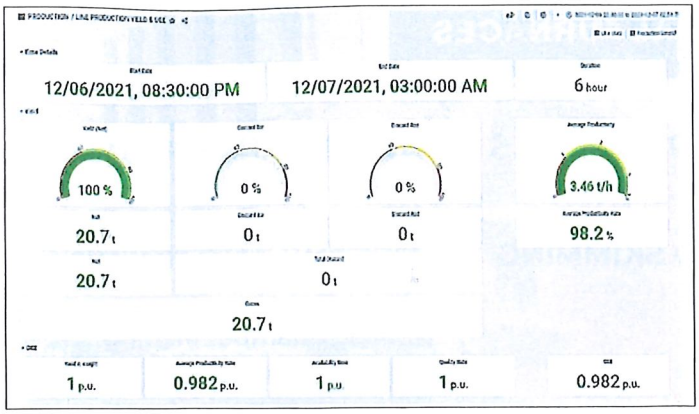
Since all the process variables provided with sensors are kept under control by the IULIUS 4.0 system, the managers and operators are more available to investigate other process variables or features that might be significant bottle necks limiting further improvements.

6. How does IULIUS 4.0 provide support to increase efficiency and reduce operational costs?

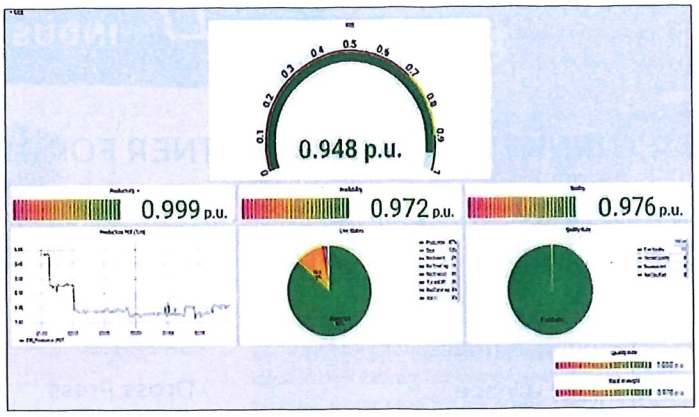
The system is designed to monitor the consumption of utilities such as gas and electric, as well as that of other significant media.

Furthermore, the system calculates the OEE, as well as all the individual efficiencies which culminate in computing this overall indicator. These individual efficiencies take into account the weights of discarded product parts (i.e., discarded bar or rod), the time used to run the Line relative to the total time available, the percentage of Line speed, and the ratio of 1st quality products to the total (see an example in **Image 5**). IULIUS 4.0 also calculates and reports the relevant data per cast and per shift.

7. How does IULIUS 4.0 make



4. Dashboard page for the production manager



5. Efficiencies and OEE

maintenance and technical assistance more effective?

i. *How does it work?*

It provides Wi-Fi access via Internet to the programmable devices of the Line, to monitor the program in execution for diagnostic purposes, and to adjust the operating parameters. It also allows duly authorised Properzi engineers and/or end-user personnel to troubleshoot, make changes, or add features from a remote location.

ii. What are the benefits of Remote Technical Assistance?

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

8. How does IULIUS 4.0 render the integration of the Line with Factory Level IT services faster and easier?

a. This occurs through a Database accessible by the end-user's IT system, with very diffused and commonly used standards/protocols.

i. What is this database used for?

This additional database is used to export and share data with the IT system of the end-user. It provides the end-user with the possibility to combine the Properzi Line data with data coming from other Lines or Systems present in the same production site, for a general grouping of KPIs, or to implement other new functionalities at the Factory Level.

ii. Where does this data come from?

To populate the new database, the SCADA takes data from its internal database and writes it to an SQL Server, for example, to facilitate easy interface by the IT system of the end-user.

b. This is further accomplished through an interface with the end-user's Manufacturing Execution System (MES)

i. Why is this interface important?

This is important because the MES plans, improves, and optimises production within the entire facility, including that pertaining to the Properzi Line.

ii. How is this accomplished?

IULIUS 4.0 instantaneously exchanges a set of ready-to-use data with the MES program that runs in the end-user's IT system.

iii. Why is this beneficial?

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 within their factory, and/or with other lines present in the same production site.

c. Additionally, the SCADA System is used as the IULIUS 4.0 platform for relevant data management and storage.

i. What does the SCADA System do?

It provides monitoring and control functionalities to continuously improve and maintain the process performance of the Line. It generates traceability data (such as metal codes, cast numbers, production lots, product numbers, weights, etc.), production and quality reports, process set point controls, as well as data acquisition trends/logs.

ii. Is there an advantage to a SCADA System compared to Edge Computing Solutions?

The SCADA allows the end-user to own and collect their facility data as opposed to having it reside in a cloud.

iii. Why have a SCADA System as the supporting platform?

Using a SCADA System as the supporting platform provides the end-user's IT with all the automation-related specificities already embedded and operational in a ready-to-use IT system

9. How is IULIUS 4.0 advantageous for the Properzi equipment end-user?

The automation is specifically designed and engineered based on our intimate knowledge of the Properzi equipment, process and technology. Since the appropriate actuators, sensors, and programming are already implemented in the IULIUS 4.0 system it provides the following advantages:

a. Capture/record all essential Properzi process information which provides ready-made KPIs, dashboards and data to the various managers within the plant

b. Reduces engineering hours and debugging period normally required by the end-user's IT Department to integrate the Line's-specific process operations/controls in the factory procedures

c. Provides ready-to-use data for the end-user's IT system

d. The results provide ready-made functionalities that are directly applicable without any effort

10. Can IULIUS 4.0 be implemented on existing Properzi equipment or is it only available on new equipment?

IULIUS 4.0 can also be implemented within existing plants through selective upgrading of the equipment and/or automation in order to provide all the features and functionalities of the System, or it can be implemented in part depending upon the specific goals and objectives of the end-user.

The contents reported in this article represent only a part of what the IULIUS 4.0 system can offer. We remain at your complete disposal for further insights that can guide customers towards Industry 4.0.■