

# MES Sistrade<sup>®</sup> SCADA & SFC SHOP FLOOR CONTROL

## MAIN FEATURES OF SCADA & SFC

- :: Analysis, Design and Installation of Infrastructure
- :: Production Data Collection via Console or Industrial PC
- :: Production Data Collection via Industrial Automation
- :: SCADA - Industrial Supervision
- :: Production Planning
- :: Quality Control
- :: Management of Raw Materials
- :: Production Record
- :: Analysis and Statistics



SISTRADe reserves one of its business areas to technology solutions implementation of data acquisition, industrial supervision, planning and production control, which are called Sistrade<sup>®</sup> SCADA & Shop Floor Control, which could also be construed as an MES (Manufacturing Execution System).

SCADA (Supervisory Control and Data Acquisition) are software systems to monitor and supervise the data acquisition devices of various participants in the manufacturing process and may act in the field by controlling remote inputs/outputs or programmable logic controllers - PLCs.

Shop Floor Control oriented, information system is software that allows one to plan job orders on time, monitor real-time production process according to the preset routing, control the movement of materials and hence make a production control more efficient. Here, SCADA turns out to be a complement to the management systems and production control.

## ANALYSIS, DESIGN AND INSTALLATION OF INFRASTRUCTURE

In these projects SISTRADe presents complete solutions for data acquisition and process control, through the analysis phase of the factory layout and equipment to be controlled; design phase, where all the infrastructure of data communications to implement is specified, as well as the list of equipment to install; the last phase comes up to the job of installing and monitoring of the entire network confirms the survey made in the previous phase.

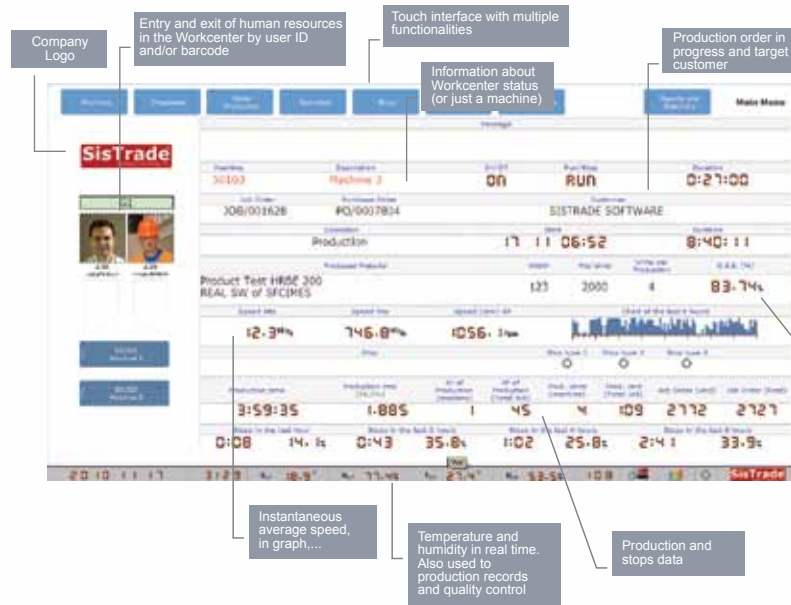
Having a wide experience in this area, SISTRADe provides various solutions, using the latest technologies, as is the case: terminals with Ethernet interface, wireless PDTs, use of laser barcode readers, installing touch-screen consoles, last generation automata, sensing equipment, RFID, etc.

In most projects, the data acquisition is based on the installation of collection points (industrial touch screen consoles + barcode reader + thermal printer) and in the installation of an automaton (PLC) to receive data directly from machines or production lines. The handling of these data is done in a collection server using Sistrade<sup>®</sup> ERP.

## PRODUCTION DATA COLLECTION VIA CONSOLE OR INDUSTRIAL PC

This system involves the placement of collection points, with the installation of industrial consoles (e.g. for groups of machines or for each machine), registered by barcode or by touch, the number of job orders, operations, incorporated materials, machine identifications, operator identifications (and other) and also the elements for quality control.

For example, we present an interface of data collection, control and supervision of the machines.



The information to be recorded in this equipment is as follows:

- Release of job orders (Start / End);
- Start/end of operations (productive activities);
- Machine;
- Appointment/dismissal of employees to certain machines;
- Start/end of the events (unproductive activities);
- Materials to be incorporated in the machine;
- Production records;
- Quality Control tests.

## PRODUCTION DATA COLLECTION VIA INDUSTRIAL AUTOMATION

To complement the data collection via console, SISTRADE recommends implementing a collection solution based on direct data acquisition through machines or PLCs.

Whenever the machine or production line provides a communication port with known protocol, it is possible to configure Sistrade® software to obtain and process the data that the machine delivers.

If it is not possible this way, SISTRADE recommends installing a network of sensing equipment, machinery and production lines in order to receive data via automaton and make its handling in the database server.

The proposed architecture typically involves the installation of a master network (CompoBus/D, compoNet or DeviceNet), from which a cable is extended with multiple input cards/digital outputs/analogues. Each of these cards will connect a group of machines. The cards are placed in a strategic place to minimize cable distance. In each machine, a box of centralizing signals is placed, to facilitate eventual transport, movement of the machinery or modification of signals.

Example of setting up a network called CompoNet.



The information that may be obtained from this collection is as follows:

- Functional status of the machine;
- Instantaneous speed;
- Average speed;
- Produced quantity;
- Time of adjustment and production;
- Downtime;
- Downtime reasons;
- Consumed quantity (according to the produced quantity, the system can calculate the incorporated amount of raw material or semi-manufactured, for the incorporation of previously defined factors);
- Other signals that can be relevant.

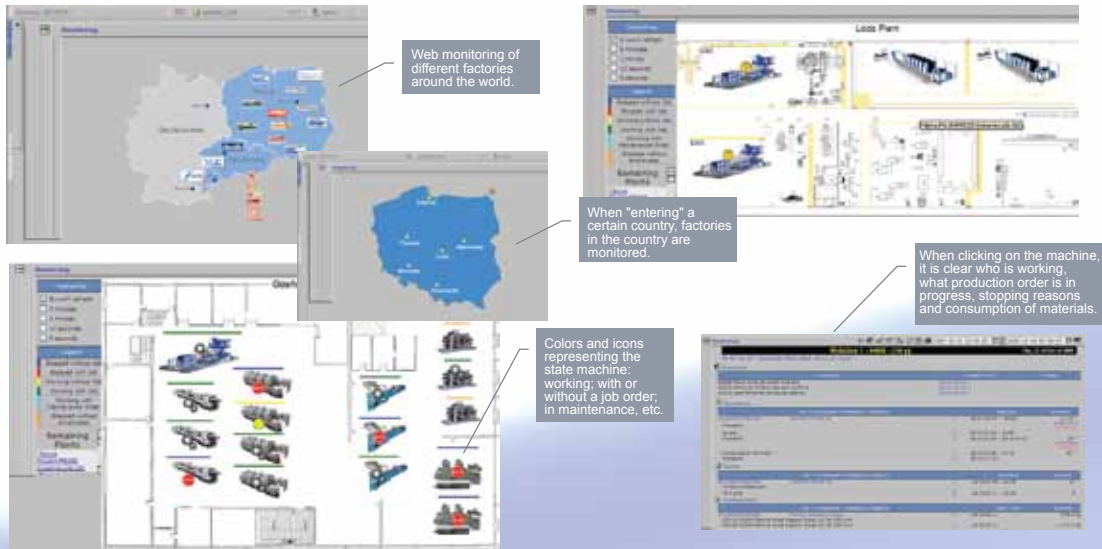
## SCADA - INDUSTRIAL SUPERVISION

Sistrade® SCADA software is a fully customizable tool to suit each plant layout, multi factory, supporting various sections and any type of resource, either a machine, a production line or a manual resource with human support.

Its main objective is graphical monitoring of the production status as well as the operating status of each resource. Through synoptic panels, each of the processes can be monitored. These panels are designed using Sistrade® Layout and then run on Sistrade® Supervision. The results can be displayed with icons and colour effect, and their representation is in agreement with the data collection on the shop floor.

In terms of features we highlight:

- Local or remote supervision, multi-factory;
- Actual information of the status of the machine operation;
- Identification of employees who are working on the machine;
- Production order that is in progress;
- Quantities produced and rejected;
- Operations carried out per job order;
- Events and occurrences per machine and per job order;
- Display of speed per machine in real-time;
- Graphical query of speed history;
- Register of automatic downtimes and their reasons;
- Actual time of adjustment and production;
- Analysis of profitability;
- Occupancy rates;
- Analyzing productive vs. unproductive time;
- Efficiency per machine.



## PRODUCTION PLANNING

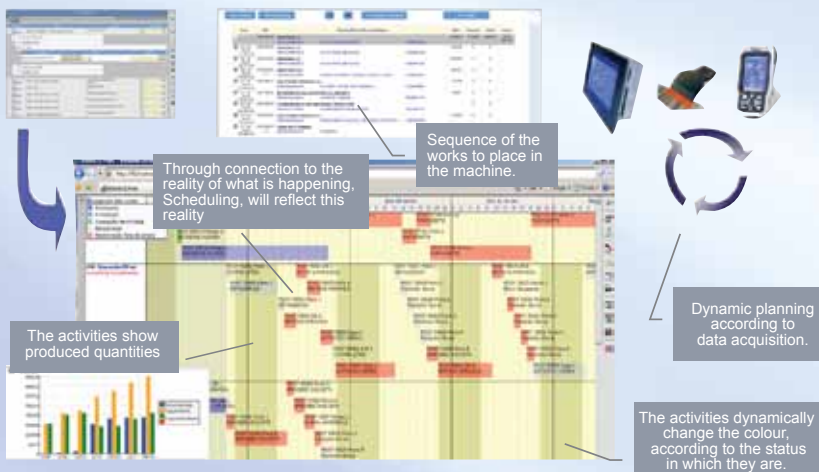
In order to assist the production manager in planning job orders and meeting delivery deadlines, SISTRADE offers its customers a tool capable of planning production operations.

Sistrade® software for production planning is a system of decision support in the planning of job orders, allowing allocation of operations resources over a given time frame.

The sequencing of activities depends on the priority criteria previously set and on the capacity of each resource.

This module provides Wizard of assisted job orders planning that enables:

- Selection of production orders or job orders to plan;
- Criteria selection for scheduling and sequencing of activities;
- Suggestion of a more appropriate workcenter to perform the work, according to the planned sequence of operations/activities, also allowing the user to select another workcenter, considered most appropriate for the job;
- Suggestion of the workcenter to perform the task allows, the people responsible for planning to divide the work between several workcenters;
- Suggestion of an optimal sequence for work order execution, allowing people responsible for planning to change the sequence according to what they consider as relevant.



Essential features:

- Master plan of production;
- Scheduling of the JOs and/or orders;
- Visualization of job orders on GANTT chart;
- Report of charges in tabular or graphical format;
- Simulation of different scenarios;
- Task scheduling;
- Drag-and-drop operations on GANTT chart;
- Setting time of operations;
- Subcontracting a particular activity;
- Dynamic planning with indexing to the beginning / end and delays in production;
- Synchronized with the production data collection.

## QUALITY CONTROL

Sometimes the shop floor control requires to record tests and quality parameters. For this reason, Sistrade® software allows parameterizing a set of measurable and visual parameters for quality control during the production process. For each test it is possible to define tolerance intervals, so that when the user indicates the value, the system validates whether it is inside or outside the allowable range.

Associated with this process, Sistrade® system can issue quality labels or certificates to highlight the results of the tests and if the product is conformable or non-conformable.

Treatment of waste is also a part of quality control. At any time and at any manufacturing stage, the user can register an inherent waste in job order.

Features that we consider the most interesting:

- Configuration of quality parameters, according to the type of process;
- Definition of tolerance intervals in absolute or percent value;
- User-friendly interface for quality records;
- History of quality control;
- Reclassifications;
- Quality certificates;
- User identification, date, time when the test was done;
- Interface optimized for touch screen and PDT;
- Possibility of connection to measurement equipment.

The system provides a set of statistics, such as:

- Analysis of waste per shift and per job order;
- Records of non-conformities per shift, per machine and JO;
- Graphic analysis of defects;
- Statistics of reclassified products;
- Non-conformities.



## MANAGEMENT OF RAW MATERIALS

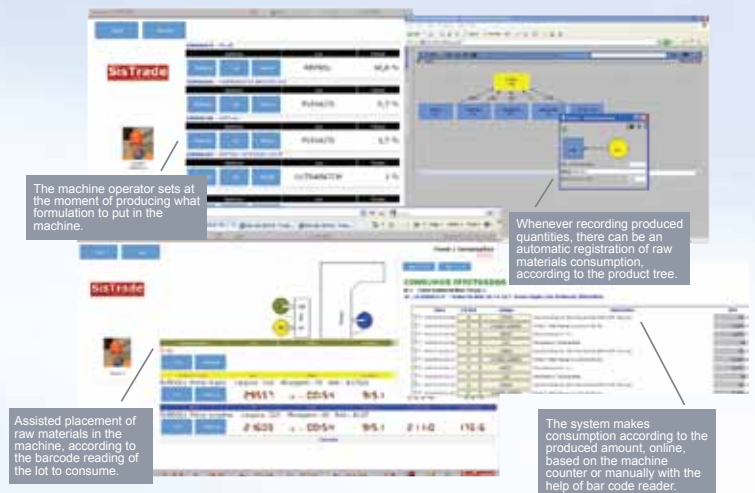
As part of the monitoring system and SISTRADE production steering, comes the management of raw materials with the definition of product trees, formulation, manual and automatic consumption according to incorporation factors.

The system has interfaces that allow the "shop floor" to define the formulation of a given production process. Through the selection of raw materials, lots and incorporation factors, it is possible to change in the collection interface, the standard formulation that is defined in the job order.

The output of stock or raw materials or semi manufactured, may be made by manual registration, reading the bar code of the lot and introducing quantity or by automatic output to the quantities produced. Whenever there is a production record, the system may terminate the stock of raw materials in the amount proportional to the factor of incorporation.

Relevant features of this process:

- Multi-level definition of product trees;
- Manual consumption with reading of bar code;
- Automatic consumption based on the quantities produced;
- Pre-confirmation of the outputs of stock;
- Definition of the formulation with the start of the JO;
- Instantaneous consumption per machine and per shift;
- Various alerts for placement of raw materials per JO and per machinery.



# PRODUCTION RECORD

The registration of products in SISTRADE shop floor control system can be done by the operator in collection console or automatically by order of the PLC (automaton) that sensitizes the machinery. In practical terms, if we have a sensor, a photocell or any other signal that the machine makes available that could be perceived as a signal that something was produced, SISTRADE interprets this signal and causes the production record in the database according to the elements that were registered in the console, including the job order, and operations and employees who are working on the machine.

Sistrade® software also allows connection to measuring equipment for measuring the recorded values, for example, the output of a machine or section may be placed on the scales for the system to record automatically the actual weight of product.

In terms of identification, SISTRADE provides labels that can be bar coded or RFID for raw materials, semi-manufactured and finished products. It is also possible to define labels to track pallets or sets of boxes.

## Relevant features of this process:

- Registration of produced quantities in the industrial console;
- Registration produced quantities via industrial automation;
- Calculation of production using a function of production time or speed;
- Connecting weighing equipment to determine actual weights;
- Productions in two measuring units (e.g. meters and kilograms);
- Traceability of the production process.

Automatic issuance of custom thermal labels per item type.

List of productions per machine and per job order. The system detects the production and calculates meters and kilos produced.

Link balance for calculating the gross weight, net and tare.

658 Kg / 2320 mts  
Bebida Glass 70gr 1180 mm

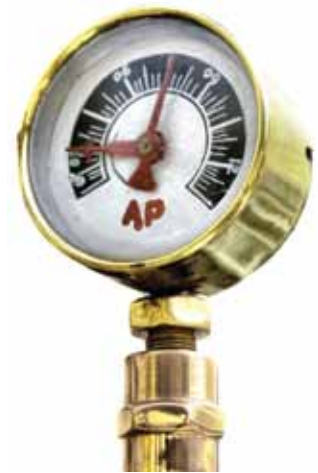
235.5 Kg  
80 Kg  
155.5 Kg

## ANALYSIS OF PRODUCTIONS, DOWNTIME AND/OR EVENTS

Indicates the moment of time when each machine was stopped, evidence and level of seriousness.

Distribution of the quantities produced per machine and per month.

Graphically indicates the % of stop time for each type of accident. Per machine, per shift, per section, per month, etc.



## OVERALL EQUIPMENT EFFECTIVENESS (O.E.E.)

O.E.E. (Overall Equipment Effectiveness) **37,6%**

Rácio de Disponibilidade **77,0%**

Rácio de Eficiência **65,2%**

Rácio de Qualidade **74,8%**

Ratio that indicates the % of product produced vs. the maximum amount that could have been

Ratio that indicates the % of time in production vs. time in which it could have been produced.

Ratio that indicates the % of product as conformities versus non-conformities.

OEE = % Availability \* % Efficiency \* % Quality

## Further analysis and statistics of MES SISTRADE:

- Graphic analysis of production per machine and per shift;
- Availability ratios per machine, section and shift;
- Income and efficiency of the machine, section and shift;
- Quality ratios per machine section and shift;
- Availability incomes per machine section and shift;
- O.E.E. (Overall Equipment Effectiveness);
- Graphical analysis of production per machine section and shift;
- Graphical analysis of downtime per machine section and shift;
- Weekly summary of machine;
- Weekly summary of employee;
- Occupancy rate per machine;
- Productivity per shift and employee;
- Screening of a final package to the lot of raw material.

## STATISTICS



## TECHNOLOGY FEATURES

- Software designed for manufacturing industry;
- Available in multiple languages (PT,SPA,EN,FR,GER,PL,...more);
- Software natively 100% WEB/Internet since 2000;
- Includes programmes for automata/PLCs of control and automatic data collection;
- Lifetime license for unlimited users and an unlimited number of factories;
- Uses relational database Microsoft SQL Server 2008;
- All the reports available in different formats: HTML, Excel, Word, PDF, XML, TIFF, CSV, and other;
- Minimum demands at hardware and software level, either for the server or for users' PCs;
- Intuitive, friendly interface and very rich functionalities;
- Internal Support for Extensible Markup Language (XML);
- Practical tools for Business Intelligence (BI).

### Modules of ERP | MIS Sistrade® Print system:

- :: Commercial Management & Estimating
- :: CRM
- :: Stocks & Purchase Management
- :: Production Management
- :: Scheduling - Production Planning
- :: SCADA - Supervision & Data Acquisition
- :: Balanced ScoreCards
- :: E-business
- :: Mobile Business
- :: Quality Control
- :: Equipment Maintenance
- :: Electronic Invoicing
- :: JDF - Job Definition Format
- :: Mobile Warehouse
- :: Financial Management
- :: Human Resources
- :: Fixed Assets

