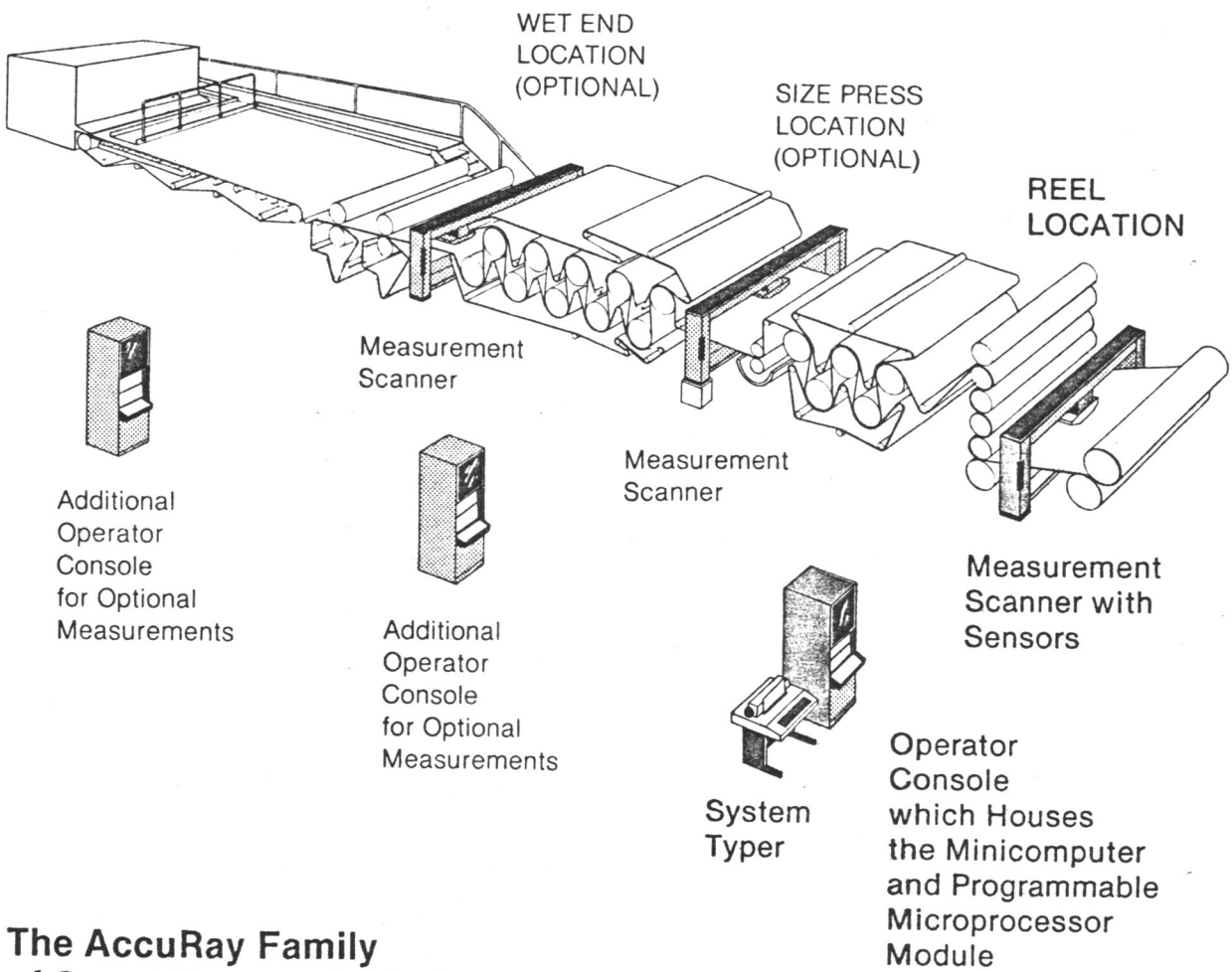
AccuRay® 1180 MICRO for Papermaking Process

Control Features Available with AccuRay 1180 MICRO

1 Digital Weight and Moisture Control
2 Scan Independent Control
3 Model Reference Control
4 Adaptive Gain Control
5 Dry Stock Flow Control
6 Auto Target Management
7 Digital Headbox Control
8 Speed Optimization Control
9 Automatic Grade Change Control
10 Coordinated Speed Change
11 Ash Control
12 Opacity Control
13 Refiner Control



The AccuRay Family of Smart Sensors Include:

1 Basis Weight Sensor
2 Moisture Sensor
3 Ash Sensor
4 Caliper Sensor
5 Opacity Sensor

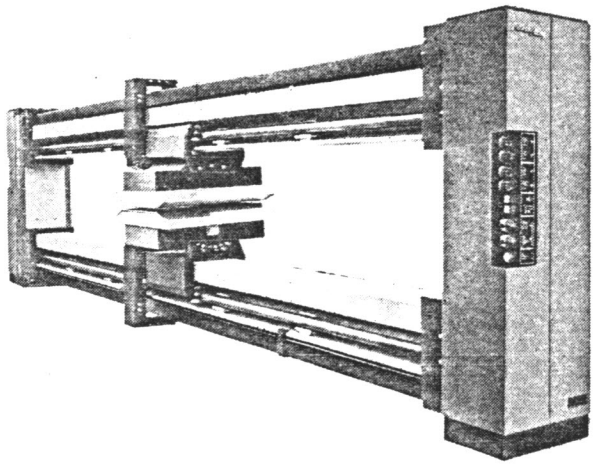
AccuRay®

3100

Precision Multisensor Scanner

GENERAL DESCRIPTION

The modular design provides in-line measurement of multiple process variables including weight, moisture, caliper, opacity, and ash. The scanner is capable of single point or scanning measurements. Heavy-duty steel construction, precision machined keyways and dowel pins, and patented automatic standardization of the tensed tubes ensure accurate alignment of the scanner and sensors during operation. Individual sensors can be removed easily for off-machine servicing.



FEATURES

Solid-state drive system is insensitive to variations in load, line voltage, and ambient temperature.

Extensive self-diagnostics are provided for frame drive, control, and sensors.

Permanent alignment of sensor package is built-in.

Sensor package is retractable into off-sheet position.

High-speed emergency withdrawals are initiated manually or automatically.

Serial data link to the Programmable Microcomputer Module.

Sensor package cable is contained within the I-beam construction.

All surfaces are primed and painted with polyurethane-base paint for corrosion resistance.

Thermal articulation subsystem maintains tube alignment during ambient temperature variations.

SPECIFICATIONS

Scan speed is adjustable up to 0.3 m/s (12.5 in./sec.).

Fits sheet trim widths of up to 10.7 m (420 in.).

51-mm (2-in.) diameter stainless steel tubes, tensed for straightness, support and guide sensor packages.

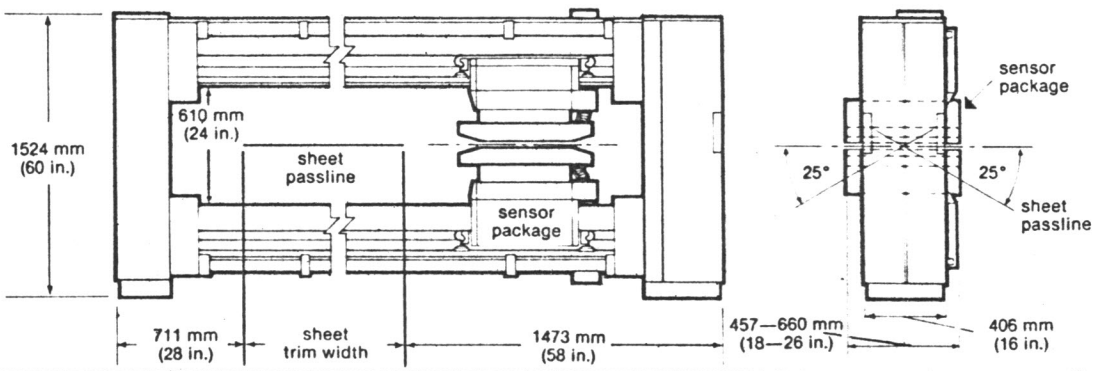
Scanner can carry 136-kg (300-lb.) sensor package across the web.

Sheet passlines beyond 25° from horizontal are available, but require change of vertical dimension.

Sensor positioning is reproducible to within 6 mm (0.25 in.).

Steel I-beams: 254 x 254 mm (10 x 10 in.).

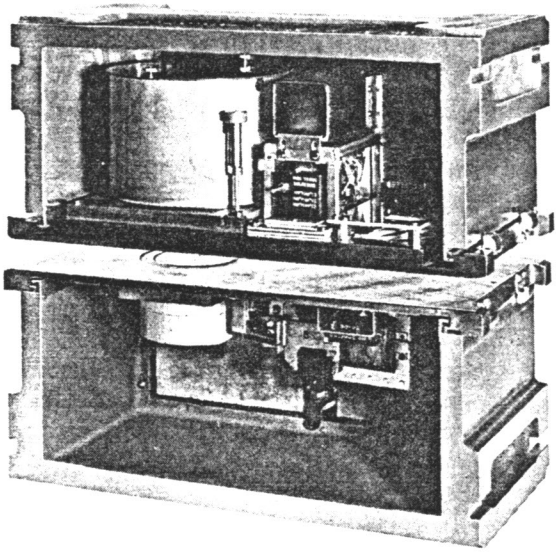
Weight: 680 kg (1500 lbs.) plus 56.7 kg (125 lbs.) per meter.



AccuRay®

3110 / 3111

MicroTec Basis Weight Sensor



GENERAL DESCRIPTION

Provides precise measurements of basis weight for products ranging from tissue to heavy board. Sensor configuration includes a source to strictly control the emission of beta particles and an ionization chamber of proprietary design to efficiently detect the radiation.

Various geometries are available for optimizing resolution, signal-to-noise ratio, deflection characteristics, and product weight range.

Several system features are incorporated to enhance the accuracy of the basis weight measurement:

BI-DIRECTIONAL FRAME STANDARDIZATION: Continuous basis weight measurement accuracy requires precise frame alignment. Frame standardization can be implemented easily by the operator from the operator station. To correct for any misalignment in either scanning direction, the system stores composite air profile information for the forward and reverse scans independently, and uses whichever correction is appropriate depending on the scanning direction. This ensures ongoing measurement accuracy with minimum frame maintenance.

SOURCE DECAY MODEL: The inherent nature of radioisotope sources is that their strength decays with time. In the case of Krypton 85, if left uncompensated, an error of approximately 1% per month occurs in the basis weight measurement.

The basis weight sensor signal processing incorporates a source decay model that accurately calculates the current source strength at any point in the system's life. This insures continued measurement accuracy over the life of the sensor.

DIRECT DIRT MEASUREMENT: Because of the source decay model and inherent stability of the digital signal processing, the only remaining variable that contributes to loss of basis weight sensor signal is buildup of process "dirt" on the sensor. Thus, it is possible for the basis weight sensor to measure the weight of dirt buildup directly. This direct dirt measurement capability allows the system to deal with dirt weights which are as much as five times the process weight -- more than 20 times the typical capability of conventional systems.

SPECIFICATIONS

TLK-5 (Model 3110)

Source of beta radiation is 500 mCi of encapsulated Kr_{85}.

Air gap: 13 mm (0.5 in.).

Measurement range: 8 to 1050 g/m^2 (5 to 645 lbs./3000 ft.^{2}).

Accuracy: ± 0.1% of weight output (or 0.15 g/m^2, whichever is greater), typical average deviation between sensor reading and scale weight of samples.

Optional model (TLK-5L) has special air gap conditioning blowers with heated air to maintain gap temperature within ± 2° C (± 3° F.).

Typically measures basis weight shifts as small as 0.05%.

Weight change of 13-mm (0.5-in.) column of air due to temperature variation is 0.005 mg/cm^2 per °C (0.003 mg/cm^2 per °F.). Heaters set to maintain measuring heads at maximum ambient temperature compensate for this. The heating plus the thermal mass of the heads stabilize the air gap temperature.

TLS-1 (Model 3111)

Source of beta radiation is 70 mCi of encapsulated Sr_{90}.

Air gap: 38 mm (1.5 in.).

Measurement range: 73 to 5859 g/m^2 (15 to 1200 lbs./1000 ft.^{2}).

Accuracy: ± 0.1% of weight output (or 0.15 g/m^2, whichever is greater), typical average deviation between sensor reading and scale weight of samples.

Typically measures basis weight shifts as small as 0.05%.

Weight change of 38-mm (1.5-in.) column of air due to temperature variation is 0.016 mg/cm^2 per °C (0.009 mg/cm^2 °F.). Heaters set to maintain measuring heads at maximum ambient temperature compensate for this. The heating plus the thermal mass of the heads stabilizes the air gap temperature.

FEATURES

Ionization chamber has unlimited count-rate capability.

Design and tuning compensates for sheet flutter.

Insensitive to moisture content because sensor provides radiation-absorption measurement of total basis weight. Absorption coefficient is identical for fiber and moisture.

Effect of ash content variations is insignificant for single grade of paper or board.

Linear response and sensor stability permit pre-installation permanent factory calibration with minimum need for on-machine dynamic correlation.

Calibration transfer in the field between sensor heads and their replacements is typically accomplished without the need for additional field calibration.

Signal processing is carried out entirely in the system's microcomputer permitting measurement over the entire process range without range switching being required by the operator.

Automatic standardization and direct dirt measurement eliminate measurement effects of contaminants on sensor heads. Video alarm messages indicate failure to standardize.

Self-diagnostics are run during each standardization and the results are stored in system memory. In the event of "failure to standardize", results of these diagnostics are detailed in hard copy form for easy diagnosis of the sensor problem.

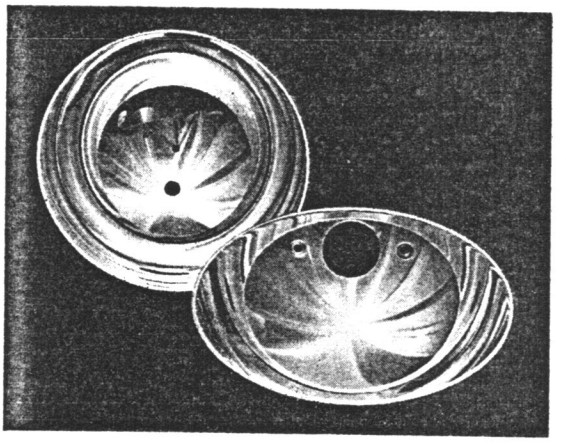
Presentation of basis weight data available to operating personnel at the push of a button.

Standard check samples allow quick verification of sensor performance.

AccuRay®

3120

MicroTec Moisture Sensor



GENERAL DESCRIPTION

Specularly reflecting partial spheres are located above and below the paper sheet to reflect and concentrate infrared energy at one spot. This focused optics configuration controls the effect of the paper scattering coefficient changes because it captures all of the usable infrared energy for the measurement. The technique of focused optics provides a moisture measurement that is relatively insensitive to the paper composition or basis weight.

SPECIFICATIONS

Measurement range: Recycled, non-deinked paper — 0-10% moisture, 9-250 g/m² basis weight. Non-recycled paper — 0-20% moisture, 9-500 g/m² basis weight.

Accuracy: ±0.1% moisture (or 1% of the moisture output, whichever is greater), typical average deviation between sensor reading and oven dry gravimetric measurement of samples.

Sensor operates accurately in ambient temperatures up to 107° C (225° F.).

FEATURES

A single lead sulfide detector senses both the reference and absorption wavelengths, totally eliminating errors due to ambient temperature fluctuations.

Linear response and sensor stability permit pre-installation permanent factory calibration with minimum need for on-machine dynamic correlation.

Calibration transfer in the field between sensor heads and their replacements is typically accomplished without the need for additional field calibration.

Signal processing is carried out entirely in the system's microcomputer permitting accurate measurement over the entire process range.

Automatic standardization eliminates measurement effects of contaminants on sensor heads. Video alarm messages indicate failure to standardize.

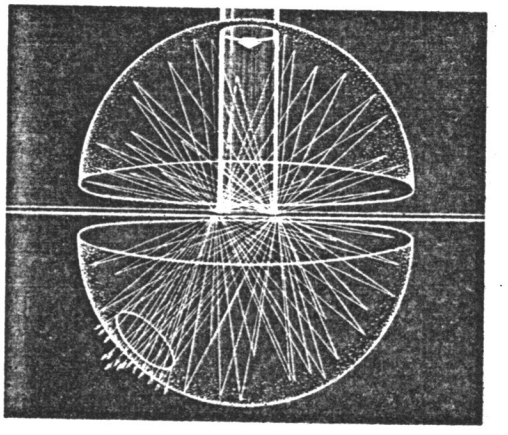
Self-diagnostics are run during each standardization and the results are stored in system memory. In the event of "failure to standardize", results of these diagnostics are detailed in hard copy form for easy diagnosis.

Presentation of moisture data is available to operating personnel at the push of a button.

Standard check samples allow quick verification of sensor performance.

Optical common mode rejection eliminates sheet flutter disturbances.

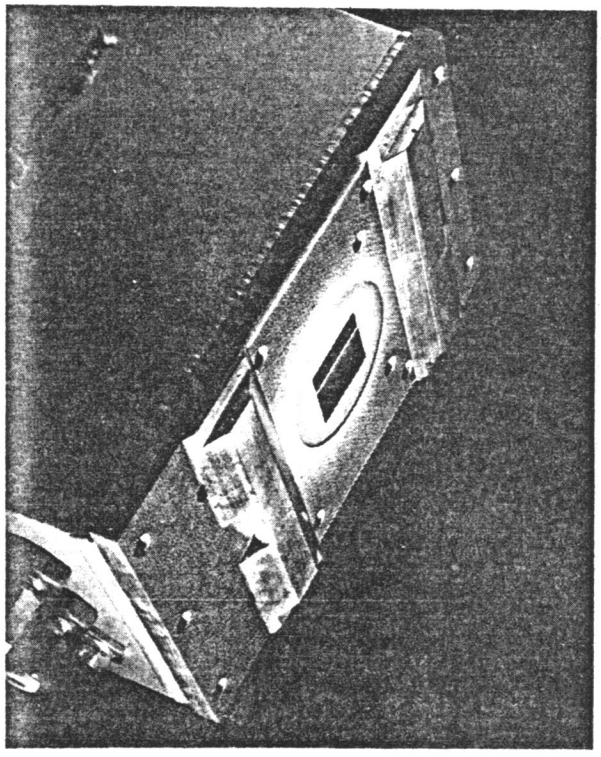
Sensor measures same section of paper in both wavelengths because of its rapid processing capability.



Two hemispherical, mirrored surfaces collect and focus all of the infrared energy at one spot. This ensures a maximum number of passes through the sheet with a minimum of energy loss.

3121

AccuRay® MicroTec Reflection Moisture Sensor



GENERAL DESCRIPTION

This sensor is designed to measure a wide range of moisture levels in the sheet. Because of its compact size and excellent performance specifications, the reflection sensor is well-suited for operations at machine locations where space is not adequate for sensors requiring two heads (transmission types). The wet press and size press are ideal locations on the paper machine for this measurement sensor.

The complete sensor is contained in one unit head package which can be mounted either above or below the sheet passline. The measurement window is divided into two sections. A source of infrared radiation is beamed at the sheet from one side, reflected back through the sensor window, and collected in a mirrored funnel which directs it into the detector on the adjacent side.

FEATURES

Linear response and sensor stability permit pre-installation permanent factory calibration with minimum need for on-machine dynamic correlation.

Calibration transfer in the field between sensor heads and their replacements is typically accomplished without the need for additional field calibration.

Signal processing is carried out entirely in the system's microcomputer permitting accurate measurement over the entire process range.

Automatic standardization eliminates measurement effects of contaminants on sensor heads. Video alarm messages indicate failure to standardize.

Self-diagnostics are run during each standardization and the results are stored in system memory. In the event of "failure to standardize", results of these diagnostics are detailed in hard copy form for easy diagnosis.

Presentation of moisture data is available to operating personnel at the push of a button.

Standard check samples allow quick verification of sensor performance.

SPECIFICATIONS

Measurement range: 0 to 65% moisture.

Basis weight range: 50 to 500 g/m^2.

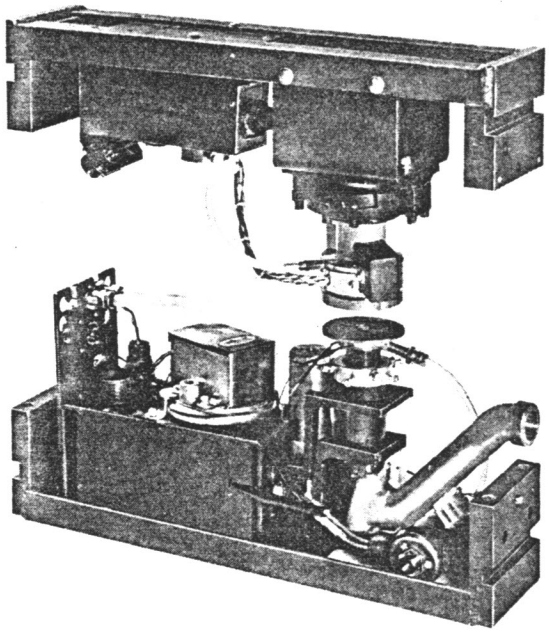
Accuracy: typically ±0.25% moisture or 2.5% of moisture reading, whichever is greater.

Sensor operates accurately in ambient temperatures up to 105° C (220° F.).

AccuRay®

3130

MicroTec Caliper Sensor



GENERAL DESCRIPTION

Provides on-machine caliper measurement of paper or board using magnetic reluctance sensor design which contacts only one side of the sheet. Eliminates "pinching" which can cause sheet breaks.

The magnetic reluctance principle of measurement involves detection of a signal based on variations in sheet thickness. The variations change the distance between magnetic components which, in turn, changes magnetic reluctance.

The sensor can detect small changes in caliper. Typically, it senses shifts of 0.05 mil in sheet thickness. And it is insensitive to sheet porosity, flutter, or electrostatic charge.

Presentation of caliper data is under fingertip control of the operator and available through several system outputs such as digital displays, video displays, plotter-charted profiles, and hard copy reports. The sensor is standardized automatically. A lighted alarm indicates failure to standardize.

FEATURES

Reference plate utilizes venturi induced partial vacuum to hold down moving web.

Measuring head floats on precisely controlled air bearing above sheet surface.

Linear response and sensor stability permit 2-constant calibration.

Insensitive to sheet porosity, flutter, or electrostatic charge.

Signal processing is carried out entirely in the system microcomputer permitting measurement over the entire process range without range switching being required by the operator.

Automatic standardization eliminates measurement effects of contaminants on sensor heads. Video alarm messages indicate failure to standardize.

Self diagnostics are run during each standardization and the results are stored in system memory. In the event of "failure to standardize", results of these diagnostics are output in hard copy for easy diagnosis of the sensor problem.

SPECIFICATIONS

Application range of 50 to 2000 microns (2 to 80 mils) sheet thickness.

Accuracy (average deviation between gauge scan average and lab caliper average), typical:
± 2.5 microns up to 500 microns (± 0.1 mil up to 20 mils)
± 0.5% above 500 microns (20 mils)

Negligible sensitivity to web speeds up to 1219.2 m/min. (4000 f/min.).

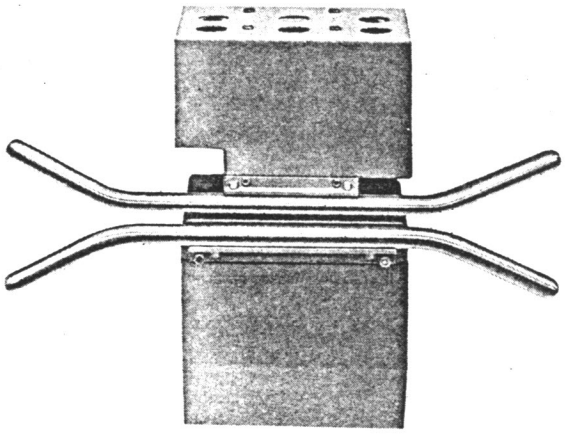
Meets TAPPI standard 411.

Air requirements:
Quantity: 0.34 m^3/min. (12 CFM)
Pressure: 5.6 kg/cm^2 (80 PSI)

AccuRay®

3140

MicroTec Opacity Sensor



GENERAL DESCRIPTION

Provides accurate, on-machine determination of opacity for fine and coated papers, using a patented optical transmission sensor. The light transmission principle employed involves detection of a signal based on variations in sheet opacity which change the level of light seen by the proprietary patented detector. Design of the sensor allows measurement to TAPPI opacity standard independent of composition and brightness effects, overcoming deficiencies in other light transmission type sensors.

SPECIFICATIONS

Designed to meet or exceed TAPPI Standard T425m-60.

Accuracy: ± 0.2 opacity points, average deviation between gauge scan average and lab opacity average (typical).

Measurement range: 75 to 100 opacity points.

Repeatability: 0.05 opacity points.

FEATURES

Insensitive to within reel changes in brightness; also insensitive to ambient light, sheet flutter, and electrostatic charge.

Detector head lightly contacts sheet using venturi-induced partial vacuum. Stabilizes moving web and eliminates effects of sheet flutter.

Linear response and sensor stability permit pre-installation permanent factory calibration with minimum need for on-machine dynamic correlation.

Calibration transfer in the field between defective sensor heads and their replacements is typically accomplished without the need for additional field calibration.

Standard check samples allow quick verification of sensor performance.

Signal processing is carried out entirely in the system's microcomputer permitting measurement over the entire process range without range switching being required by the operator.

Automatic standardization eliminates measurement effects of contaminants on sensor heads. Video alarm messages indicate failure to standardize.

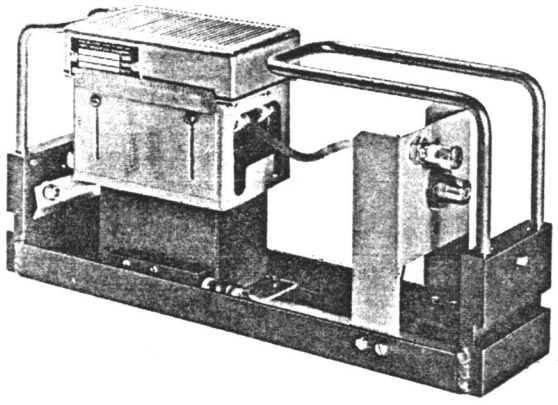
Self-diagnostics are run during each standardization and the results are stored in system memory. In the event of "failure to standardize", results of these diagnostics are output in hard copy for easy diagnosis of the sensor problem.

Presentation of opacity data available to operating personnel at the push of a button.

AccuRay®

3122

MicroTec RFM Moisture Sensor



GENERAL DESCRIPTION

Undistorted on-machine measurement of sheet moisture is provided by the RFM sensor by using one of three selectable radio frequencies to make an admittance measurement. The sensor, extremely sensitive to moisture content, is available in a variety of probe designs. A specific design, along with the proper frequencies, is chosen for optimum measurements in each application. Compensation for variations in sheet temperature is provided by an infrared sensor specially engineered for that purpose.

The RFM probe output is processed in the AccuRay Programmable Microcomputer Module to provide a linear signal proportional to moisture. The final slope and offset are grade code selected coefficients. Since the algorithm provides a mathematical relationship, in digital format, between the probe output and the process moisture, the measurement range is not limited by sensor span setup (typical of analog systems) or linear segment extremes (typical of less powerful computer system approximation techniques). The RFM sensor accurately measures moisture content in products ranging from fine papers to board applications.

FEATURES

Linear response and sensor stability permit pre-installation permanent factory calibration with minimum need for on-machine dynamic correlation.

Calibration transfer in the field between defective sensor heads and their replacements is typically accomplished without the need for additional field calibration.

Signal processing is carried out entirely in the system's microcomputer permitting measurement over the entire process range without range switching being required by the operator.

Automatic standardization eliminates measurement effects of contaminants on sensor heads. Video alarm messages indicate failure to standardize.

Self-diagnostics are run during each standardization and the results are stored in system memory. In the event of "failure to standardize", results of these diagnostics are detailed in hard copy form for easy diagnosis of the sensor problem.

Presentation of moisture data available to operating personnel at the push of a button.

SPECIFICATIONS

Measurement range: 0.5% to 50% moisture.

Accuracy: ±0.1% moisture (or 1% of the moisture output, whichever is greater), typical average deviation between sensor reading and oven-dry gravimetric measurement of samples.

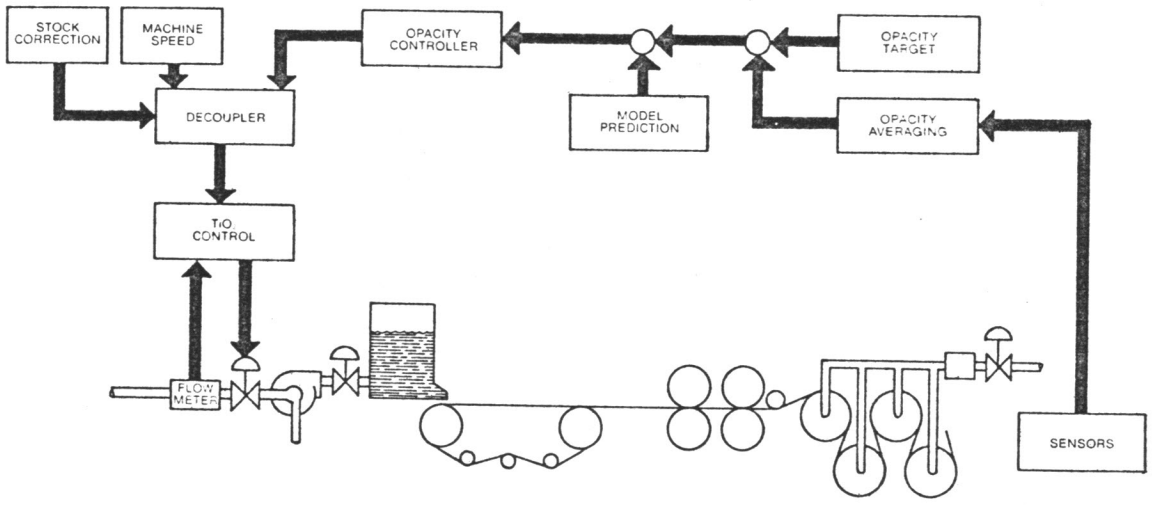
Sheet temperature compensation measurements can be made for temperatures up to 149° C (300° F.).

Effect of ash content variations is insignificant for single grade paper or board.

Effect of weight variations insignificant within grade run; grade to grade weight variations automatically normalized by product range entry.

AccuRay®

3450
Opacity Control

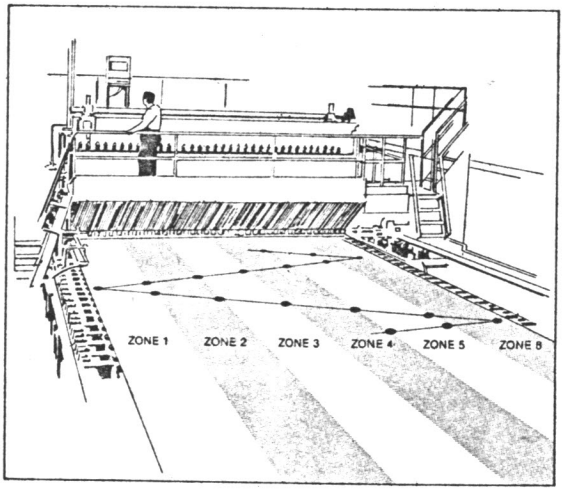


GENERAL DESCRIPTION

Based upon feedback from the measurement sensor, adjustments are made to titanium dioxide flow to control opacity. Opacity Control is optimized through four important features. Together they provide greater product uniformity while product quality stays closer to specified targets.

SCAN INDEPENDENT CONTROL Allows control actions to occur as often as every 15 seconds, independent of scan speed. As the sensor scans the sheet, actual opacity values are compared with targets at the boundary of each of up to six scanning zones established for the sheet. Control corrections are then based on the most recent data collected in each zone.

PREDICTIVE MODEL REFERENCE CONTROL A reference model for Opacity Control operates in parallel with the actual process. The model predicts the error based on process values at the point of measurement and process corrections that have been made but have not yet reached the sensors. This procedure adjusts for the time lag and other process dynamics which occur between the time when a titanium dioxide flow correction is made and when it is fully completed.



Scan Independent Control reduces high frequency machine direction variations with control actions as often as every 15 seconds while maintaining machine-matched scan speeds.

ADAPTIVE GAIN CONTROL The small process offsets associated with control deadbands are effectively eliminated with this feature. It ensures the process is always being controlled at the setpoint, so that maximum allowable target shifts can be made.

NON-INTERACTIVE CONTROL Titanium dioxide corrections are fully decoupled and compensated for changes in stock flow and machine speed. The true process error is calculated by means of decoupling logic which considers both the measured process values as well as the error that occurs when stock or machine speed is changed.

FEATURES

Scan Independent Control provides faster response to process upsets.

Stock and titanium dioxide corrections are non-interacting.

Predictive Model Reference Control automatically compensates for process dynamics.

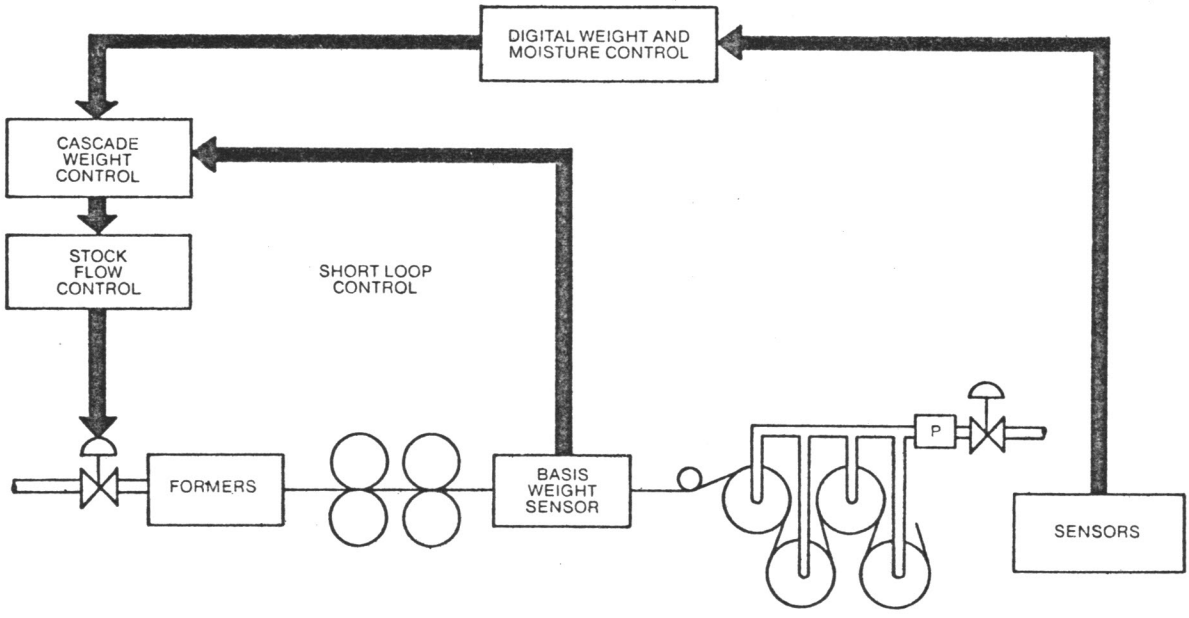
Adaptive Gain Control eliminates control deadbands.

Built-in safety features check for excess errors and correction, inhibit control outputs, and alert operator to out-of-limit conditions.

Opacity Control outputs operate in direct digital or supervisory setpoint modes.

AccuRay®

Cascade Weight Control



GENERAL DESCRIPTION

The combination of Short Loop Control with AccuRay Digital Weight and Moisture Control forms Cascade Weight Control. Based on a wet press measurement of basis weight, Short Loop Control responds very quickly to machine direction variations close to their source. On machines with very long wet end to reel time lags, Short Loop Control at the wet press provides closer control to target a higher percentage of the time.

SHORT LOOP CONTROL The stock control to wet press time lag is much less than the stock control to reel time lag, especially on multiformer machines. The Short Loop Control detects deviations from target close to their source and outputs a feedback control to stock flow. Therefore, corrections are made much sooner in the process than would have been possible without Short Loop Control.

Scan Independent Control and Adaptive Gain Control are incorporated in Cascade Weight Control to provide faster response to weight upsets and to eliminate control deadbands.

FEATURES

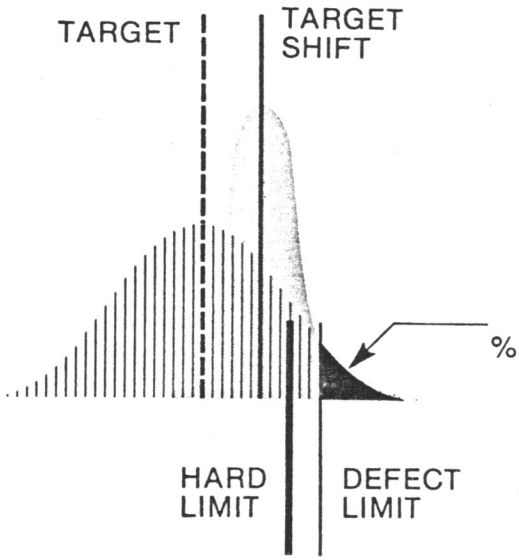
Short Loop Control insures fast reaction to basis weight variations, especially upsets.

Adaptive Gain Control eliminates control deadband.

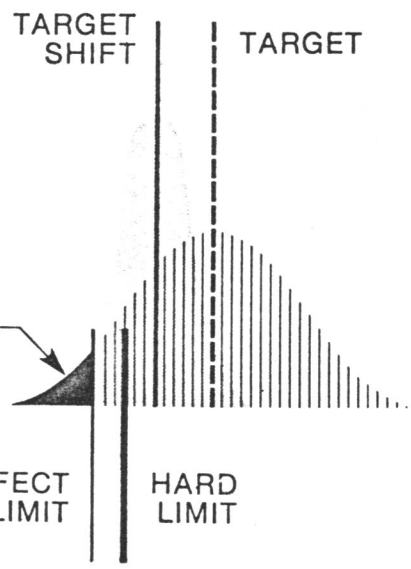
Scan Independent Control combined with optimum scan speed provides faster response to process upsets.

AccuRay® Automatic Target Management

MAXIMIZE TARGET



MINIMIZE TARGET



TARGET % DEFECTIVE

GENERAL DESCRIPTION:

Automatic Target Management (ATM) adjusts key product control targets to ensure maximum production yield while protecting quality from process upsets. Each target shift is based upon a statistical analysis of machine performance with 95% confidence level. Limits are preset by mill management and customized to the mill's grade structure.

ATM continually collects data from the system's measurement sensors. Product variance and statistical confidence levels are computed based on actual rather than theoretical bell-shaped distribution curves. A proprietary data collection method is employed to determine product variance and high and low frequency variations. Any variation (e.g., profile, high frequency, low frequency, machine direction) is accounted for and factored into the computerized target selection. Targets are then automatically shifted according to the magnitude of variability, allowing only an acceptable fraction of production to exceed programmed weight, moisture, ash, or opacity limits. In the event of process upset, the target is quickly shifted to a safe value.

Frequency of shift depends upon machine variations. A shift toward limit occurs after collection of statistically -valid measurement data and upon computation of product variance and statistical-confidence level. A shift away from limit occurs immediately after process upset. Unlike techniques using data from only a single scan, the ATM statistical technique prevents target "hunting".

Size of shift is dependent upon the adaptive gain algorithm. Limits are individually stored in the computer by customer grade for upper and lower targets, and for percent of product defective.

ATM is available for control of these product variables:

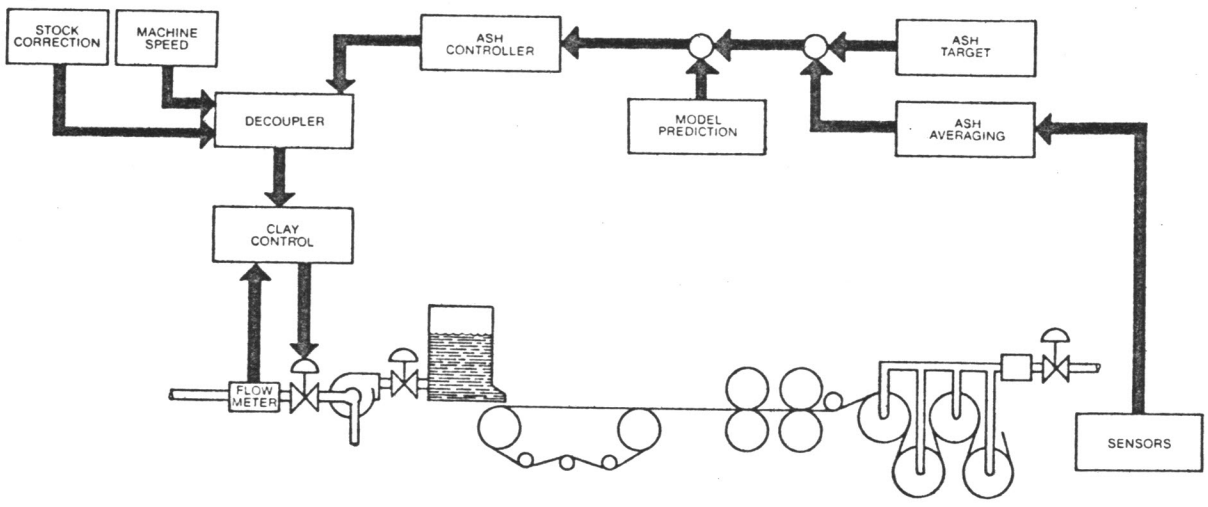
Model 3455 — Basis Weight ATM

Model 3456 — Moisture ATM

Model 3457 — Ash ATM

Model 3458 — Opacity ATM

Ash Control

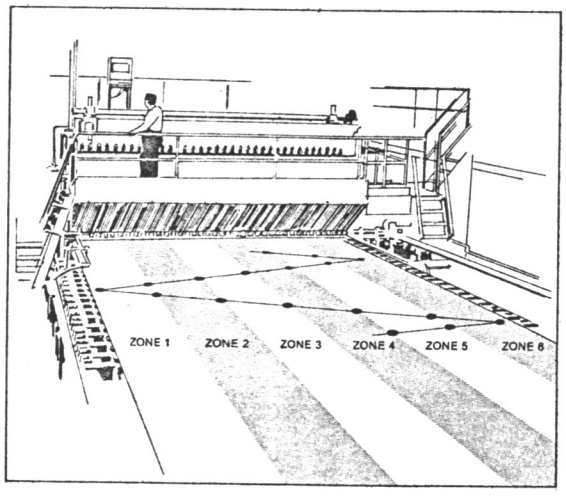


GENERAL DESCRIPTION

Based upon feedback from the measurement sensor, adjustments are made to the paper machine's clay flow to control ash content. Ash control is optimized through four important features. Together they provide greater product uniformity while product quality stays closer to specified targets.

SCAN INDEPENDENT CONTROL Allows control actions to occur as often as every 15 seconds, independent of scan speed. As the sensor scans the sheet, actual ash values are compared with targets at the boundary of each of up to six scanning zones established for the sheet. Control corrections are then based on the most recent data collected in each zone.

PREDICTIVE MODEL REFERENCE CONTROL A reference model for Ash Control operates in parallel with the actual process. The model predicts the error based on process values at the point of measurement and process corrections that have been made but have not yet reached the sensors. This procedure adjusts for the time lag and other process dynamics which occur between the time when a clay flow correction is made and when it is fully completed.



Scan Independent Control reduces high frequency machine direction variations with control actions as often as every 15 seconds while maintaining machine-matched scan speeds.

ADAPTIVE GAIN CONTROL The small process offsets associated with control deadbands are effectively eliminated with this feature. It ensures the process is always being controlled at the setpoint, so that maximum allowable target shifts can be made.

NON-INTERACTIVE CONTROL Clay corrections are fully decoupled and compensated for changes in stock flow and machine speed. The true process error is calculated by means of decoupling logic which considers both the measured process values as well as the error that occurs when stock or machine speed is changed.

FEATURES

Controls to actual ash weight or percent ash.

System accommodates clay base loading as a constant flow or flow ratio to the stock flow.

Scan Independent Control provides faster response to process upsets.

Clay and stock corrections are non-interacting.

Predictive Model Reference Control automatically compensates for process dynamics.

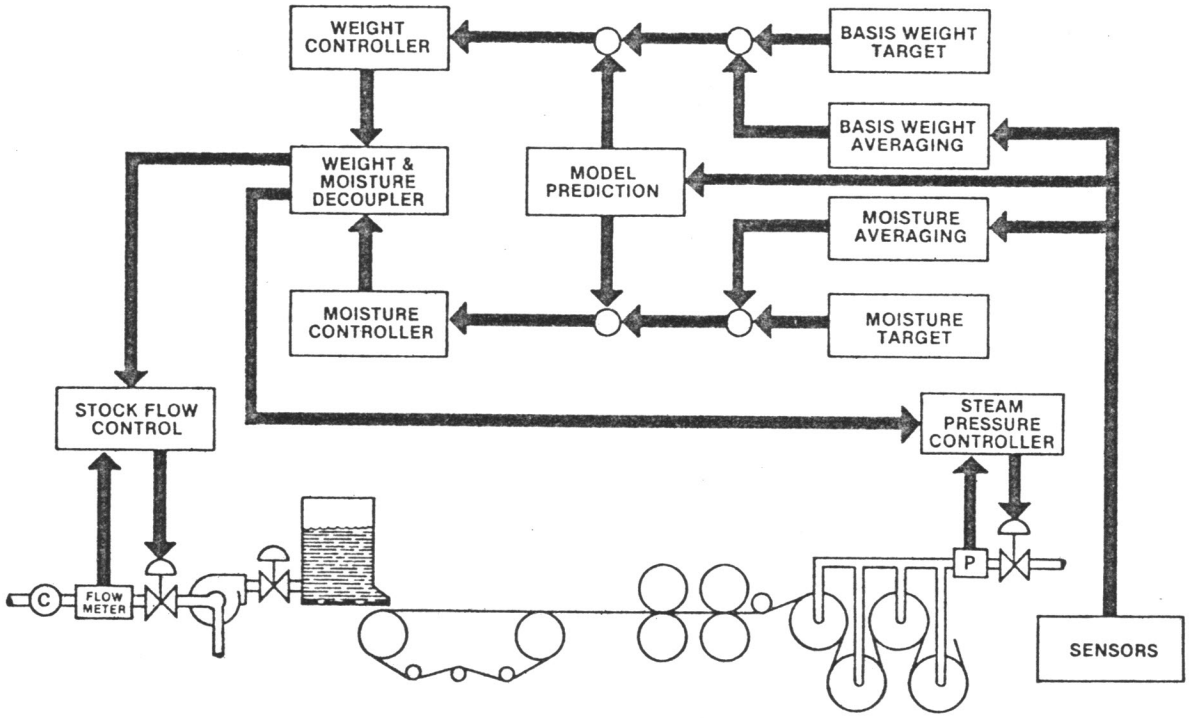
Adaptive Gain Control eliminates control deadbands.

Built-in safety features check for excess errors and correction, inhibit control outputs, and alert operator to out-of-limit conditions.

Ash control outputs operate in direct digital or supervisory setpoint modes.

AccuRay®

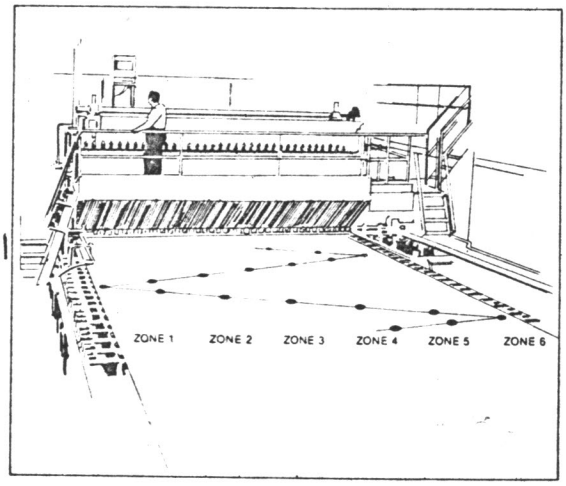
3400/3420 Digital Weight and Moisture Control



GENERAL DESCRIPTION

Based upon feedback from measurement sensors, adjustments are made to the paper machine's stock flow to control basis weight, and steam pressure to control moisture. Digital Weight and Moisture Control is optimized through four important features. Together they provide greater product uniformity while mill production stays closer to specified targets.

SCAN INDEPENDENT CONTROL — Allows control actions to occur as often as every 15 seconds, independent of scan speed. As the sensors scan the sheet, actual basis weight and moisture values are compared with targets at the boundary of each of up to six scanning zones established for the sheet. Control corrections are then based on the most recent data collected in each zone.



Scan Independent Control reduces high frequency machine direction variations with control actions as often as every 15 seconds while maintaining machine-matched scan speeds.

PREDICTIVE MODEL REFERENCE CONTROL
A reference model for Digital Weight and Moisture Control operates in parallel with the actual process. The model predicts the error based on process values at the point of measurement and process corrections that have been made but have not yet reached the sensors. This procedure adjusts for the time lag and other process dynamics which occur between the time when a stock flow or steam pressure correction is made and when it is fully completed.

ADAPTIVE GAIN CONTROL — The small process offsets associated with control deadbands are effectively eliminated with this feature. It ensures the process is always being controlled at the setpoint, so that maximum allowable target shifts can be made.

NONINTERACTIVE CONTROL — Although bone dry fiber, conditioned weight, or total basis weight target entries can be accommodated, the interactive nature of stock flow and steam pressure changes is overcome. The true process error is calculated by means of decoupling logic which considers both the measured process values as well as the error that occurs when stock or pressure are changed.

FEATURES

Scan Independent Control provides faster response to process upsets.

Weight and moisture corrections are non-interacting.

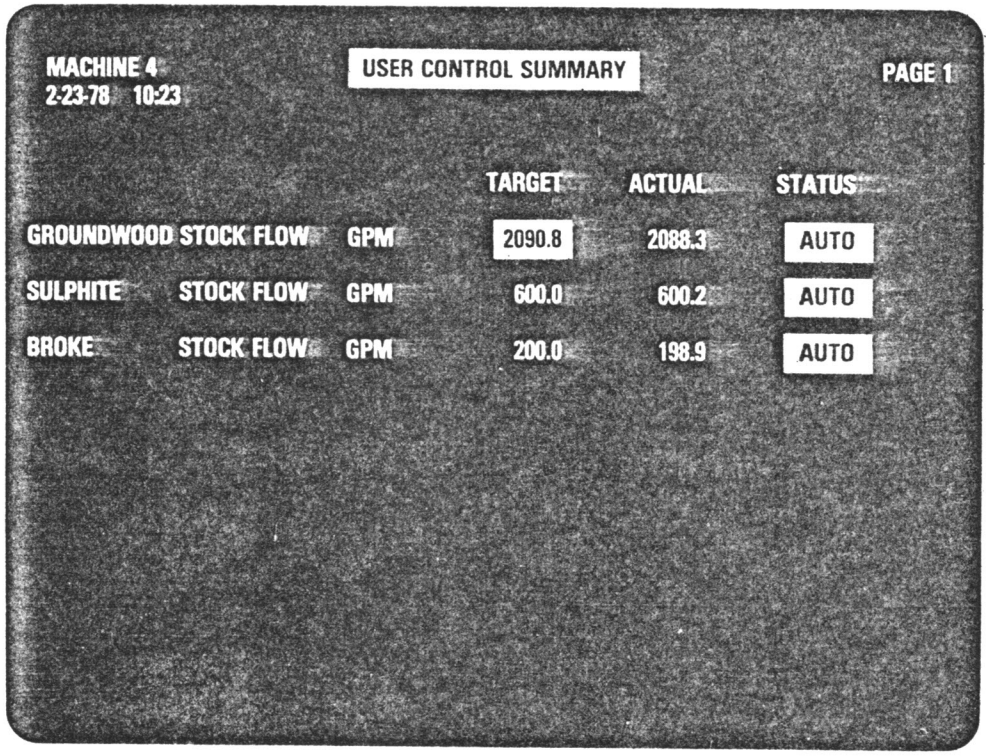
Predictive Model Reference Control automatically compensates for process dynamics, including actual machine speed changes, dryer time constants, product weight and moisture levels.

Adaptive Gain Control eliminates control deadbands.

Built-in safety features check for excess errors and correction, inhibit control outputs, and alert operator to out-of-limit conditions.

Weight and moisture control outputs operate in direct digital or supervisory setpoint modes.

User Control



GENERAL DESCRIPTION

The Program One User Control module is designed to allow mill personnel to take greater advantage of the computing power of the AccuRay 1180 MICRO system and of software modularity.

Each User Control module provides the capability to control three separate control loops. Additional User Control modules are available as options to provide control of more process loops.

The control loops that comprise the User Control module are independent of each other, as well as the other control programs in the AccuRay 1180 MICRO system. They are stored in that portion of the 1180 MICRO system reserved for use by mill personnel. The module is designed to take full advantage of the video light bar technique for data entries and the concept of user programmability in Program One (re: data sheet 3700).

The control loops are provided with the necessary process interface hardware to receive process inputs and to transmit control outputs. The user is then free to decide which process he wishes to control, to identify the control loop with whatever descriptive words he desires, and to tune the control for optimum performance. The user also may transfer the control loops from control of one process to another as the need arises. The video page shown is an example of how this module might be used by a mill.

FEATURES

Three independent control loops are featured per module.

All the necessary process interface hardware is provided.

Additional modules are available as options.

Target changes are performed with a video light bar.

The User Control summary video page may be modified by non-technical mill personnel using the "cookbook" approach of Program One (re: data sheet 3700).

Mill personnel select the process loops to be controlled and tune them.

SPECIFICATIONS

Process inputs may be 10-50 ma, 4-20 ma, 0-10 V, and local/remote status inputs.

Process outputs may be pulse train or on-time.

Control may be either DDC or supervisory setpoint control.