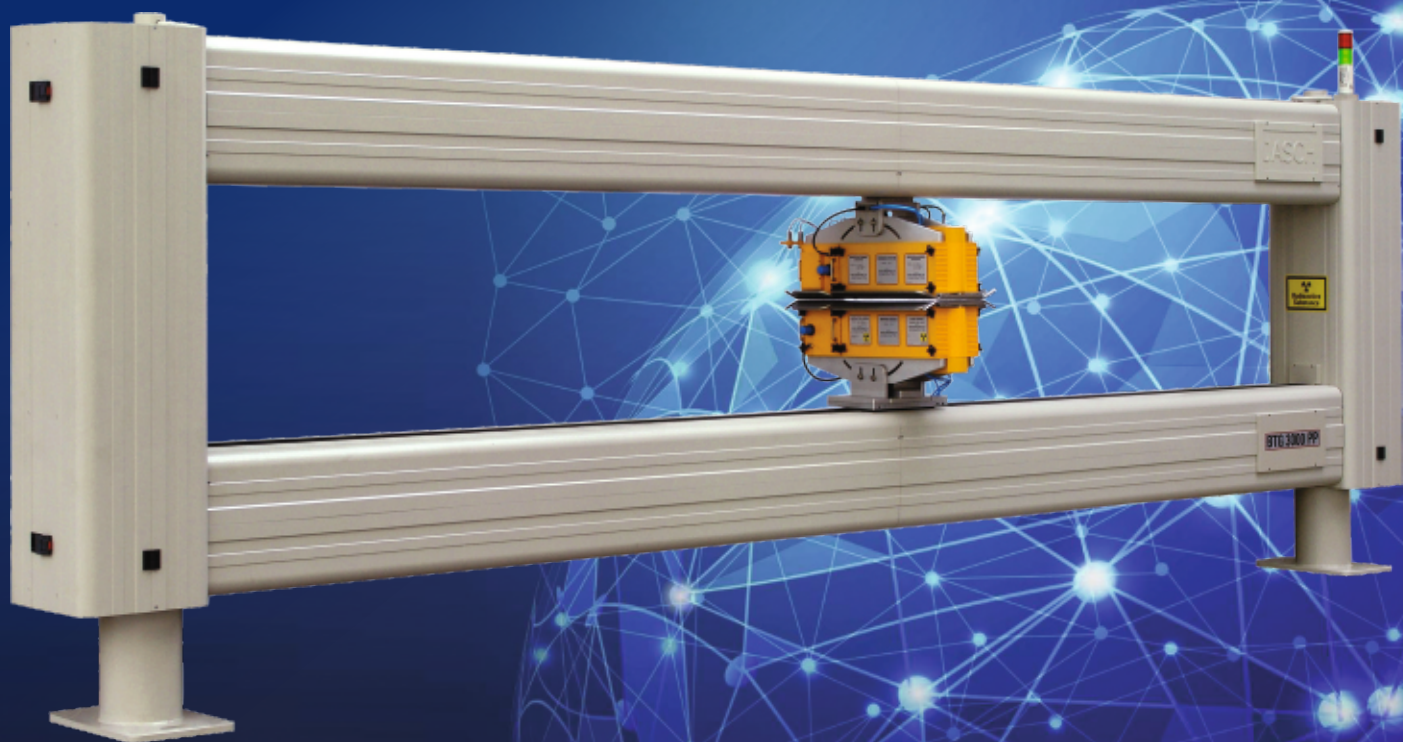


Quality Control System for Paper/Board Machines



BTG-3000PP

www.jasch.biz



JASCH

QUALITY CONTROL SYSTEM

Jasch develops and manufactures measurement and control systems to improve the quality of production on paper machines and bring cost reduction and productivity increase to operations.

Our systems continuously monitor and control the quality parameters such as Basis weight, Moisture, Ash, Caliper & Coating thickness etc. The deviations from preset target values are instantly detected allowing immediate corrections to the production process to maintain constant product quality. All relevant measuring results are evaluated and displayed graphically on a monitor and documented by hard copy.

More than 130 systems installed worldwide are impressive evidence of the market acceptance and capability of our products and services.

SYSTEM ARCHITECTURE

The modern Quality Control System, designed to be flexible and with open software architecture without compromising on system reliability, availability and ease of maintenance: JASCH BTG-3000 PP system fulfills all these needs using the latest in electronic technology and proven heavy duty mechanical components.

The system is designed to concentrate on the most important task of accurate and stable measurements of the paper parameters. The sensors are mounted on a highly precise scanner platform which carries the sensors and scans across the paper web continuously. The scanner has all the function control and signal conversion/processing electronics included in a side panel. All measurement data from scanner is sent digitally via RS485 link to a PC based system which processes all measurements, generate profiles, implements calibration tools, service & maintenance and machine/process control.

The Operator interface is implemented on another PC based system which is connected to the processing system through Ethernet link. The Operator interface is based on Labview™ which is highly user customizable and adaptable to varying mill requirements. Comprehensive production reports are generated for storage and hard copy.

The whole set of profiles and measurement & control parameters from the processing system are available through an OPC server for mill wide access.

The basic BTG-3000 PP system provides Machine Direction control of Basis weight, Moisture and Ash content in paper. For multilayer machines, the control is provided by calculated dry weight for each individual layer. In addition Jasch also provides Cross Direction control of Basis Weight, Moisture and Caliper.

SENSORS

For all paper machines the basic measurement required is the Basis Weight of the paper. The measurement is displayed as GSM (org/m^2) which is the basic parameter the operators use to ensure that their production is always with in the acceptable weight range. The measuring principle is based on the attenuation of Beta radiation emitted by a nuclear source as it passes through a material. The basis weight is determined by sensing variations in the energy radiated by the source of known intensity.

The next most important measurement is the Moisture measurement. This measurement enables the machine operators to keep the water content in the paper with in acceptable limits and is especially useful for optimising the production capacity. There are two types of moisture sensors based on Infra-red (IR) or the Microwave radiation.

IR sensor is most suitable for fine paper and lighter paper grades. For paper upto 250 GSM, the IR sensor is used in the transmission mode. For higher

range, the single sided backscatter sensor has to be used as IR radiation can not pass through the paper. The transmission sensor measures the bulk moisture of the paper and the backscatter type measures only the surface moisture in paper by reflection. The measurement is based on the principle that when infrared light passes through or is reflected by a paper sheet, it is preferentially absorbed at very specific wavelengths by the water in the sheet, more so than fiber or other sheet components.

The Microwave Moisture Sensor is most suitable where GSM of paper is higher than 250 GSM and bulk moisture measurement is required or where there is high carbon black content in paper. The sensor is commonly used for multi-ply products such as box board and corrugated cardboard. The measurement is based on measurement of shift in resonant frequency of a cylindrical cavity by presence of a strong dielectric like water.

The other two important measurements are Ash contents and Caliper.

The Ash measurement is based on the principle that X-ray radiations are absorbed preferentially by the inorganic material in a paper sheet. As Ash contents increases, transmitted radiations that are captured by the ion chamber type detector is reduced. Ash content is calibrated for sheets containing Clay, Calcium Carbonate & Titanium Dioxide.

The Caliper sensor is a standard contact type. The light weight contacting fingers are extremely flexible being held through silicone bellows and ride on the moving sheet ensuring firm contact with paper with minimum pressure regardless of flutter and edge defects. The measurement principle is based on electromagnetic induction. A inductive coil and the ferrite target are mounted on the bellows and placed

on the opposite side and close to paper sheet. The distance between them changes as the paper thickness changes and with the change in gap between the coil and the ferrite target, the inductance of the coil changes which is measured through a coupled oscillator circuit.

The contacting parts are made up of crystalline sapphire to minimize wear and sheet marking. The coil is inserted inside a sapphire disk. The ferrite target is laminated with an ultra thin sapphire wafer.

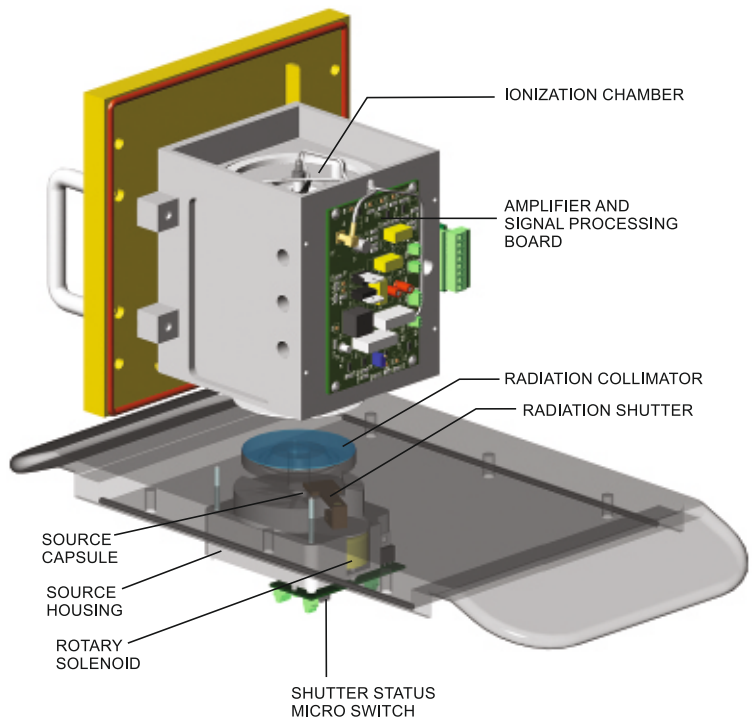
SCANNER

The scanning platform (O-Frame) carries all the sensors required by the customer and continuously scans back and forth across the paper sheet being measured. The sensor carriage is continuously moving, and throughout its scan the source and detector parts of the sensors remain aligned. Scanner precision and stability is crucial for obtaining proper measurements from the sensors. The O-Frame Scanner is designed to be very strong, reliable and at the same time accurate also. The design is based on double I-Beam structures welded together to form a box construction. The resulting O-Frame structure is very strong, rigid and mechanically stable. It is only with this rigid structure that makes it possible to mount transmission sensors and maintain high precision alignment during scanning back and forth across the paper sheet. During the manufacturing process the top and bottom sensor carriages are precisely aligned through laser alignment system to within $\pm 0.3\text{mm}$ in x, y and z directions. The materials used are chosen for precise and reliable heavy duty use. With the rigid O-Frame design this precise alignment is mechanically locked into the system. The carriage movement is on heavy duty linear motion system based on overrated ball bearings.

TECHNICAL SPECIFICATIONS

BASIS WEIGHT SENSOR

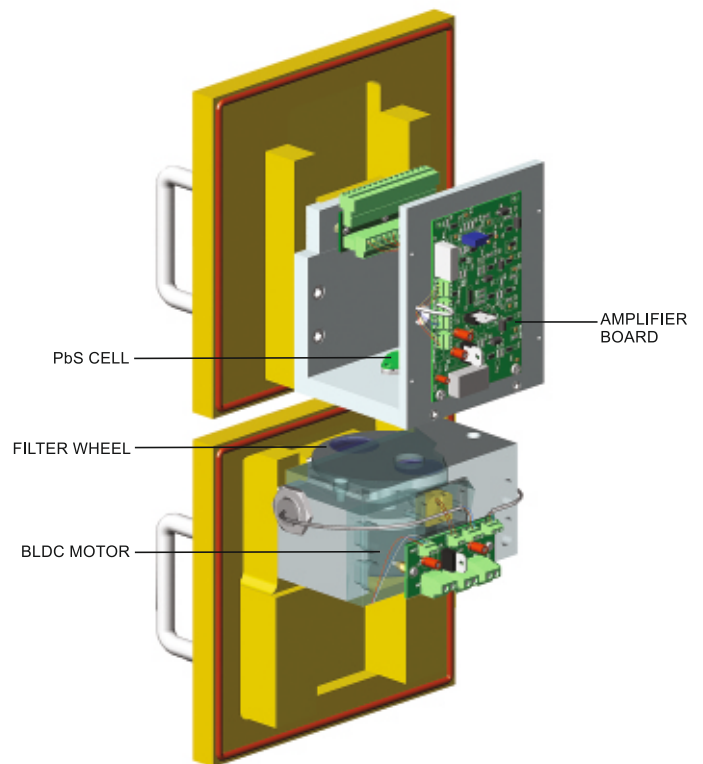
- ★ Beta Transmission Sensor
- ★ 200mCi Kr 85 Radioisotope (10-1000 g/m²) or 500 mCi Pm 147 (10-200 g/m²).
- ★ Accuracy & Repeatability : 0.25% or 0.25 GSM (whichever the greater)
- ★ Sampling Time : 10msec
- ★ Air Gap : 10mm
- ★ Operating Temperature : 0-70° Celsius
- ★ Ionization Chamber Detector with Electrometer amplifier
- ★ Integrated signal conversion through 24 bit A/D converter with in-built digital filters
- ★ Digital interface with Interface unit
- ★ Spot Size : 12mm
- ★ Air gap temperature compensation
- ★ Z-axis compensation for long scanner widths
- ★ Insensitive to paper formation



MOISTURE SENSOR

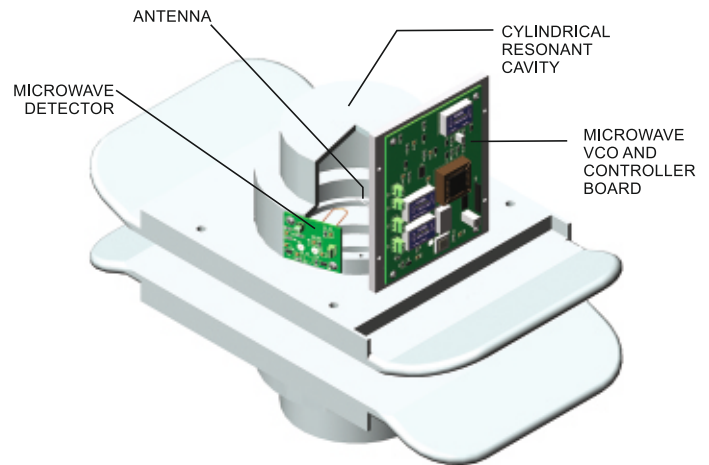
Near Infrared Transmission/Backscatter Sensor

- ★ Measurement Range : 0-15%
- ★ Accuracy & Repeatability : $\pm 0.1\%$
- ★ Sampling Area : 20mm circular
- ★ Operating Temperature Celcius : 0-70°C
- ★ Sampling Time : 10msec.
- ★ Insensitive to paper scattering using special scattering optics
- ★ Carbon black compensation



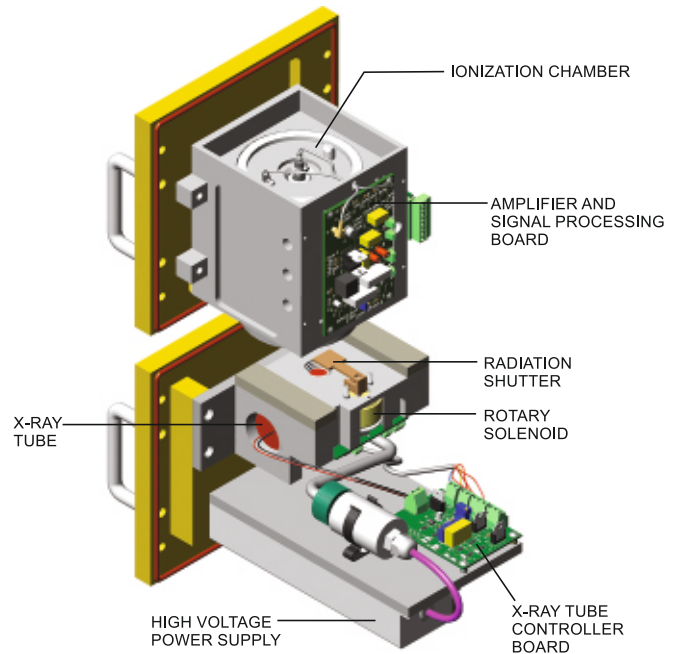
MICROWAVE SENSOR

- ★ Insensitive to ink residues in recycled paper or color of the sheet
- ★ Insensitive to surface structure or moisture stratification.
- ★ Insensitive to fillers such as China clay or whiteners
- ★ Sampling Frequency : 100 samples per second
- ★ Measurement Range : upto 100 GSM of water
- ★ Measuring gap : 10mm
- ★ Measuring Area : Circular 50x50 mm
- ★ Operating Temperature Celcius : 0-70°C



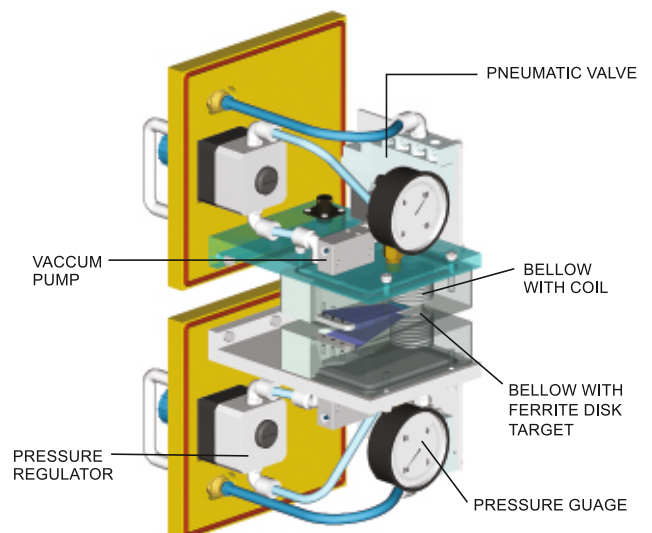
ASH CONTENTS SENSOR

- ★ X-Ray Transmission Sensor : 2W, 10KV (max) X-Ray Source
- ★ Measurement Range : 10-400 GSM
- ★ Accuracy & Repeatability : ±0.4%
- ★ Air Gap : 10mm
- ★ Sampling Time : 10msec.
- ★ Operating Temp. : 0-70° Celcius
- ★ Ionization Chamber Detector with Electrometer amplifier
- ★ Integrated Signal Conversion through 24bit A/D converter with inbuilt digital filters.
- ★ Digital interface with Interface Unit
- ★ Spot Size : 12mm



CALIPER SENSOR

- ★ Measurement Range : 0.02-1.00 mm
- ★ Repeatability : 0.5 micron
- ★ Dynamic Correlation : 1.5 micron
- ★ Long term stability : 1.0 micron
- ★ Sampling Time : 10msec



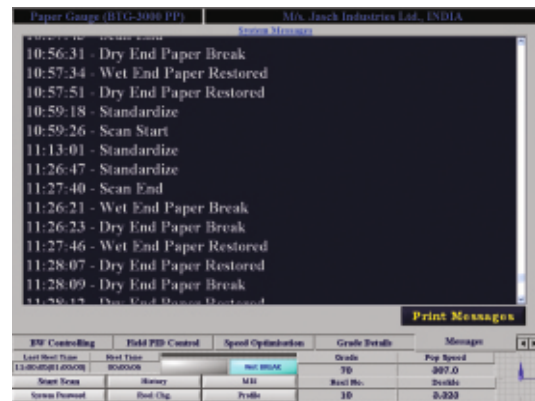
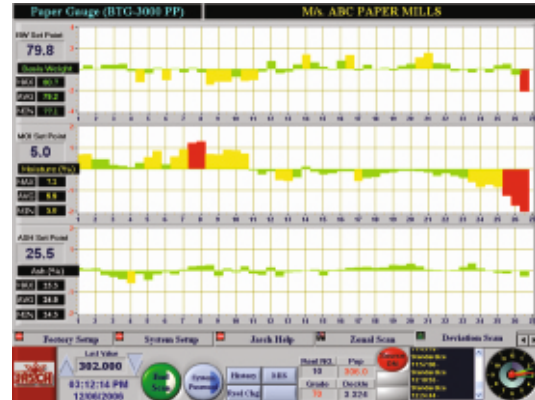
SCANNER FRAME

- ★ Precisely manufactured Box Beam design
- ★ Sensor carriage on linear motion guides based on overrated ball bearings
- ★ Laser alignment of top & bottom carriages.
- ★ Power Track cable carriers for reciprocating cables.
- ★ Steel reinforced timing belt drive.
- ★ Variable scan speed through variable frequency inverter drive (max. 20m / min.)
- ★ Maintenance free AC Motor.
- ★ Frame totally enclosed from all sides to shield all mechanical & electronic components. Excellent dirt exclusion. Optional pressurized frame.
- ★ High Speed two wire Serial RS 485 interface to Process.

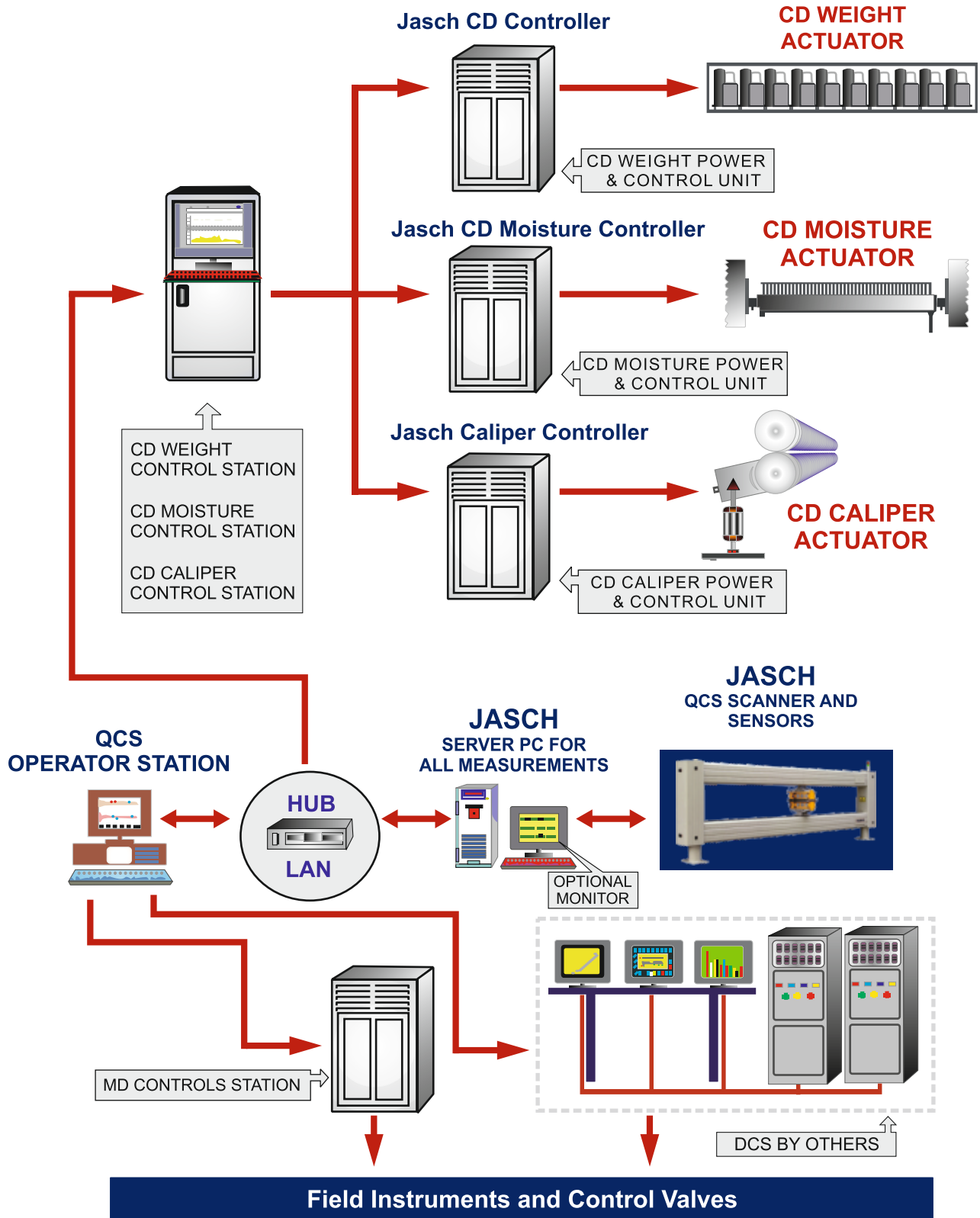
CONTROLS

- ★ Decoupled control of Basis Weight, Moisture and Ash
- ★ Dead time (transport lag) compensation through Smith Compensator
- ★ Feed forward compensation from consistency transmitters
- ★ Dryer shut down in case of paper break
- ★ Steam optimization
- ★ Jet/Wire Ratio Control
- ★ Auto Grade change
- ★ CD Control or Basis Weight, Moisture and Caliper.





QCS MD & CD CONTROLS SYSTEMS SCHEMATIC



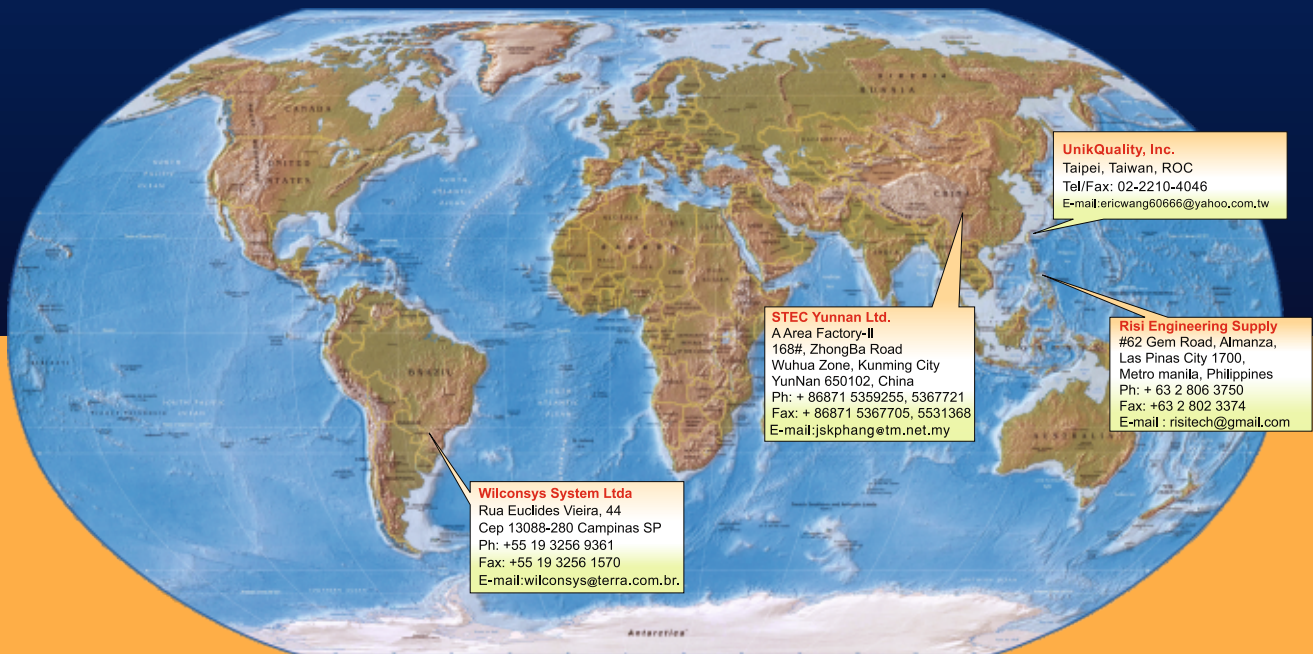
JASCH develops and builds online measurement and control systems for paper, plastic film, metal strip, aluminum foil and metal coatings. We are a leading supplier for these products with more than 350 installations worldwide and will continue to extend that lead by delivering compelling business solutions, business focused hardware and software products, robust service and support and above all cost effective solutions.

For paper industry, our QCS systems are widely used to measure and control basic quality parameters of paper like **Basis Weight, Moisture, Ash and caliper**. We are striving hard to offer technically advanced & almost competitive products to become one of the major suppliers of QCS in the world.

Mission Statement : Quest for constant quality improvement leading to excellence.

Customers : We Exist and Excel due to our customers and they are our marketing front. Repeat confidence in terms of their order/recommendations is our marketing success.

Global Presence : Our Sales/Service Network



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