

The Sugar & Alcohol  
Reference Book

**smar**

## A Message from the Founder

When Smar was founded in 1974, our original goal was to provide service and maintenance for steam turbines in a region of Brazil dominated by the sugar industry. Within 5 years, I was joined by my good friend Edmundo Gorini and several other engineers from the Zanini Company. This move was a step into the future and one that would promise to revolutionize not only the Brazilian, but also the world automation and control markets.

Brazil ranks number three in the world for sugar, with annual production in excess of 15 Mt. It stands to reason that Smar, located in the center of the Brazilian sugar industry, would focus its R&D efforts on solutions for sugar and alcohol production. Smar's first control system in a sugar process were installed in 1979, to control the feed, crushing, and conveyor processes. We were welcomed with enthusiasm by the owners of each plant, who in turn, acted as ambassadors promoting Smar products and systems in over 15 countries.

Smar's success can be attributed to a close understanding of, and partnership with, its customers. We are proud to be associated with the world and Brazilian sugar cane and alcohol production industries. This has driven our company to new and exciting levels.

Smar is a recognized world leader in the control and automation market. Its experience, and expertise are well known, and applied within the petrochemical, pulp & paper, mining, food, cement, steel, and water/wastewater industries.

The growth and recognition of Smar around the world are results of partnerships that have been forged with a true commitment to excellence. This would not have been possible without the people, that embody a spirit and willingness to succeed.



Mauro Sponchiado  
**Vice-President**  
**Smar Industrial Equipment**

# Smar: Revolutionizing the world of process automation.



smar

2003:

Absolute Leadership



smar  
Líder em Automação

2000

Recognized within the world's control and automation community



1999:

Smar's 25th anniversary



1992:

Smar develops and introduces the world's first Fieldbus Chip, the FB1050

smar

1988:

Smar begins its International Sales efforts



A logo featuring a stylized 'S' symbol to the left of the word 'smar' in a bold, sans-serif font. Below this, the text 'TECNOLOGIA BRASILEIRA' is written in a smaller, all-caps font.

1984:

Smar introduces its first, PC-based, supervisory control and data acquisition systems



1974:

Smar is founded by Mauro Sponchiado and Martinucci

# Client Satisfaction



“Our plant automation was so successful that we have continued to add control to our process each and every year. Our first project to automate the plant was with boiler automation in 1988, and as of now we have automated the entire facility with Smar technology”.

**Marco Antonio Barreto Miranda**  
**Industrial Manager, Usina Mandu S/A, Guaira - Sao Paulo**

“We admire Smar as a supplier of control and automation equipment, not only due to their product quality, but also because of the service they provide”.

They are highly skilled in engineering, training, and service.

**Carlos Silva Caetano - Responsible for the Instrumentation Dept.**  
**Luis Cesar Zingaro - Electrical Engineer, Usina Moema S/A, Orindiuva - SP**



“For nearly twenty years I've witnessed Smar's role in the technical development of our industrial process. The investments made, not only brought instant results, but also integrated the process making it more efficient.

Three aspects stand out :

- quality products
- applications versatility
- the evolution of the technology

That's why we're proud of Smar, and proud of Brazil”.

**Maurício de Veras Souza**  
**Automation Manager, Carlos Lyra Group - Usina Caeté, São Miguel dos Campos - Alagoas**



“Our relationship with Smar is excellent. Their products and services made possible the increase of our productivity and also contribute a great deal to the professional qualification of our technical people.”

**José Raimundo Nonato**  
**Industrial Manager - Barralcol S/A, Barra do Bugre, Mato Grosso.**



“The evolution and prosperity of Brazilian Sugar and Ethanol segment, is bringing from companies like partners and competent which intends to do, bringing technological solutions with high degree of responsibility and reliability. With SMAR it is not different, company with qualified professionals and applications more and more interesting. SMAR is a partner from many years of João Lyra Group, bringing control solutions and high level automation, for ours day by day, not only in the warm promptly service, as well as, but in a strategic planning of medium and long period. Always looking for continuous improvements, in each process of the factory and always together with our technical team. Therefore, we continued partners until today “.

**Eng. Laudemir José Barros Mendes - Regional General Manager João Lyra Group**



“We know that Smar is well ahead of the other suppliers, because their instruments work, and work well. Furthermore, their service group has never failed us.”

**Nilton Inácio de Alcântara**  
**Industrial Manager, Generalco S/A - General Salgado, São Paulo.**





“The success in the production numbers reached by Usina Itapagipe since our first crop is largely due to the good operation of all the automation supplied by Smar “

**Eng. Paulo Takeu Kamimura**  
**Industrial Manager - Usina Itapagipe.**

“ Besides offering products and automation systems with an excellent quality and high technology, Smar possesses a technical team that always assisted us in a differentiated way, with prominence the areas of applications engineering, installation, commissioning and start up of the equipments “.

**Eng. Paulo Henrique Pompeu Trazzi**  
**Industrial Manager - Usina Guariroba**



“We admire Smar for its continued evolution. We also acknowledge the company’s pledge in providing complete satisfaction to its clients.”

**Arthur Alvarenga**  
**Industrial Manager, Usina Aralco - Araçatuba, SP**

“The reason we acquired Smar automation systems for our industrial units, is because they have a good history with technology and solutions for our industry needs.”

**Managers and Director, Group Santa Teresinha S/A,**  
**(Iguatemi, Paraná City and Ivaté plants- Paraná, PR)**  
**Clockwise: Carlos Pereira de Paula, Maintenance Manager**  
**Gilberto Luiz Gualtieri, Industrial Manager**  
**Sidney Meneghetti, Industrial Director**  
**João Meneghetti, Industrial Director**  
**Francisco Meneghetti, Industrial Director**  
**Fernando Avelar, Industrial Director**



“Since the beginning we have had an excellent relationship with Smar. We always believed in the Smar team and products, from the early controllers in the ‘80s to the pioneer of fieldbus systems for Brazilian sugar mills.”

**José Morais, Industrial Manager - Unialco S/A**  
**Ademir Pitske, Automation Supervisor- Unialco S/A - Guararapes, SP**

“We have been continuously and successfully adding Smar automation at our plant. We replaced equipment from other suppliers. Today Smar supervisory systems provide centralized monitoring, and uniform plant process.”

**Gerson Forti, Industrial Manager, FBA/Univalem Mill**  
**Silvio Redígolo, Automation Supervisor, FBA/Univalem, Valparaíso- SP**



# Products

Smar has the world's largest line of Fieldbus products.

## Pressure + Differential Pressure + Level



LD301

LD302

LD303

**Differential Pressure Transmitter**



LD301

LD302

LD303

**Level Transmitter Sanitary connection**



LD301

LD302

LD303

**Transmitter with Extended Remote Seal SR301E**



LD301

LD302

LD303

**Pressure Transmitter**



LD400

**Pressure Transmitter**



LD301

LD302

LD303

**Absolute Pressure Transmitter**



RD400

**Level Transmitter**



LD301

LD302

LD303

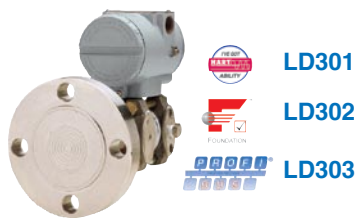
**Transmitter with T-Type Remote Seal SR301T**



Transmitter with sanitary connection Remote Seal SR301S



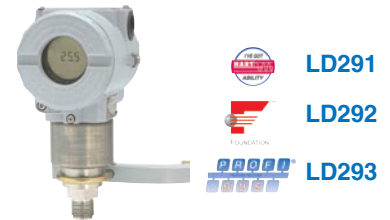
Transmitter with threaded Remote Seal SR301R



Level Transmitter



Pressure Transmitter 4-20mA (manifold not included)



Pressure Transmitter

## Density / Concentration Transmitters

Industrial Models



Sanitary Models



DT301  
DT302  
DT303

## Position



Valve Positioner

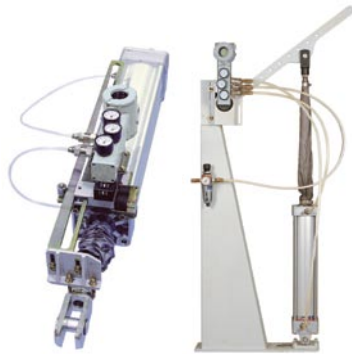
Valve Positioner



Valve Positioner with Remote sensor



Position Transmitter



Linear

Rotary

Pneumatic - Cilinder Actuator

## Temperature



Temperature Transmitter

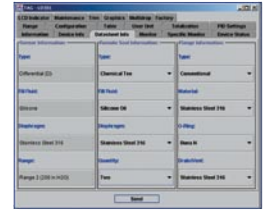


Panel Mounting Temperature Transmitter TT411



Head Mounting Temperature Transmitter TT421

## Configurators



HART® Configurator Interface CONF401



HART® Configurator for Palm HPC301



HART® Serial Interface HI311



USB HART® Interface for PC's HI321



## Converters



Foundation Fieldbus or Profibus PA to pneumatic signal Converter



Current to Foundation Fieldbus or Profibus PA Converter



Foundation Fieldbus or Profibus PA to current Converter



HART® / Foundation Fieldbus Interface HI302



HART® /Current Converter HCC301

## Chips



HART® Modem HT2015



HART® Modem HT2012



Communication Controller FB2050



Communication Controller FB4050 - TQ



Communication Controller FB3050 - TQ



Mathematical Coprocessor, LCD Controller and D/A Converter HT3012 - TQ

## Controllers



Programmable Logical Controller LC700



Digital Controller CD600Plus



Foundation Fieldbus Universal Interface DFI302

## Didactic Plant



## Accessories



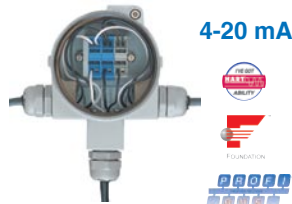
Auto/Manual Transfer Station  
AM01P



RP302 RP312  
H1 Fieldbus Repeaters



Current to Voltage  
Converter CIV200P



3 Ways Junction Box JM1



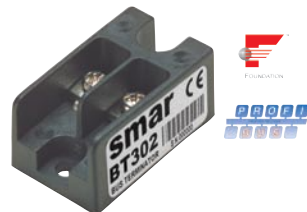
Signal Distributor and  
Isolator IS400P



4 Ways Junction Box JM400

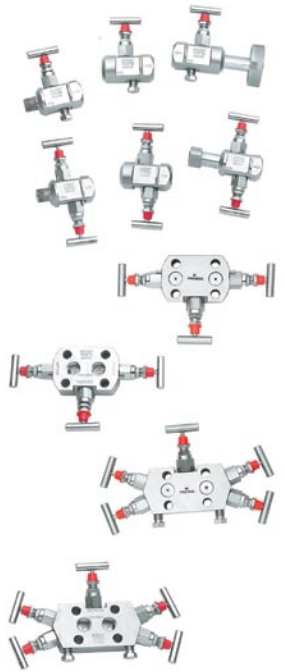


H1 Bus Power Supply DF52



Foundation Fieldbus and  
Profibus PA Bus Terminator  
BT302

## Others



Manifolds and Block Valves



Foundation Fieldbus  
Relay FR302



Foundation Fieldbus Remote  
I/O DC302



SB312 DF47  
Isolated Intrinsic Safety  
Barriers

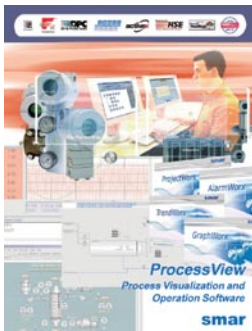
# Systems



**Studio302**



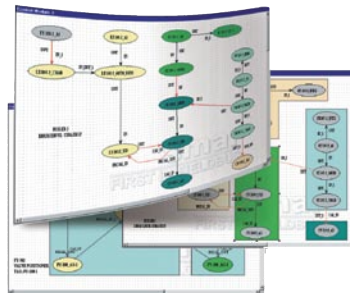
**AUDITFLOW**  
Flow Measurement System



**PROCESSVIEW**  
Process Visualization Interface



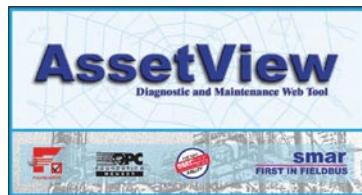
**LC700 Configurator Software**  
**CONF700**



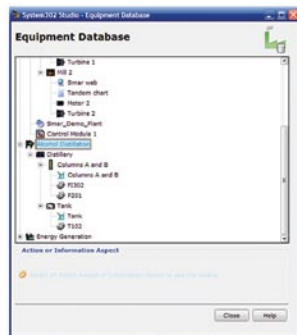
**Foundation Fieldbus System**  
Configurator



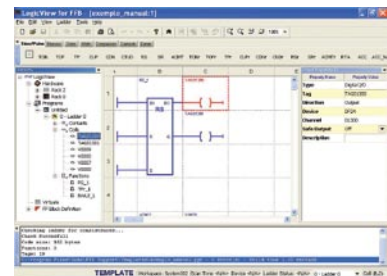
**CONF600Plus**  
Configurator Software  
**CONF600**



**ASSETVIEW**  
On Line Plant Asset  
Management Tool

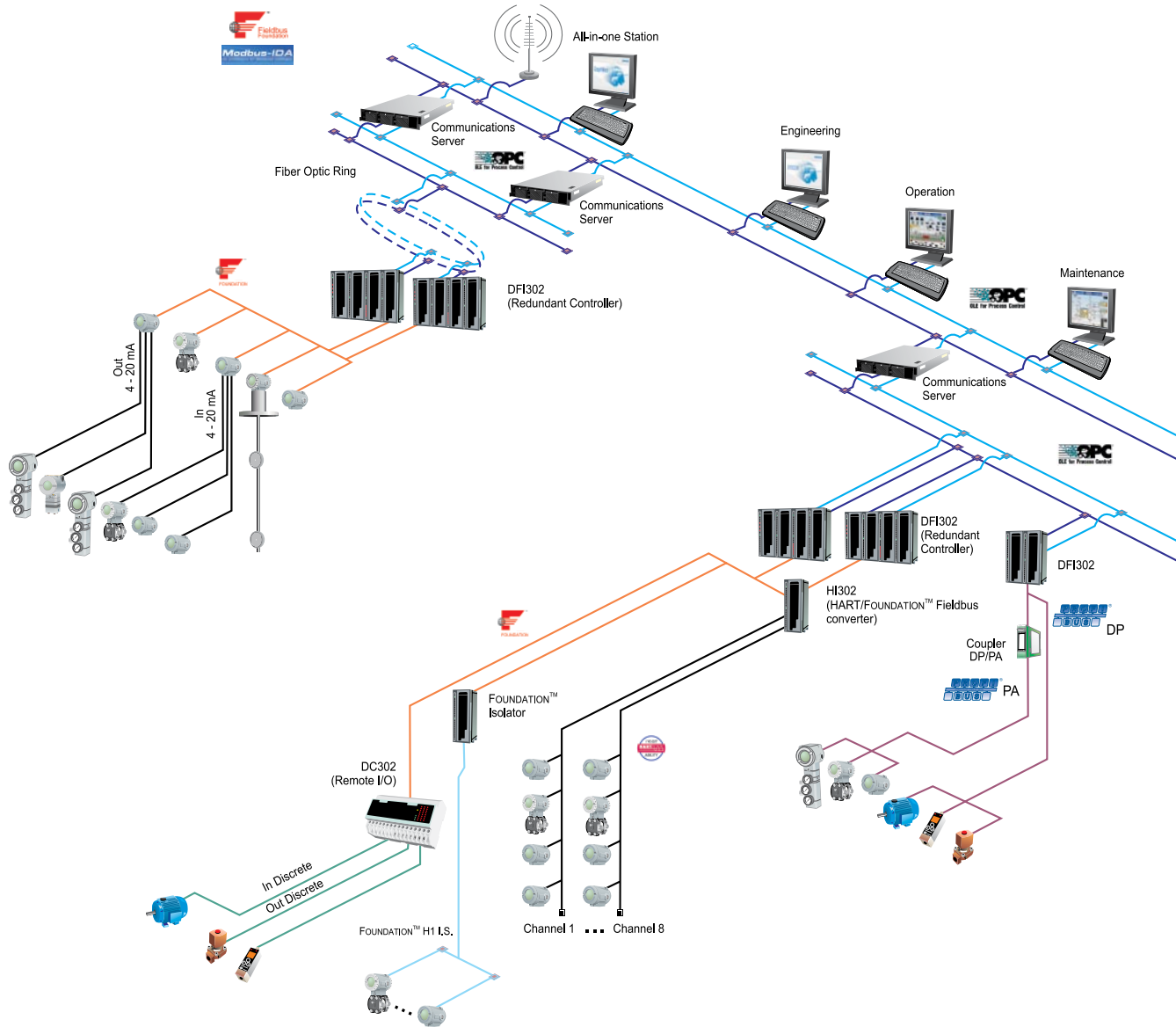


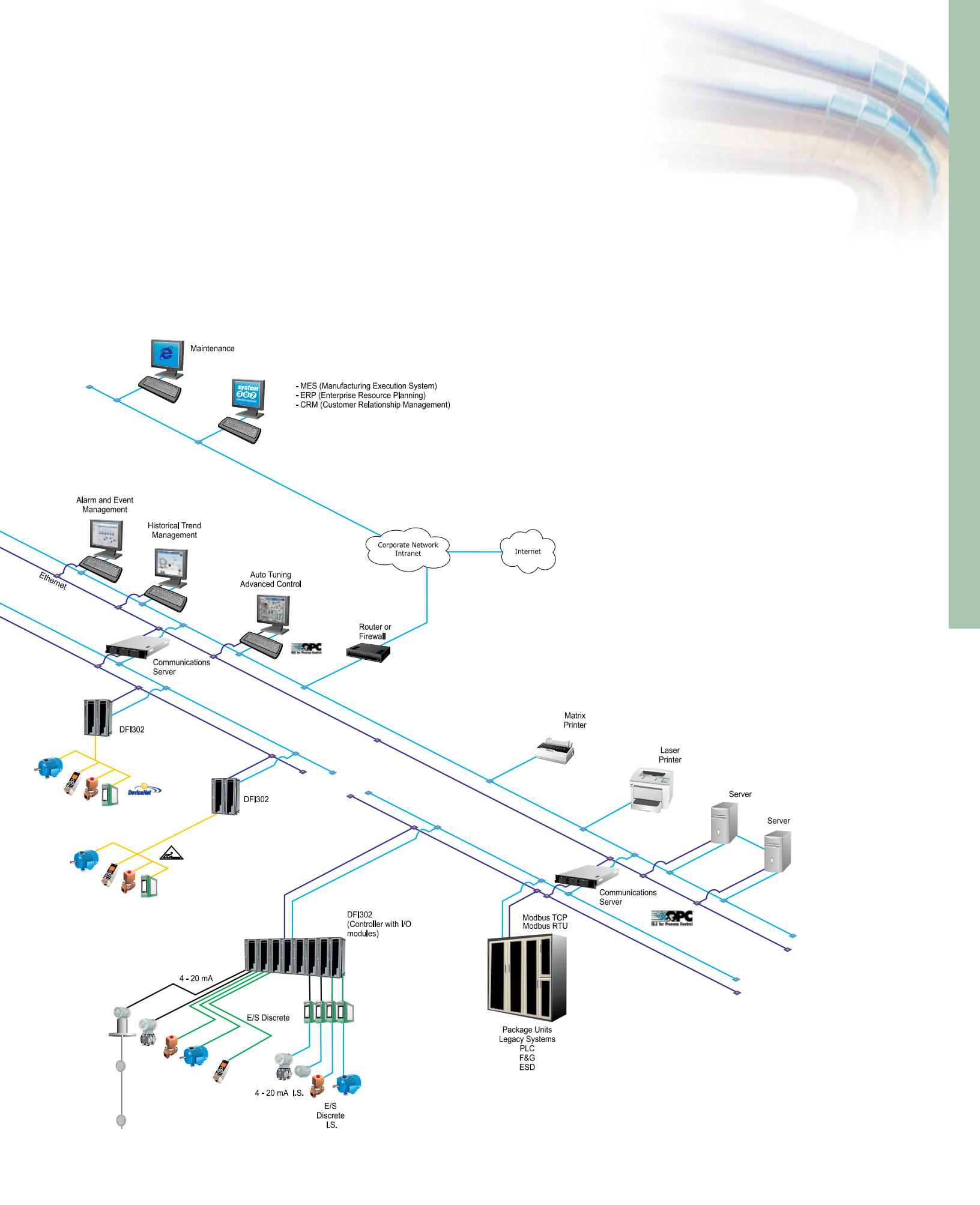
**EQUIPMENT DATABASE**



**LOGICVIEW FOR FFB**

# SYSTEM302 Architecture

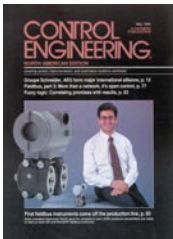




# Awards and Recognitions



1992:  
Company achieves certification



1994:  
LD302 Fieldbus Pressure Transmitter - Best Product Award recognized by Control Engineering magazine.



1997:  
FY302 Fieldbus Valve Positioner - Best Product Award recognized by Control Engineering magazine.



1999:  
Excellence in Documentation Award - "Addressing Benefits and FAQ's of Fieldbus-Based Architecture". Eng. Jonas Berge.

2000:  
Excellence in Documentation Award - "Reliability with Foundation Fieldbus". Eng. Claudio Fayad, Eng. Pedro Biondo.



2000:  
"Data Link Bridge" Group member, 'High Speed Ethernet Development Program. Eng. Libanio Carlos de Souza.



2001:  
DT301 Density Transmitter  
Best Product Award recognized by Control Engineering magazine.



2001:  
Albert F. Sperry Award  
Awarded by ISA in recognition of Smar's dedication to Fieldbus Technology.



2001:  
First registered Foundation Fieldbus HSE Device



2001:  
Industrial Solutions Top Supplier Award.



2001:  
Master Cana Award - Automation Company  
MASTER FIVE AWARD - 5 Best Sugar Companies.



2001:  
Master Cana Award - Sugar Plant Automation



2002:  
FINEP Award for Technological Innovation  
Southeast Region.



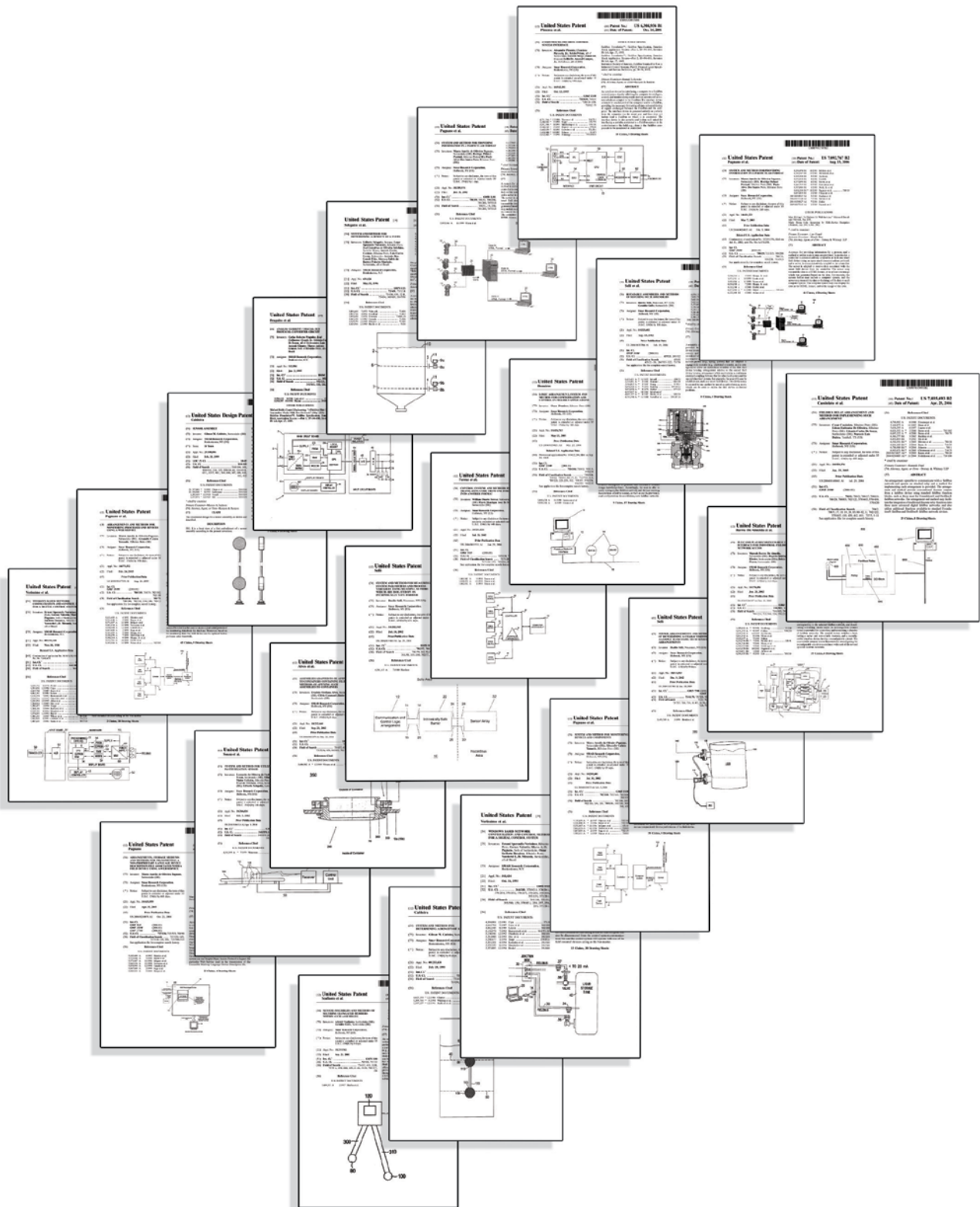
2002:  
IAN Magazine  
Excellence Awards - DC302



2003:  
FINEP Award for Product Innovation - AssetView

# Patents

Smar holds many patents.





# Process Optimization

The SYSTEM302 was developed in an innovative way and focus on results to give to the many industrial segments unparalleled, safe and excellent operational competitive edge. The SYSTEM302 flexibility and capability of expanding its architecture make possible to reconfigure and expand quickly and easily the system to face new conditions, without more investments.

The entire SYSTEM302 environment is devoted to the automation and information technologies. The result is a robust, safe and integrated architecture, one that is based in Ethernet and enables the use of standardized, non-proprietary communication protocols, like the HSE – High Speed Ethernet. The connectivity with Internet/Intranet makes possible the complete management of units from a central control room, regardless of being on local network, dispersed over a region or around the world.

With an encompassing and totally digital platform it supports, in addition to conventional technologies, several worldly renowned buses and protocols, such as FOUNDATION fieldbus, HART, AS-Interface (AS-i), DeviceNet, Modbus, PROFIBUS-DP and PROFIBUS-PA.

Smar's experience in process control aggregates value to the system, by mastering several types of applications, while offering additional safety and capabilities to users.

Pioneering and leadership in field networks, with thousands of systems installed in Brazil and abroad, attest to our technological expertise ahead of our competition.



## When choosing the SYSTEM302 weigh its main benefits:

- Lower initial costs
- Flexibility
- Interoperability
- More information availability and integrity
- Lower maintenance costs
- Lower expansion and modification costs
- Easily operated
- Simplified Engineering
- Easier and faster learning
- More safety



# Applications

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Since 1974, Smar has developed several products for the sugar/alcohol sector.

One example is the DT301-"Touché", the world's most efficient instrument for on line Brix measurement. Its performance appeals to many process engineers within the sugar industry. This is exemplified by as many as 15 applications within a single sugar mill.

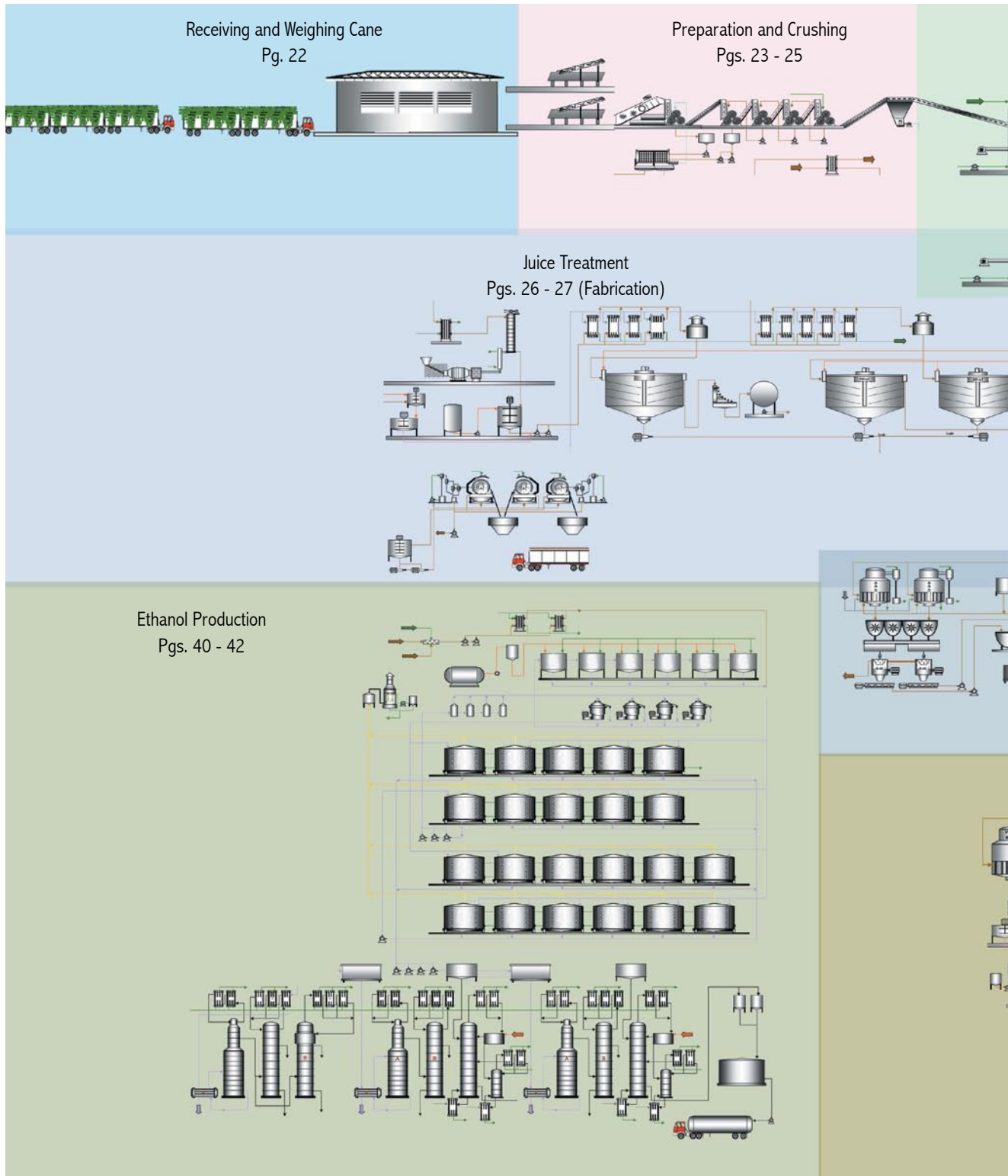
Smar's history is intertwined with that of the sugar/alcohol industry. Committed to the continued efficiency of the sugar/alcohol production process.

The following pages will describe how Smar's expertise can contribute to the process optimization of the sugar industry, as well as the global results achieved over almost three decades.

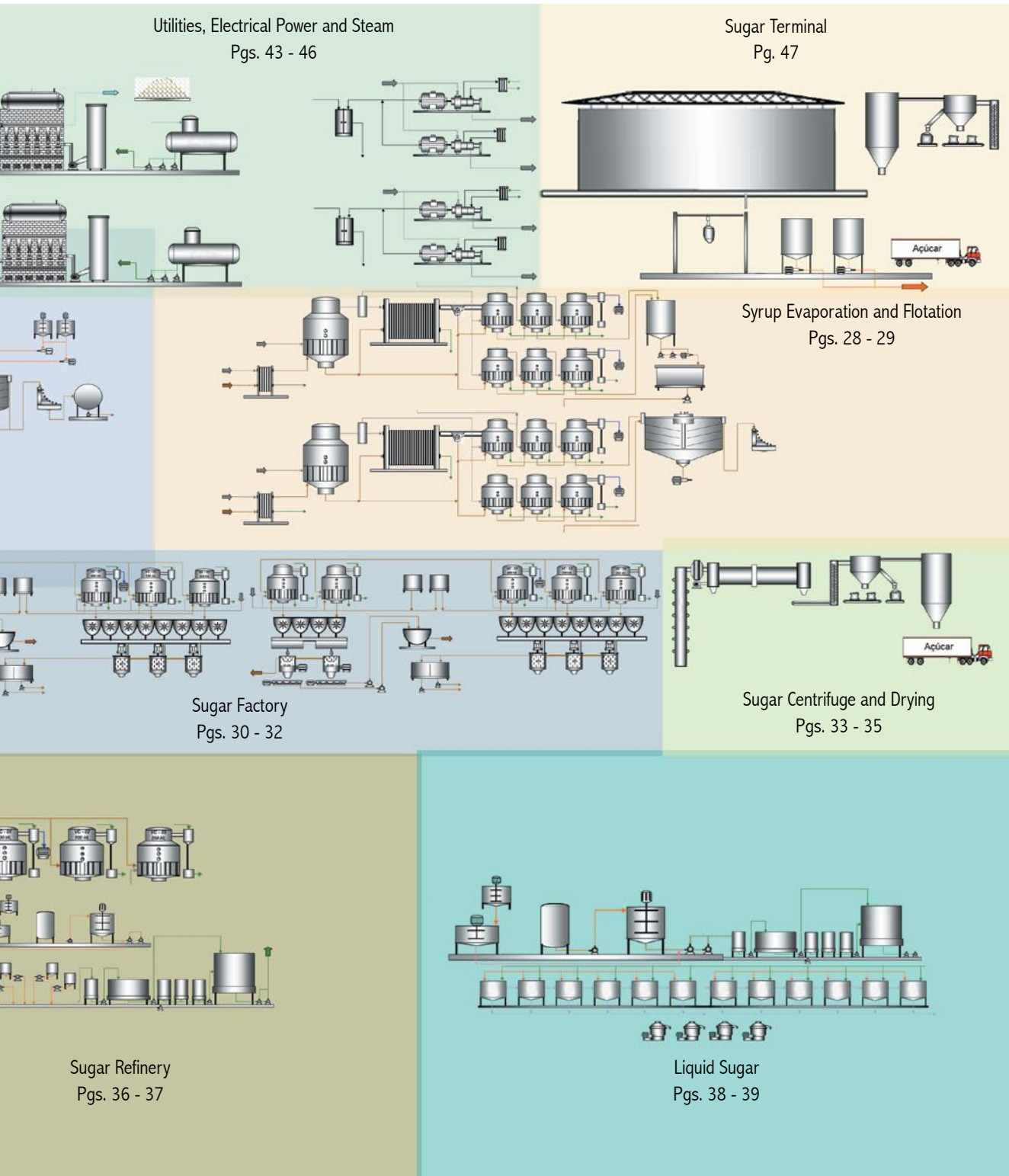


# Smár Automation Solutions

In almost forty years of activity, Smár developed automation solutions for



all stages of the production process, with installations in thousands of facilities.



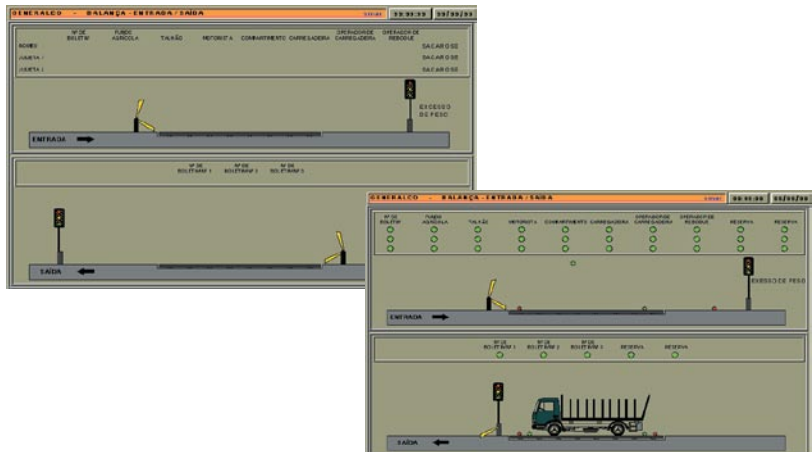
# Receiving and Weighing Cane



- Automatic Bulletin Emission
- Farm Fund
- Automated identification and registration of cane supplier, transporter, weight and conformity



Smarter automation systems are found at every stage of sugar and alcohol production. System efficiencies begin at the start of the process, and continue through preparation and crushing/diffusion, where the risks of losses increase.



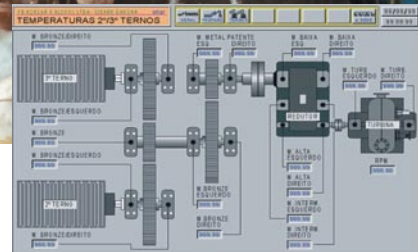
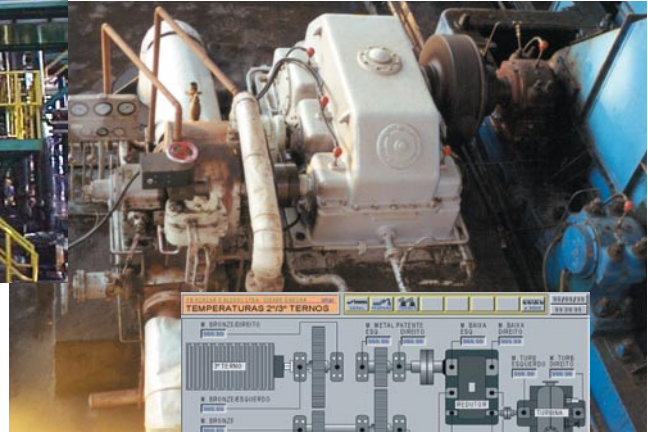
# Preparation & Crushing



- Synchronized conveyor belts
- Cane Level at 1<sup>st</sup> Tandem
- Cane Preparation Protection
- Turbine Speed
- Imbibition Water Flow
- Imbibition Water Temperature
- Juice Tank Level
- Juice Separation for Plant and Distillery
- Motor Command and Interlocking
- Crushing Rollers and Rotary Sieve Automatic Cleaning
- Upper Roller Shift at the Crushing Tandems
- Temperature monitoring of gear Bearings
- Steam Temperature for Turbines
- Lubricating Oil Pressure
- Feeding Table, Conveyor Belt and Turbine Rotation
- Bagasse Humidity

Smar products and systems provide control and ensure a consistent and scheduled feed process to the plant.





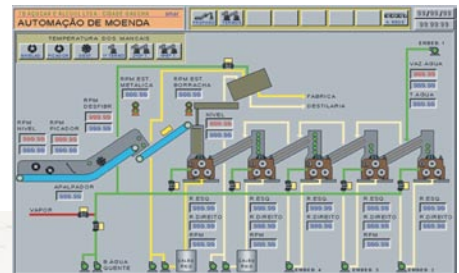
Smar products have enhanced the control process. Bearing overheated temperatures are no longer a maintenance issue. Juice extraction is controlled for optimum performance.



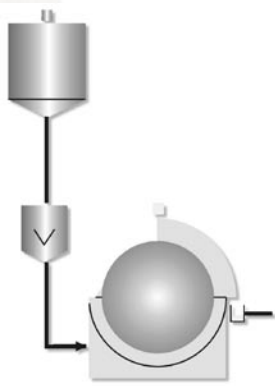




An example is the LC700 employed for monitoring and controlling multiple events, including hydraulic pressure, bearing temperature and many other critical parameters.



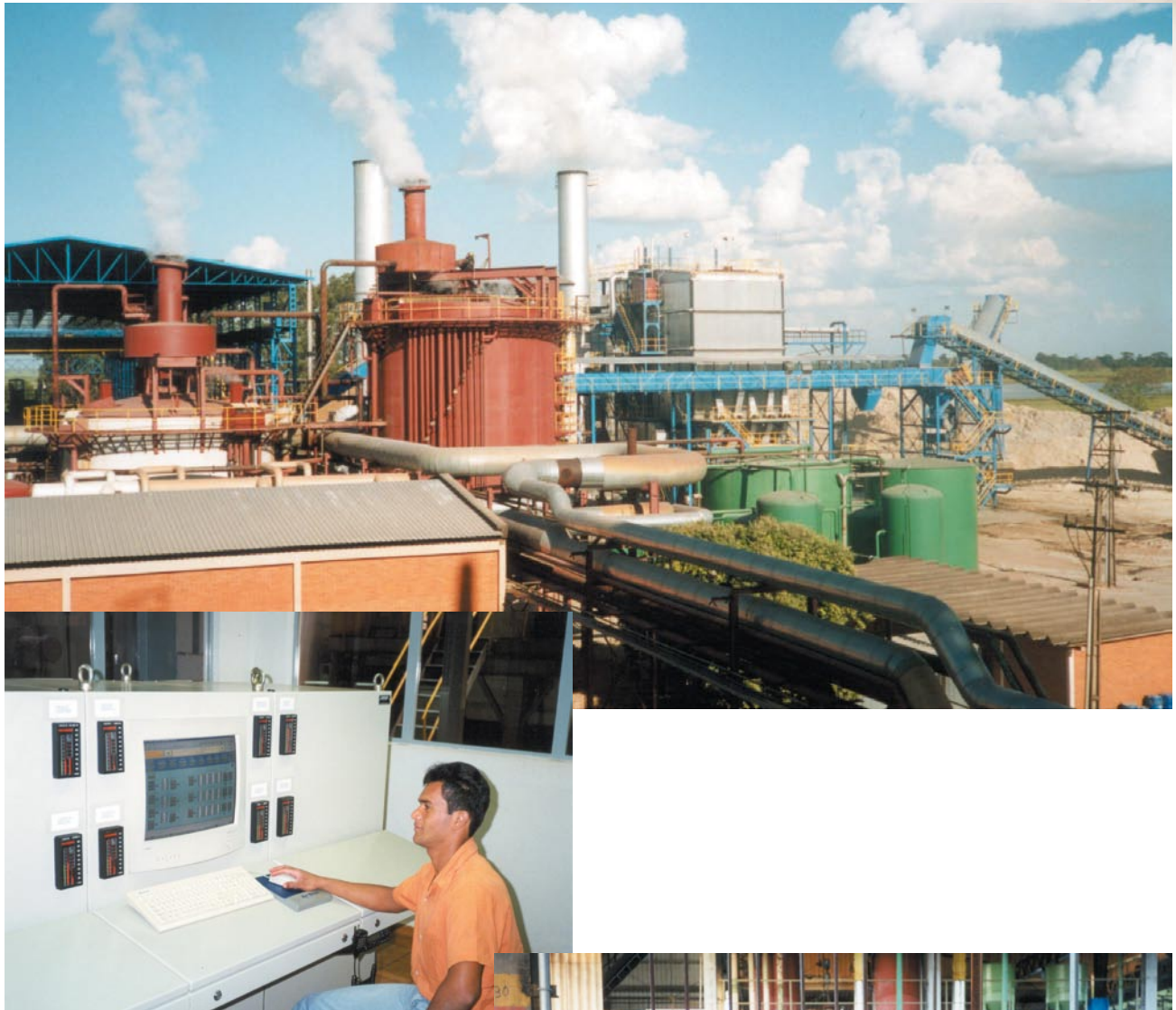
# Juice Treatment



- Sulfated Juice pH
- Lime Juice pH
- Juice Temperature
- Juice Separation into Clarifier
- Polymer Dosage to Clarifier
- Clarifier Sludge Cleaning
- Mud Box Level
- Mud Level Control on Rotary Filter
- Motor Command and Interlocking

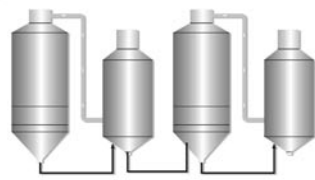


In the clarifier stage, Smar's DT301 exclusive concentration and density meter - the "Touché", (provided a new and unique method to allow the clarifier to be cleaned automatically), formerly done manually by the operator.



A clear, bright juice is fundamental for the production of a good quality sugar, and also for obtaining a “must” with adequate aseptic conditions. This is a basic requirement in juice treatment.

# Syrup Evaporation and Flotation



- Clarified Juice Tank Level
- Juice Temperature
- Pre-evaporators Level
- Pre-evaporators Brix
- Juice Separation into the Several Pre-Evaporators
- Multiple-Effect Evaporation Boxes Level
- Juice Flow into the Evaporation Boxes
- Syrup Brix
- Vacuum in the Evaporator
- Escape of Incondensable Gases from the 3<sup>rd</sup> and 4<sup>th</sup> Effects
- Condensate Tank Level
- Motor Command and Interlocking
- Clarified Juice Temperature
- Evaporation Tank Body Temperature
- Evaporation Tank Calander Temperature
- Cold Water Temperature at the Multijet Inlet
- Hot Water Temperature at the Multijet Outlet
- Evaporation Tank Body Pressure
- Escape Steam Pressure
- Vapor Pressure
- Condensate Conductivity



Control and consistency in the juice evaporation process is essential - it ensures a high energetic yield on sugar/alcohol production. Smart control systems maintain a high thermal exchange rate at the evaporators, while maintaining optimum density of the syrup. These systems provide total flexibility despite changes in size, load, number or location of evaporator units.

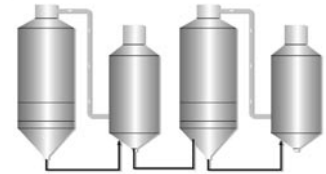
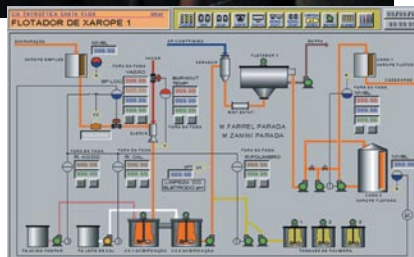




Smar's concentration and density transmitter - the DT301 "Touché" - has proven itself throughout the sugar/alcohol industry as a product that improve's process performance, and quality. The DT301 is used in quality control throughout the process, from the pre-evaporation juice stage, to the outlet evaporation stage. It also facilitates preventative maintenance and process cleaning schedules for operations staff.

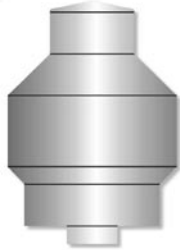


Smar products and systems work within all processes, from pH correction to juice heating, decantation, filtration to flotation.



- Syrup Flow
- Syrup Temperature
- Syrup pH
- Syrup Box Level Control
- Phosphoric Acid Dosing
- Polymer Dosing
- Discolorant Dosing
- Floater-Aerator Level
- Motor Command and Interlocking

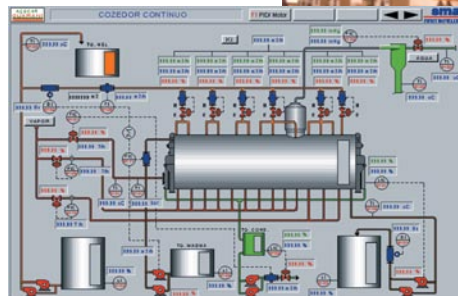
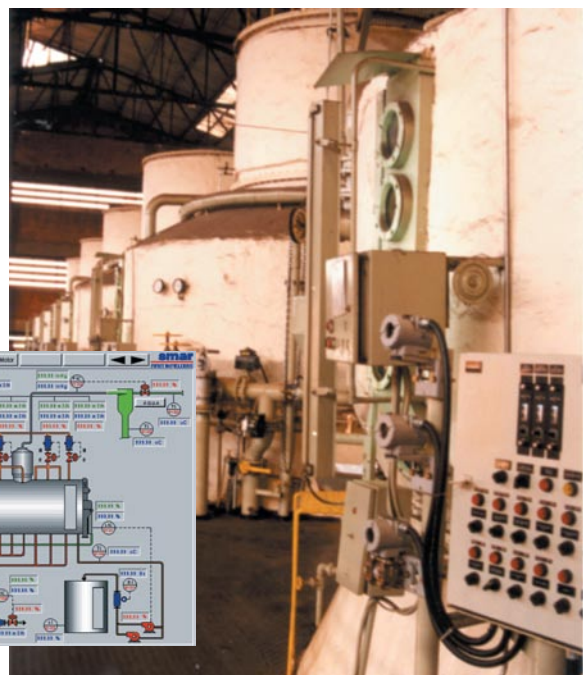
# Sugar Factory

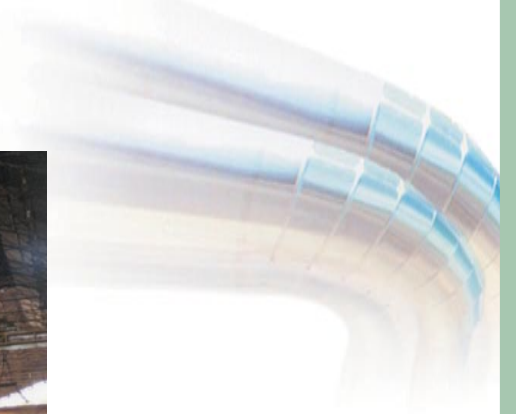


- VP Body Vacuum
- Calander Steam Pressure
- Sugar Product Feed
- Grain Stablishment
- Escape of Calander Incondensable Gases
- Condensate Tank Level
- VP Level
- VP Mass Temperature
- Products Feeding Temperature
- Agitator Motor Current
- Condensator Water Temperature
- Crystalizer Level
- Syrup, Molasses, Magma and tank Level
- Vapor Pressure
- Mass Discharge
- Mass Cutting
- Vaccuum Breaking
- Cleaning Steam
- Seed Feeding
- Clean Water Feed
- Viewer Cleaning
- Liquidizing
- Motor Command and Interlocking



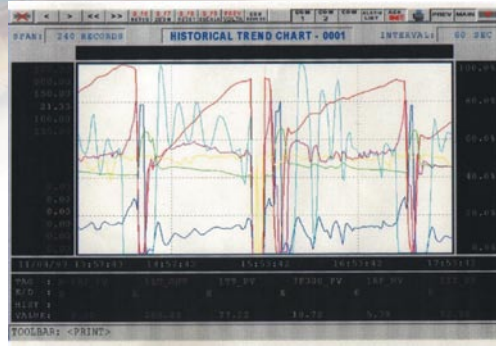
The heart of the sugar/alcohol process is the cooker. Smar's VP Automation Systems are developed so that maximum flexibility is obtained, when choosing production strategies.



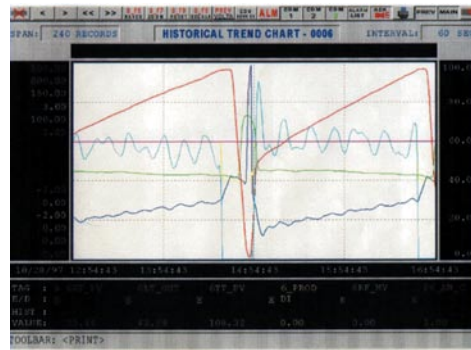


Whatever the process, Smar always has the best solution. Regardless of mass and/or product type used for cooking sugar, the LC700 can control and monitor the entire sequence; including cooking, cutting, and discharging of VP's.





Manual operation screen



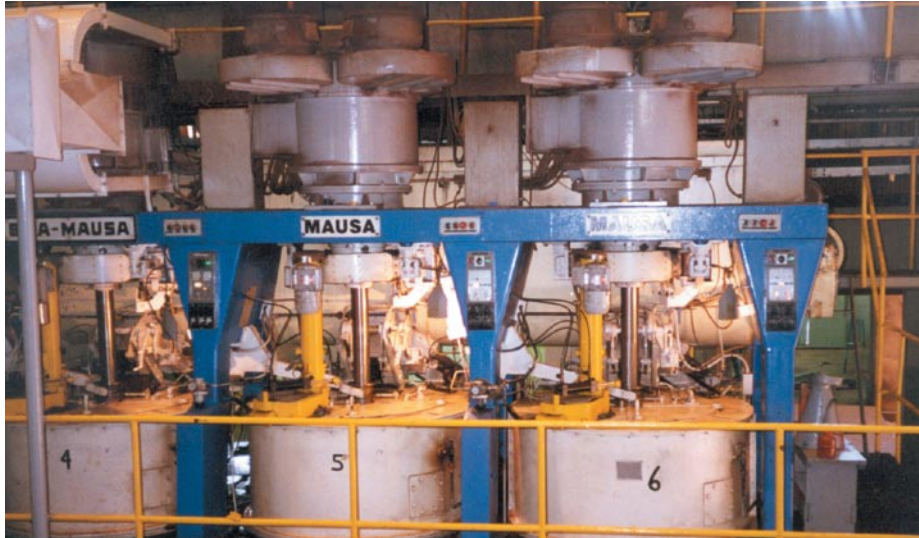
Automatic operation screen

The precise control afforded by Smar equipment ensures quality in production, sugar granular size and operational consistency regardless of the feedstock.

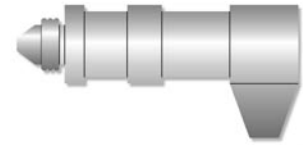
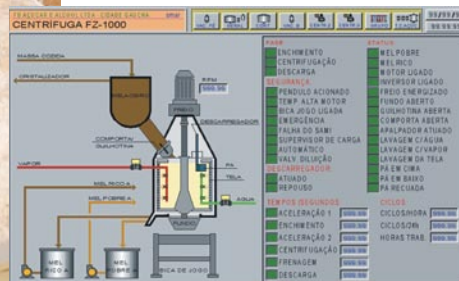
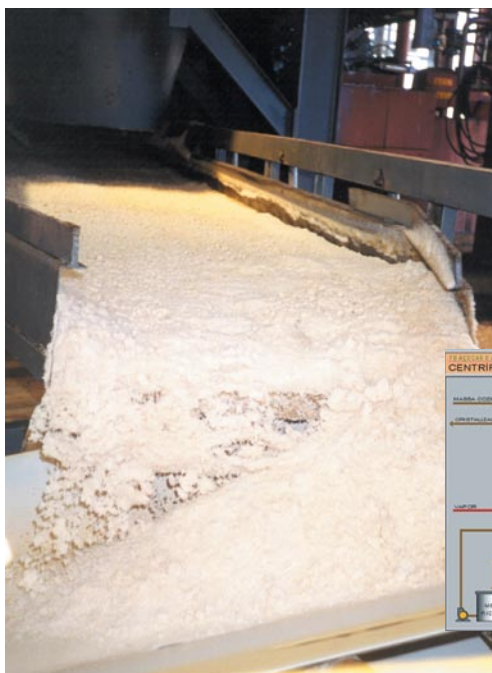




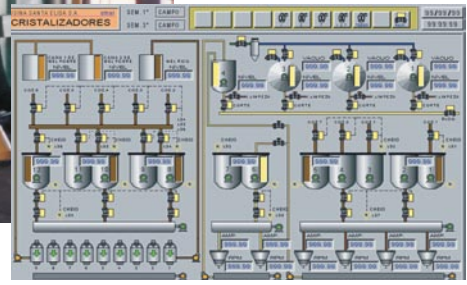
# Centrifuge and Drying Processes



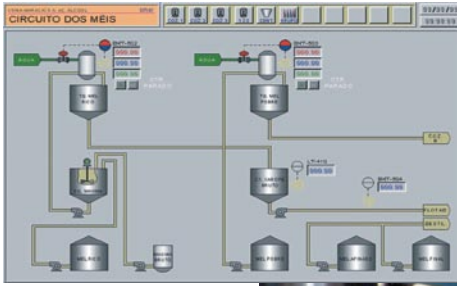
Regardless of the grade, quality or quantity of sugar being produced, Smar systems make it easier to adjust the production process. The user-friendly HMI enables the operators to make process adjustments easily as required.

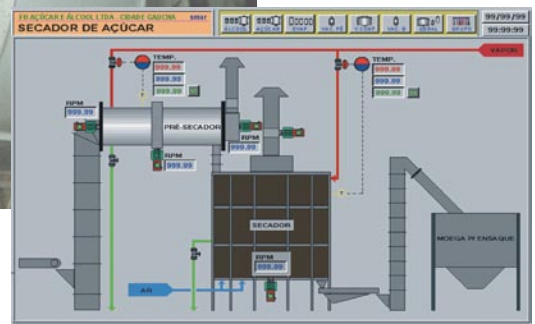
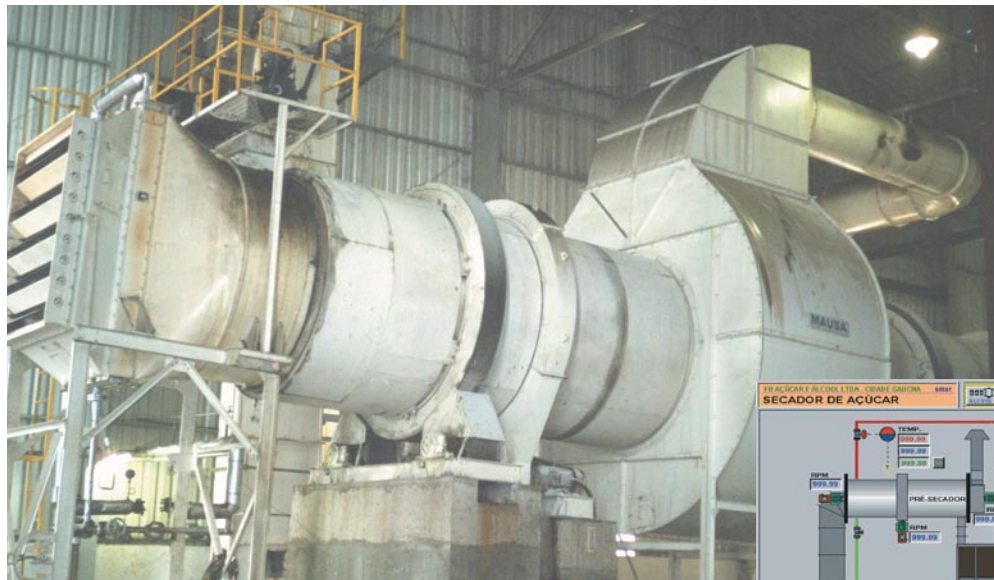


- Crystalizers Temperature
- Crystalizers Level
- Batch Centrifuge Cycle
- Centrifuge Current
- Water Flow to the Centrifuge
- Centrifuge Interlocking System
- Rich, Poor and Final Molasses Tank Level
- Rich and Poor Molasses Brix
- Magma Level
- Water Flow for Magma Preparation
- Raw Syrup Tank Level
- Raw Syrup Brix
- Sugar Temperature
- Washer Level
- Fresh Water Brix
- Dryer Air Temperature
- Sugar Temperature
- Steam Temperature
- Dryer Rotation

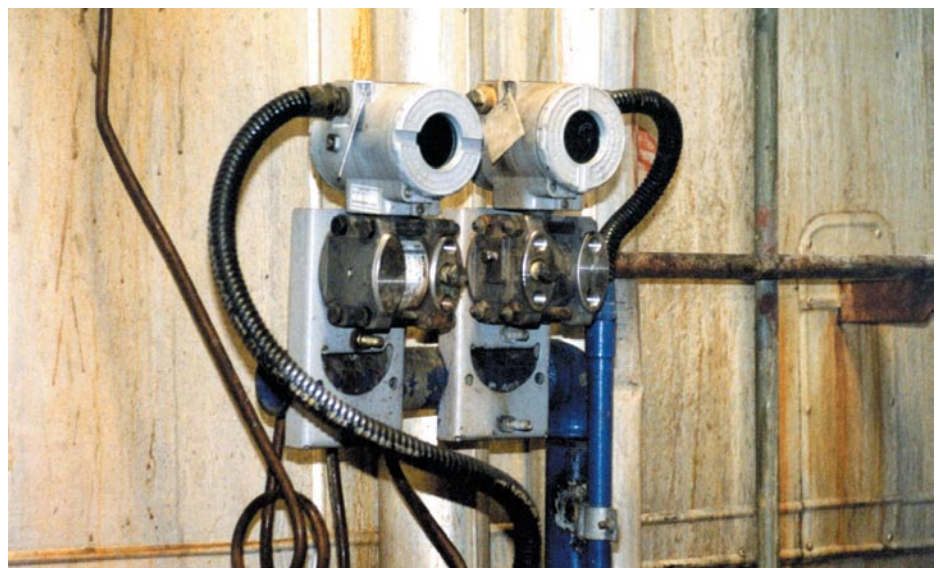


The Smar LC700 monitors and controls the output and also the need to reuse molasses to improve product quality.

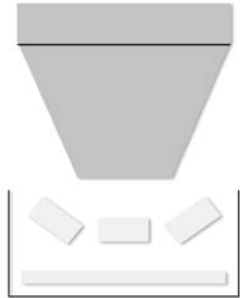




This part of the plant also takes advantage of the DT301-"Touché" for Brix measurement, which provides control for the correct dilution of molasses, enhancing plant efficiency.



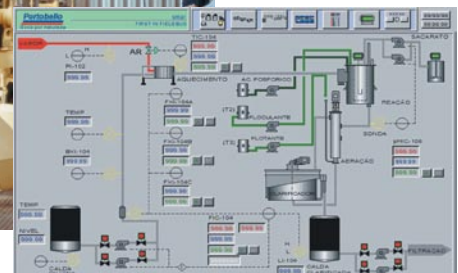
# The Sugar Refinery



- Juice Brix in the Dilutor
- Dilutor Temperature
- Syrup Flow to the Clarifier
- Syrup Level Control
- Automatic Dosing of Phosphoric Acid
- Automatic Dosage of Floculants
- Syrup Temperature
- Syrup pH
- Aerator Level
- Foam Recuperator Water Brix
- Fine Syrup Brix
- Refining VP's Vacuum for Granulated Sugar
- Automated Centrifuge Sequencing
- Syrup Measuring Tank Level for Amorphous Sugar
- Cooking Boiler Temperature for Amorphous Sugar
- Amorphous Sugar Beater Control
- Motor Command and Interlocking

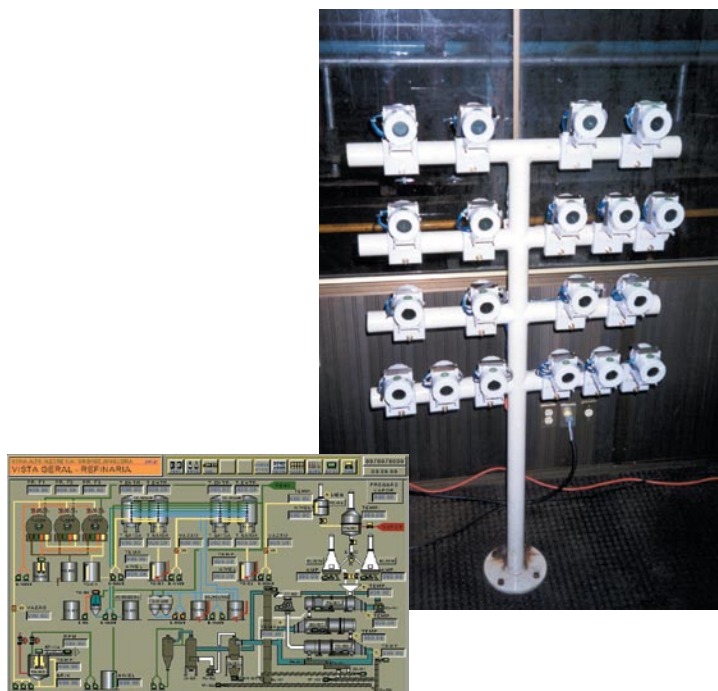


Smar also supplies specific Automation Systems for the production of refined, granulated or amorphous sugar, and/or, liquid sugars. These systems allow great operational flexibility, either for monitoring and/or controlling all the process variables.





The flexibility and interaction of the control system and software have enabled control and process improvement to the sugar industry.

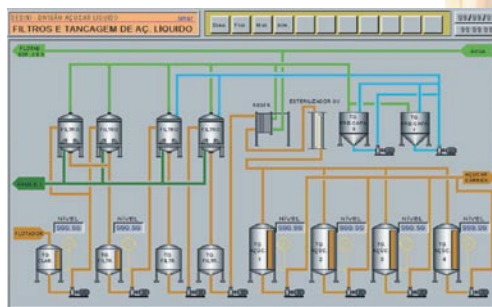
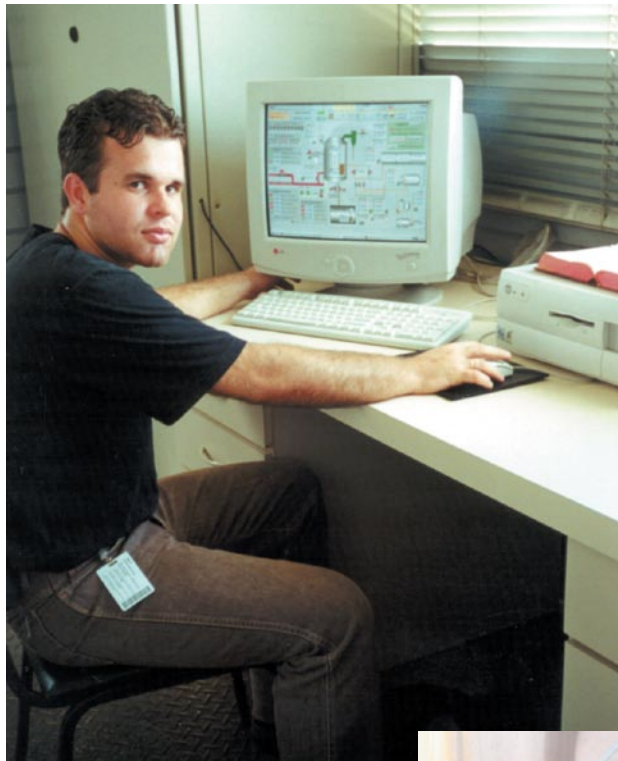


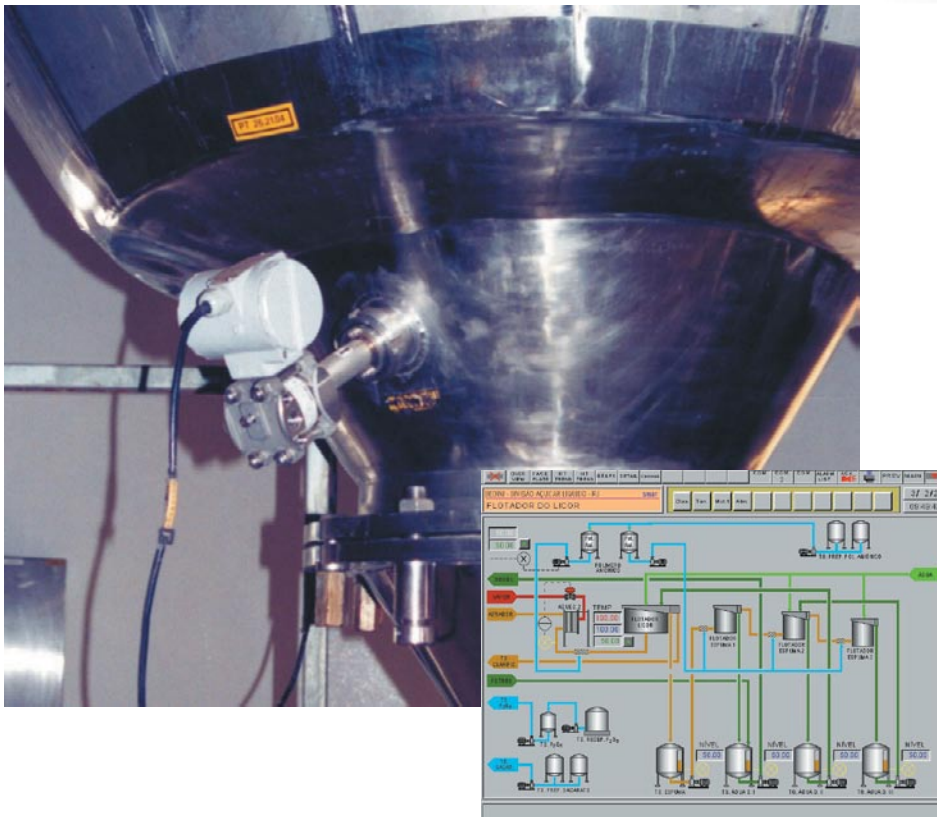
# Liquid Sugar



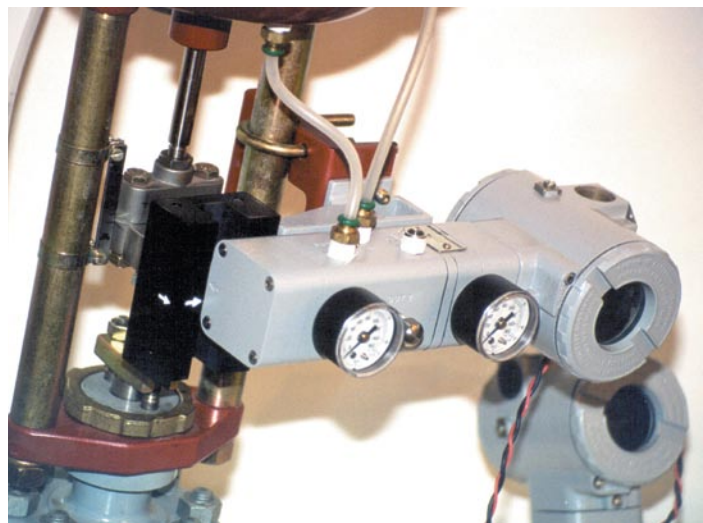
- Fresh Water Flow
- Polymer Tank Level
- Phosphoric Acid Tank Level
- Fresh Water Brix
- Silos Level
- Feeding Conveyor Belt Load
- Raw Sugar Weight
- Dissolving Tank Level
- Liquor Brix
- Liquor Flow
- Reaction Tank pH
- Liquor Temperature in the Floater
- Liquid Sugar Level at Filters and Tanks

Smar has obtained excellent results with DT301 “Touché” in Brix measurement of liquid sugar and interface levels in the refining and production process.

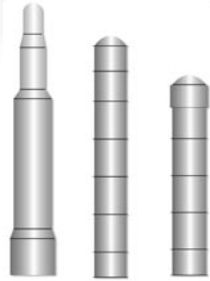




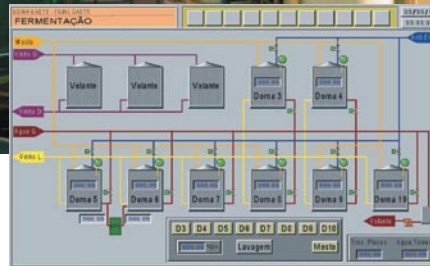
The Smar FY valve positioner product line was designed to accommodate the diversity of valves used in industry and sugar facilities. The positioner is ideal for use with existing actuators, whether linear or rotary, regardless of size.



# Alcohol Production



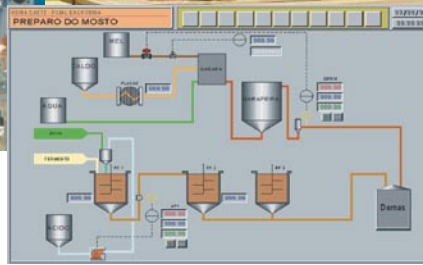
- Must Brix
- Must Flow
- Fermentation Vat Level
- Fermentation Vats Temperature
- Water Flow to Cask
- Fermentation pH
- Fermentation Flow
- Centrifuge Motor Current
- Flying Vat Level
- Molasses Box Level
- Molasses Temperature
- Must Temperature
- Juice Temperature
- Must Temperature
- Cooling Water Temperature



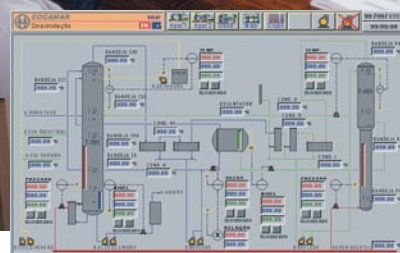
The multiplicity and varieties of the raw materials used for alcohol production, make Smar Distilleries Automation Systems invaluable.

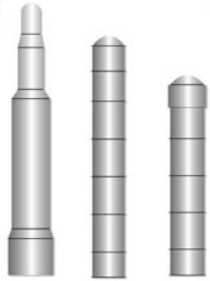
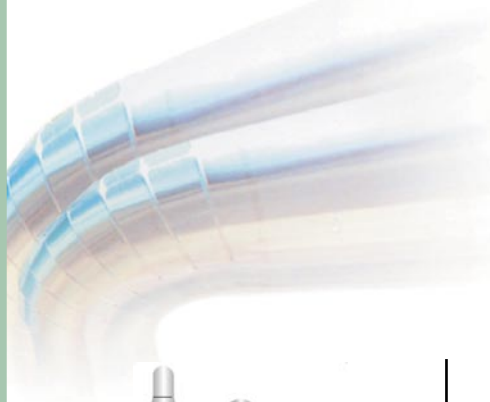






The Smar Systems apply both to continuous fermentation or batch methods and to equipment for hydrated or anhydrous alcohol. The latter are applicable to columns operating with several types of dehydrators, such as hexane or ethylene glycol or, still, molecular sieves.





- A,B,C & P Column Pressures
- Wine Feeding to Column A
- Column A Calander Level
- Alcohol Remotion
- Reflux Tanks Level
- Hydrated Alcohol Acidity
- Dehydrator (Cyclo-Hexane or Ethylene-Glycol) Feeding
- Column C Level
- Column C Ternary Extraction
- Ternary Flow to Cyclo-Hexane Decanter
- Recovered Dehydrator Extraction
- Condensers Temperature
- Beer Temperature
- Distillation Columns Temperature
- Cyclo-Hexane Decanter Temperature
- Refrigeration Water Temperature
- Steam Temperature
- Steam Pressure
- Beer Pressure
- Beer Flow to Column A
- Beer Flow to the Distillation Columns
- Ternary Reflux Flow
- Motor Command and Interlocking

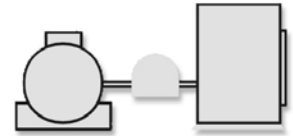
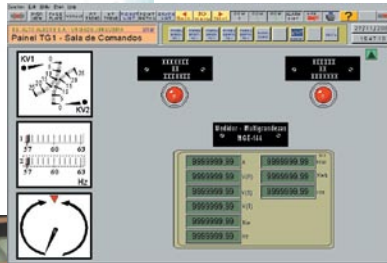


Smar's concentration and density meter DT301-"Touché" has been proven very successful in several applications in alcohol fermentation and production stages. Below are examples of where the product is applied in either hydrated or anhydrous alcohol applications:

- Vat Brix Measurement
- Correct Must dilution
- Measurement of tanks with dehydrating products
- Alcoholic Graduation

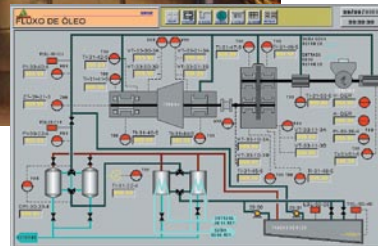


# Utilities, Power and Steam

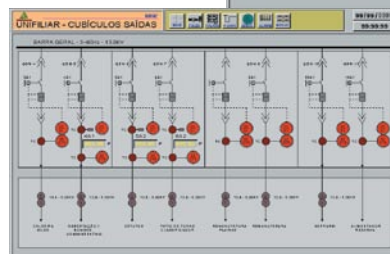
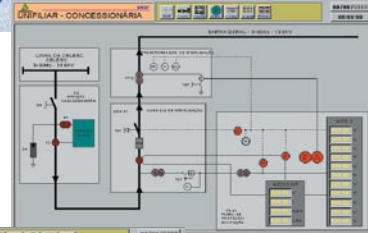
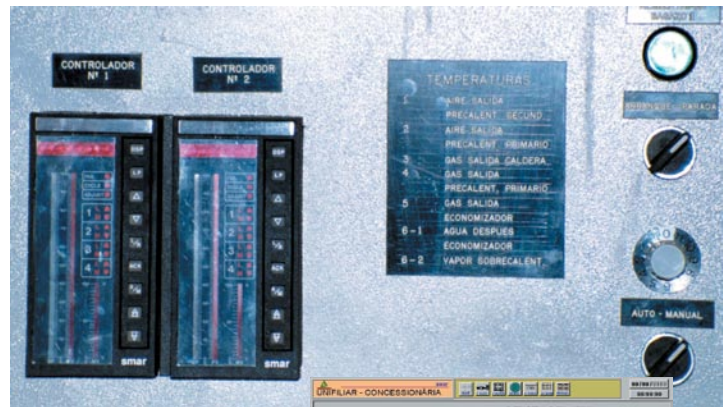


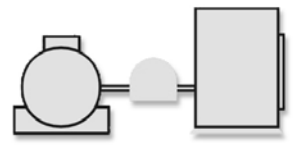
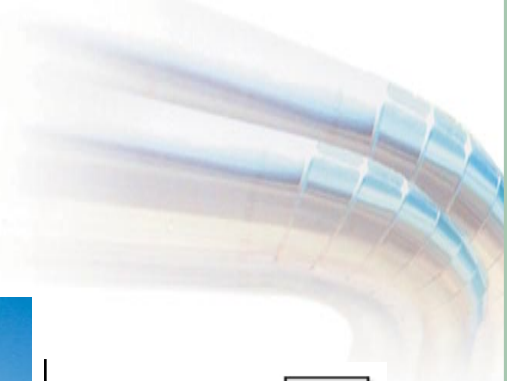
- Turbine Rotation
- Frequency
- Generator and Network Loading
- Phase and Frequency Synchronization
- Circuit Breaker Synchronization Work
- Power Generation and Demand
- Power Transfer
- Turbine/Generator Vibration
- Generator Performance and Management
- Power Factor
- Tension
- Current
- Circuit Breaker and Status
- Tripped Relays

Constant power generation is fundamental in the operation of alcohol and sugar plant processes. Smar is well established in power control systems, by controlling critical variables on multiple-stage turbines and turbo-generators.

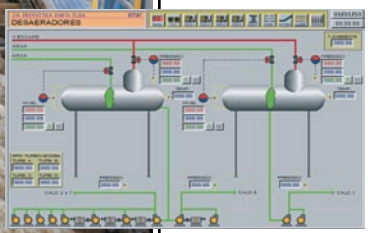
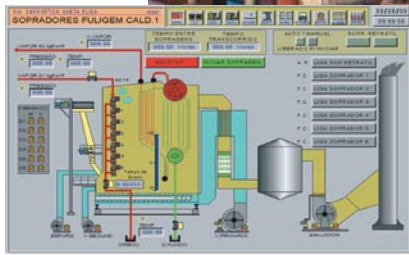


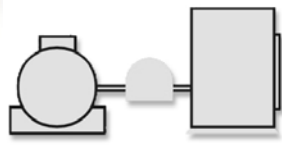
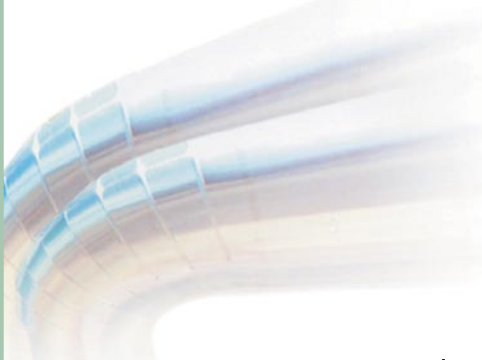
Smar's Micro-processor based Controller Multi-Loop CD600 is well known in the sugar/alcohol industry. The product has proven itself to be simple to configure, flexible, with extensive function block capability, versatile, and most importantly reliable. The CD600 provides optimum control of many process variables, such as, steam production, optimum boiler efficiency thus ensuring trouble-free operation.





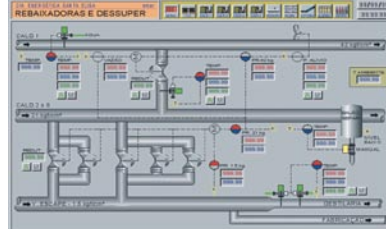
- Tube Level
- Steam Flow
- Feed Water Flow
- Feed Water Temperature
- Feed Water Pressure
- Steam Pressure
- Master Steam Pressure with Individual Adjustment
- Furnace Pressure
- Overheated Steam Temperature
- De-aerator Level
- De-aerator Pressure
- Automatic Bottom Discharge
- Automatic Screen Cleaning
- Automatic blow down
- Direct Steam Pressure Reduction to Escape Steam
- Escape Steam Reduction to Vapor





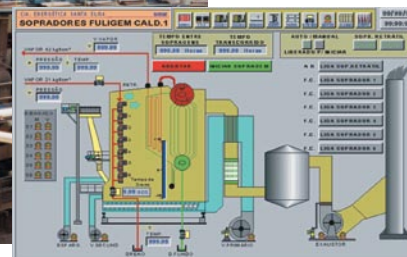
**Boilers Safety Systems**

- Induced-Fan Turbine Disconnection
- Bagasse Dosifier Disconnection
- Steam Tube Pressure
- Pre-heater Air Pressure
- Pre-heater Gas Pressure
- Gas Pressure on Economizer
- Feeding Water Pressure
- Tube Steam Temperature
- Pre-heater Air Temperature
- Pre-heater Gas Temperature
- Economizer Gas Temperature
- Economizer Water Temperature
- Bagasse Dosimeter Rotation
- Exhauster Turbine Rotation
- Feeding Water Turbo-pump Rotation
- Motor Current (Fans, Exhausters and Water Pump)
- Motor Command and Interlocking

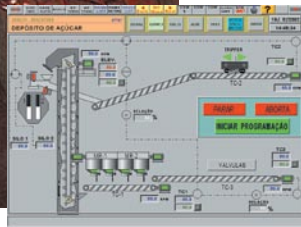
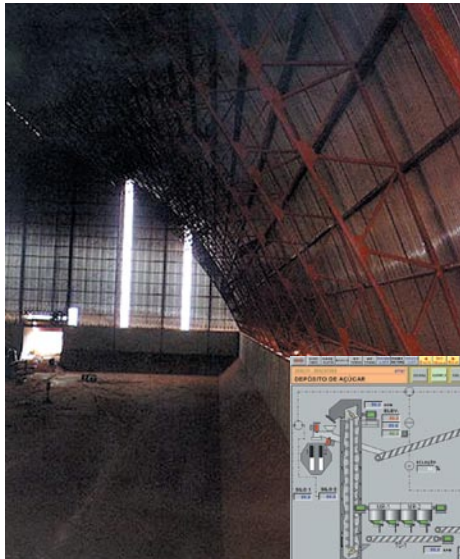


ANUNCIADOR DE ALARMES			
NIVEL ALTO NO TUBULÃO	PRESSÃO ALTA DE VAPOR	PRESSÃO BAIXA ÁGUA ALIMENTAÇÃO	ALM. COMBUSTIVEL PARADO
NIVEL BAIXO NO TUBULÃO	PRESSÃO BAIXA DE VAPOR	PRESSÃO BAIXA AR INSTRUMENTOS	RESERVA
NIVEL BAISSIMO NO TUBULÃO	PRESSÃO FORNALHA ALTA	EXAUSTOR 001 PARADO	RESERVA
BAIXA ROTAÇÃO TURBO-BOMBA	PRESSÃO FORNALHA BAIXA	EXAUSTOR 002 PARADO	RESERVA

Smár has vast experience in control systems for steam boilers, regardless of size or load. More than 80% of the boilers in operation in major Brazilian sugar plants use Smár Automation Systems.



# Sugar Terminal



- Silo Control
- Conveyor Belts Synchronization
- Conveyor Belts Load
- Elevator Load
- Valves Selection and Control
- Motor Command and Interlocking
- Safety Alarms and Trips

At the control room, a supervisory system communicates with the LC700. Terminal operators access the data via the Smar HMI package.

Smar's field instruments are employed in collecting data and controlling the process. Whether its the LD301 pressure transmitter or the FY301 valve positioner, Smar once again provides an integrated solution for the sugar and ethanol industry.



# Global Results

- Improved power efficiency
- Complete and integrated process control
- Increased production efficiency
- Better sugar quality (less color, smaller granuals)
- Improved diagnostic capabilities - unsiuring more process uptime
- Compliance with standards
- Better condensate recovery in steam exchange
- Improved technical competency
- Elimination of routine labor intensive work. Operators can be more gainfully employed in process optimization
- Simplified maintenance through asset management software, providing a historical registry
- Possibility of establishing a separate strategy for each operational situation without interference from one another
- Optimized operational personnel
- Centralized operation enabling better decision making
- More detailed process information
- Simplified operation
- Better use of the installed capacity
- Real and reliable process data statistics
- Higher operational protection and safety
- Easy exchange of information among areas, to facilitate the operation
- Interoperability between Process Control Systems and Management System, providing total management and control capabilities





# Smar offers solutions for the bio-fuel market



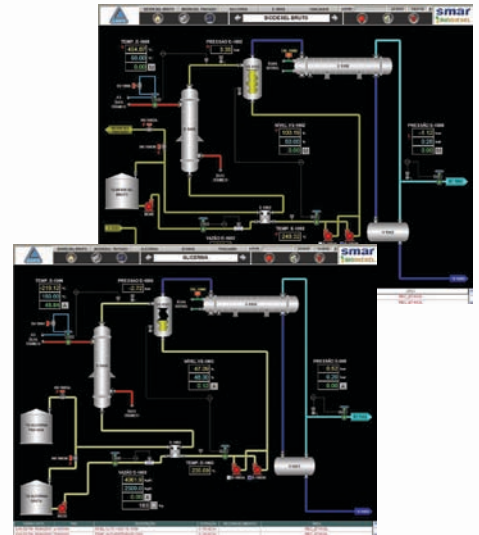
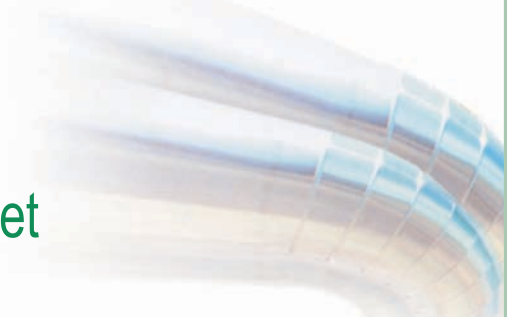
The search for a clean energy that will help neutralize fossil oil destructive environment, socio-economic and political effects has involved Brazil in a scene of expectations, due to its potential in terms of research and production of this type of energy.

In this environment, the ethanol produced from sugar cane is enhanced as a fuel clean and alternative to petroleum, both in the field as in urban centers. But Brazil doesn't produce only ethanol as a viable alternative. Extracted from vegetable oil, soy, castor, palm, babaçu and peanuts through transesterification, bio-diesel also ranks first in the list of clean and renewable products.

Bio-diesel is a steroid fat acid that may be mixed in different proportion with common diesel oil without altering the performance of automotive engines or electricity and heat generators.

Brazil may become a great bio-diesel producer due to its climatic, hydric and geographic conditions (good quality soil and vast unexplored extensions) which influences low production cost and high productivity.

The bio-diesel production viability gave Smar the possibility of entering in a new and promising market. With more than 34 years automation experience and know-how for sugar and ethanol plants, Smar, a genuinely Brazilian company, is apt to meet the bio-diesel market demands and offer the best industrial solutions.



# Services



Since our inception in 1974, Smar has always been recognized for its excellence in technical support.

Although originally founded for maintenance services on steam turbines, Smar has always had close links with the sugar/alcohol business.

The competence and foresight of its founders, in addition to the gradual increase of its technical team, led to the creation of new departments, whose personnel are motivated to focus in the technical enhancement not only of newly hired employees, but also end-users of its products.

Smar's team has evolved since 1974. Many skill sets have been added to the company, from multiple disciplines, in multiple countries. However, one thing has been consistent in the evolution - the commitment and motivation to focus on the customer's needs.

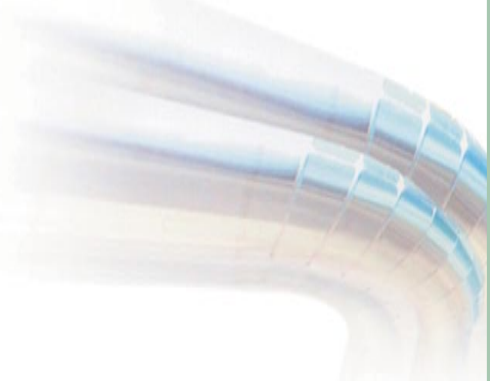
This can be seen in our:

- Applications Engineering Team

Composed of several groups of engineers who specialize and have backgrounds in specific market segments, such as sugar production. These engineers ensure Smar products are correctly applied, and look for opportunities to help customers optimize product performance for their benefit.

- Training Team:

Formed to educate both Smar and customer employees in both product and application knowledge.



- Commissioned Service Team:  
Established to help customers implement Smar solutions with minimum impact on the process.
  - Quality & Approvals Team:  
To ensure that Smar products are designed to meet our customer's exacting needs in terms of repetitive product quality and also specific industry approval requirements.
- For these reasons and many more, Smar is acknowledged as a leading supplier of automation and control systems to the sugar and alcohol industry.



# A view into other Industry Applications

In addition to its experience in the sugar industry, Smar provides solutions to several other industries:



## Food & Beverage

- Evaporators • Blending and Batching
- Retorts • Fermenting



## Brewery

- Mashing • Lautering • Boiling • Fermenting
- Conditioning • Filtering • Filling



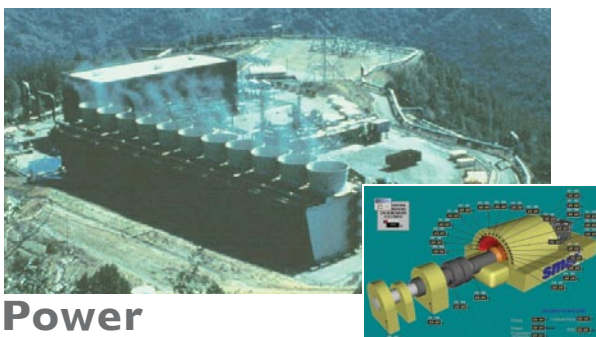
## Biodiesel

- Reactors • Separators • Washers • Purifiers
- Evaporators



## Pharmaceutical

- Fermentation • Extraction • Formulation
- Packaging



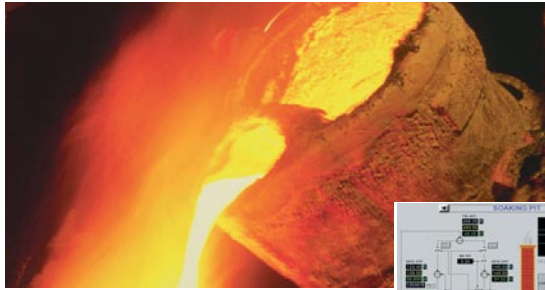
## Power

- Burner Management Strategies
- Performance Monitoring • Safety Shutdown



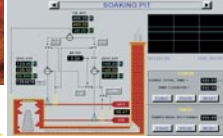
## Textile

- Weaving • Dyeing



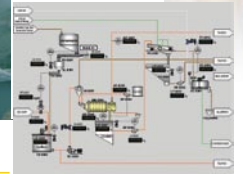
## Steel

- Blast Furnaces • Continuous Casting • Reheating Furnaces
- Biological Waste Treatment • Annealing Lines
- Sinterization



## Mining

- Ore Dressing • Pyro/hydro Processing
- Electrolytic Refining • Crushers • Ball Mills • Classifiers
- Filters • Flotation Devices • Magnetic Separators
- Calcining Kilns • Digesters • Evaporators



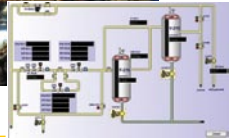
## Pulp & Paper

- Mass Preparation • Inlet Box • Bleaching
- Recovering Boiler



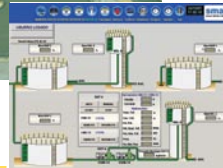
## Oil & Gas

- Platform and Pipeline • Catalytic Cracking
- Distillation Columns • Blending • Reactors



## Water & wastewater

- Filter Backwash • Chemical Treatment and Feed Systems
- Water Pumping and Control • Remote Telemetry
- Sludge Processing • Sludge Drying
- Sludge Incinerator Control



## Chemical & Petrochemical

- Distillation columns • Reactors • Evaporators
- Heat Exchangers • Blenders • Tank farm



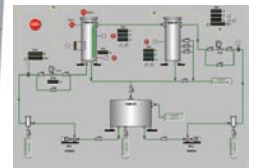
## Glass

- Glass Ovens • Suppliers • Thermic Treatment



## Training & Research

- Simulation Plant • Demo-kit
- Automation Projects for Pilot Plant



**smar**  
www.smar.com

Specifications and information are subject to change without notice.  
Up-to-date address information is available on our website.

web: [www.smar.com/contactus.asp](http://www.smar.com/contactus.asp)



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