



Italian automation in Ikea production

Ikea chooses the quality of ‘made in Italy’ in the furniture sector by shifting production further into Italy due to the great level of automation used by Italian companies that guarantee top quality productivity with excellence.

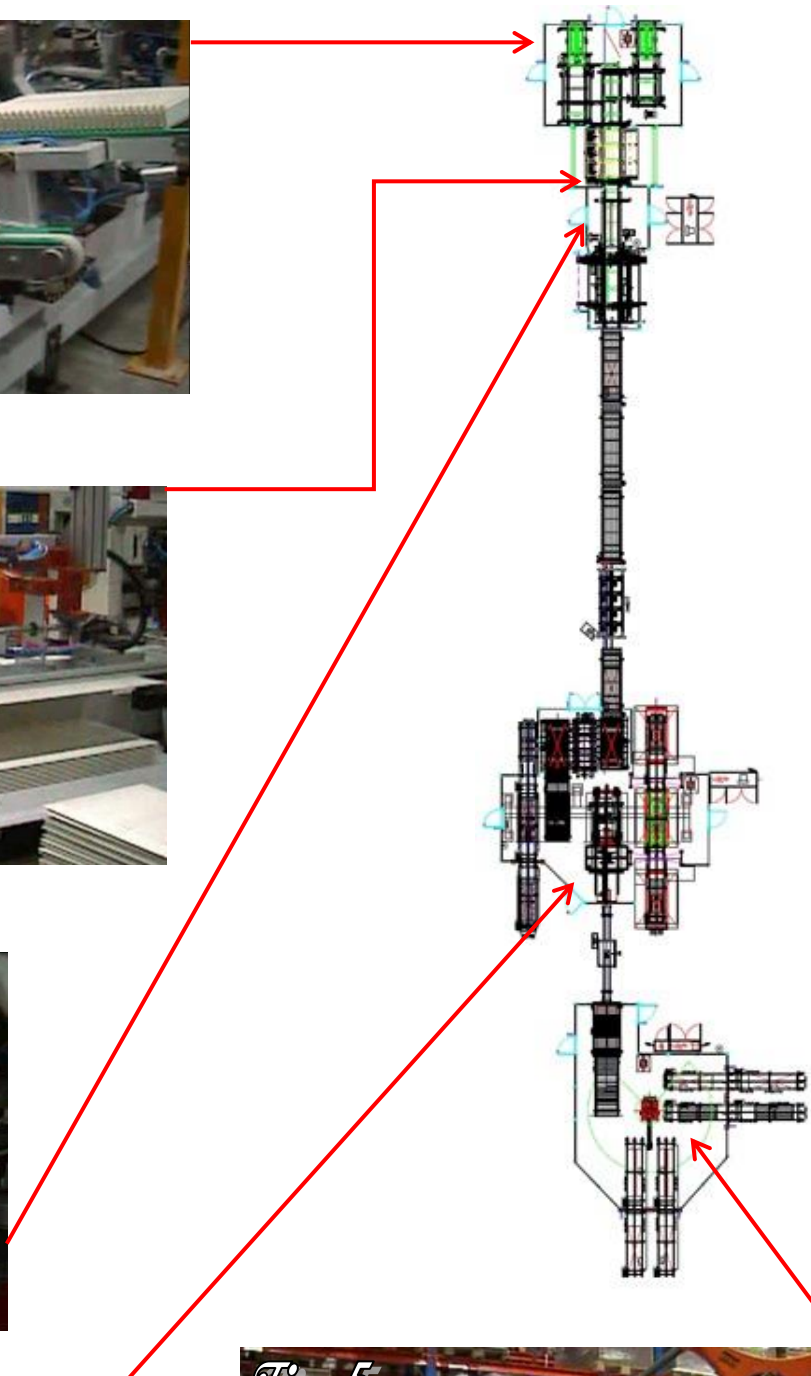
IKEA’s history starts in 1943 in the small village of Agunnaryd, in Switzerland, when Ingvar Kamprad, the company founder, was only seventeen years old. Starting out as a simple match seller at the age of five, Kamprad’s skill as a seller constantly developed into bigger things later to become a multinational furniture retailer. Today the IKEA Group is a worldwide trademark present in 41 countries with 131,000 co-workers and annual turnover reaching more than 24.7 billion euro. With simple self assembly furniture kits made with wood from the Swiss forests, the group currently creates and produces their own home furnishing design solutions using the logic of globalization. They have chosen suppliers and partners from all over the world who are capable of producing cost effective and top quality furniture components while taking particular care to be eco-friendly.

Recently, the Swedish giants announced their desire to develop relationships further with 24 Italian suppliers involving around one billion purchases. The Ikea group already does 8% of its

worldwide wholesale purchasing in Italy which comes third after China and Poland. The delegated administrator Lars Petersson emphasized that “we have singled out **new Italian partners** that have taken the place of our Asian suppliers due to their competence, commitment and ability to produce better quality products at a lower price than their Asian competitors”. This has also been possible due to the high automation level of Italian manufacturing companies which can guarantee top quality productions.

By 2011 the group had already bought more than it had sold in Italy, confirming itself as an engine pushing the country’s economy forward. **Kitchen purchases** are the biggest success: one in every three kitchens sold by Ikea worldwide is made in Italy. These purchases are prevalent in Veneto (38% of purchases), Friuli (30%), Lombardia (26%). Ikea sells more through these three regions than it does in Switzerland and Germany.

The plant system consists of three production lines: The assembly line, which includes rail feeders (Fig.1), panel feeder (Fig.2), assembly feeders (Fig.3) packaging (Fig. 4) loading onto pallets (Fig.5). Three HMI systems based on Movicon CE locally reside on each production line, and the general Movicon 11 supervisor manages the whole process, records and analyses production data.



The impact on employment

related to these new production orders is quite significant. Jobs have been provided for an additional 2,500 employees who join the exiting 6,600 employees working throughout the Ikea sales networks, logistics and outlet stores. Italian satisfaction for the Manuex company who have been occupying warehouses since 2011 that were previously abandoned by the historically famous Fraver of Quaregna biellese textile company. Manuex now uses these warehouses to manufacture drawer doors, guides, sliders, fronts and side panels for kitchen units designated for the giant Ikea furniture stores. Manuex is part of the FBV Group, which stands for Formenti and Giovenzana, Veduggio being the names of the founders who founded the company group in 1947 putting the town on the map in the province of Como (Veduggio with Colzano) where the Head Offices reside.

Door production

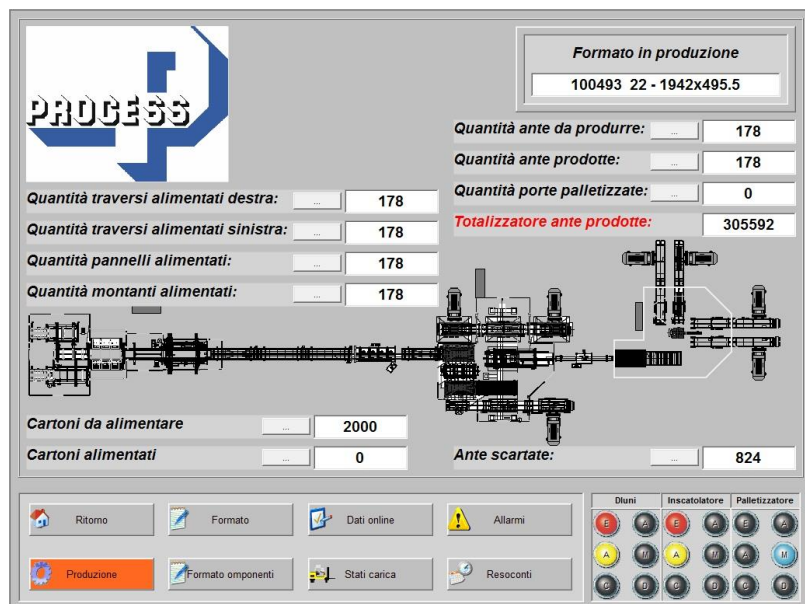
In order to ensure mass production targets with quality and flexibility to satisfy customer demands a new system was designed and engineered for the production, assembly and packaging lines of doors designed especially for Ikea kitchen units.

The project's design engineering was commissioned to Process Srl from Sassuolo, a company who have been operating in the automation sector for wood production processes for more than 25 years. Process Srl boasts skills that have realized assembly and palletizing lines with advance automation technology. They designed a system that can assemble and glue doors together perfectly with the possibility to compose any door type with any number of panels just by automatically changing format in an instant. This system is composed of an assembly, packaging and palletizing line capable of producing a maximum of 12 unit doors a minute with minimal interaction on behalf of personnel: only one factory worker is needed to monitor all the automatic process operations.

The plant system architecture

The production plant system's automation is managed by three Saia PLCs connected up to each other using the same operator interface

system network connection to the main supervision PC. The plant system management is based on the Movicon 11 software technology, used by Process Srl for more than ten years for its versatility, hardware independence and flexibility. In this case, the production line has been equipped with three fifteen inch HMI touch screens based on Windows CE distributed along each production line. The Scada supervision system is connected to the plant system. By deploying the Movicon software, the company has been able to save on installation time and reuse parts of the same project elsewhere. In addition the control system is connected through modem to Process Srl's remote control



Main Movicon Supervision screen page displaying the whole plant with access to data on the three production lines.

service to enable the technical help team to control and modify the PLC's programs, alarm statuses (intervention by remote control in cases of anomaly) and perform daily, weekly and monthly production reports for diagnostic analysis. As a supervisory system, Movicon's inbuilt and powerful features permit total management of machine operations, maintenance and performance optimization without the aid of expert personnel. Setting the machine to run a certain production type is simply done by selecting one of the

previously memorized formats from the PC's database using intuitive control buttons.

The Assembly Line

This part of the production plant is divided into three sections: the first section is composed of feeder conveyors that feed the drawer panels from two storage containers through to the machines fitted with PVA glue dispensers that distribute glue along the panel grooves. The drawer slides are then automatically positioned onto the conveyor belt according to panel size. The second section is composed of a panel feeder system, based on an automatic moving portal, a conveyor belt and feeder. The panels are unloaded from the pallets and deposited onto the alignment conveyor which transfers them to the portal section of the main machine. While the clamper machine works on one side, a factory worker prepares stacks of panels to feed through to the other side.

The third section is composed of two support frame feeders, positioned alongside both sides of the main machine. A robotic system unloads a complete layer of support frames and positions them centrally into loading bays of the two feeders by alternating between the two. A manual worker loads the support frames onto the feeders. The grooves in the center of the support frames and the drilled holes are filled with glue by two pistol dispensers which move along two control axes. These axes are also equipped with two apparatus for applying drops of hot glue along the support frames. Once the support frames have been glued together they are transported to the closing stages where a set of ten control axes complete the assembling stage. The chain driven conveyor exiting the machine connects the assembly section with the packaging section passing through a drilling machine section.

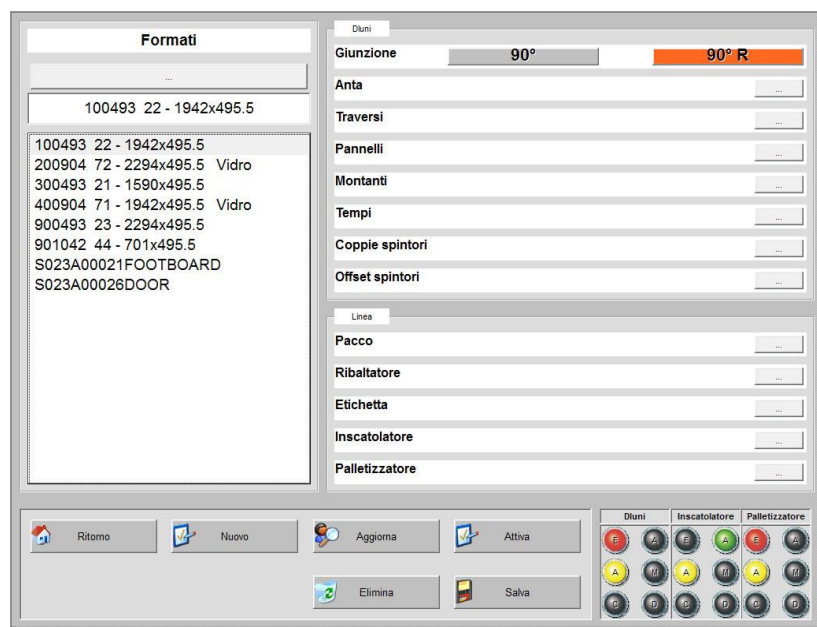
Packaging

When the doors are completely assembled they arrive at this station ready for packaging. A portal structure equipped with two vertical controlled axes and end gripper robot section: the gripper robots role is to picks up a box from the pile of stacked boxes, deposits and transports it to packaging station; picks up a turned over drawer door panel from the assembly line (to

avoid damaging the door in the packing stage) and places it in the already positioned box; transports rejected damaged doors and stacks them onto another roller conveyor belt. Approved drawer doors are then passed through to packaging where they are packed inside boxes which are then sealed with tape.

Palletizing Line

The closed and sealed boxes are then automatically labeled (labels can be stuck onto box in any position) and are then passed through to the palletizing stage which is handled by another articulated robot which positions and places the boxes of drawer parts onto awaiting pallets.



One of the pages of setup and configuration of the line.

Supervision, HMI and Plant Intelligence

The running of the whole production plant, composed of the three production lines described above, is completely automated, and all the production parameters and reports are completely supervised at computer level with the possibility to use remote control. The alarm management performs locally on HMIs but the main supervisory system provides more indepth data that, in cases of anomaly verification, alerts the operator of alarm type signaling causes and the procedures to take to remove anomaly.

Furthermore, the system records all productivity-related data on database and displays it through the Movicon 11 integrated report system. In addition to the all production data, these reports show data by batch, product, shift, operator, all production run times, downtimes, machine downtime due to alarm intervention or stopped production type. In this way productivity and plant performance-related parameters can be displayed applying the plant intelligence criterion. Based on these principles production managers can study the difference between real and theoretical productivity and the causes determining the most frequent downtimes, by examining all the information provided by the supervisory system to implement preventive maintenance and improve productivity. Maintenance workers can then intervene in time to resolve any problems due to the anomaly status of a certain piece of machinery. All operations performed by the operators are protected by password using a powerful security user management provided by Movicon. Different priority levels have also been implemented to protect data and the various functions from non-authorized persons. Process Srl has found that the Movicon Scada platform has proven to be a highly suitable for achieving the most difficult objectives and demands specified by clients. The Movicon platform permits applications to be developed quickly with reliable and intuitive interfaces; consents project decentralization and flexibility; powerful reporting and analysis functionalities and provides operators security.

A specialized company

Process srl started out in 1985 with the mission to integrate in the wooden fabric industry by offering the same automation technology used by the ceramic sector. They had their first success with an automatic door clamper machine, which developed into handling doors of all types and sizes. This soon made Process Srl one of the leaders in the sector among the first companies to extend the use of articulate robots to different production line industries other than the car manufacturing industry where they are usually implemented.

Process Srl incorporates its rich experience of designing ceramic systems into the laminate flooring sector revolutionizing the concepts of plant system integration using robots and laser-

guided vehicles. This revolutionary system integration has also increased productivity per capita unsurpassed by rival companies so far. Protected by various patents for the creativity and ingenuity of its designer, Process Srl offers its clients automation system and high-tech facilities with value added specialized experience in the wood, furniture, wooden and melamine flooring and streamline packaging sectors as well as logistics and palletizing.

Today, the Ikea kitchen unit door production plant realized by Process Srl, is running to the great satisfaction of the client. In addition to the evident benefits of the automatically run process, the production plant has promoted considerable capital returns in terms of personnel. Installing and utilizing software such as this one to manage the complete production process has been able cut down on manual staff by 80% compared to staff needed for conventional plant systems. Therefore quick return of all investments can be counted upon.

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