



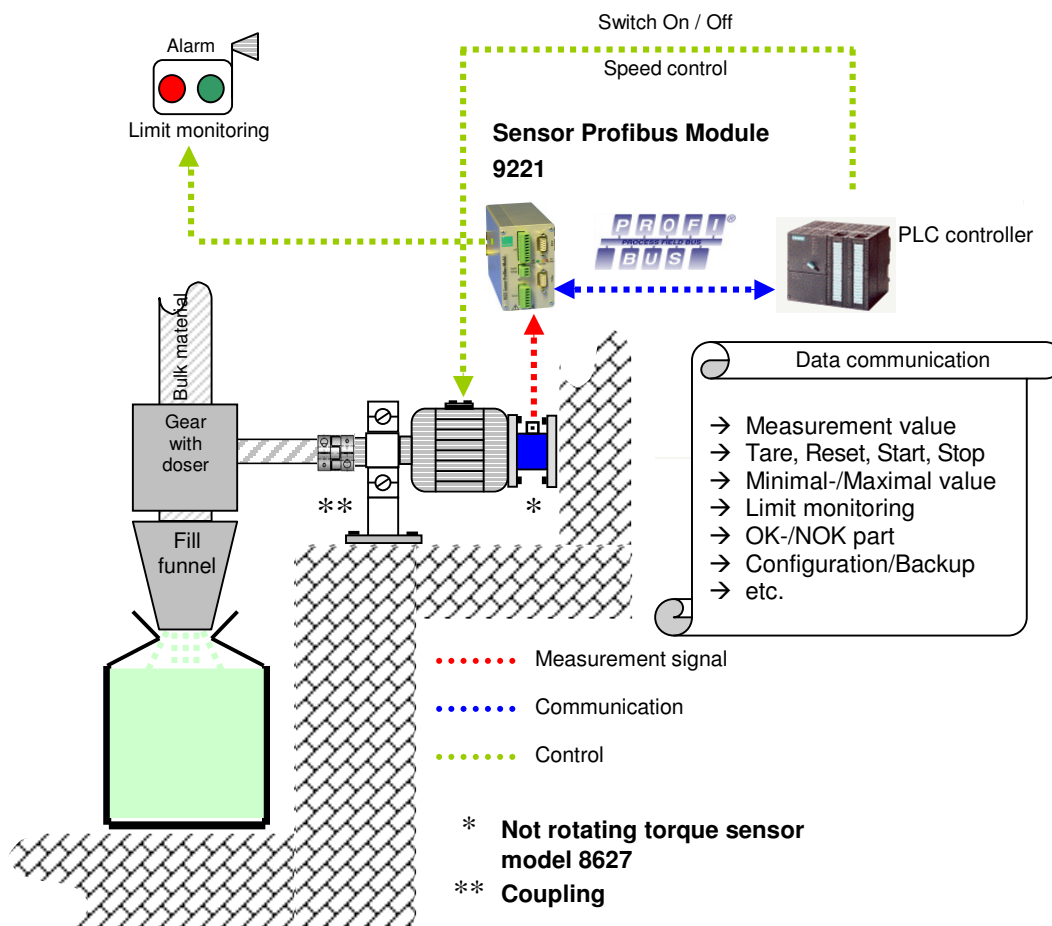
1. Torque measurement on a fill facility with monitoring and controlling system

Task

The torque working on a gear shall be acquired and controlled, and measurement values transferred to the recording via Profibus at a paramount PLC. This procedure is necessary in order to avoid a possible mechanism damage. Among others for security reasons the device setting parameters should be transferred via Profibus and stored before each shift beginning.

Specific Requirement

In order to guarantee real time qualities, the torque monitoring should be already done before the PLC evaluation takes place.



Solution

For the static torque recording, the torque sensor model 8627 was implemented. The apparent torque is observed by the Sensor Profibus Module 9221 with a sampling rate of 1000 measurements per second. Afterwards, these measurement values are stored by Master Profibus Participant. In order to protect the mechanism, once a limit is infringed, an alarm output is triggered. The protocol Profibus DPV1 enables easily, in case of possible data loss, to transfer the centrally stored configuration data over the Profibus interface.

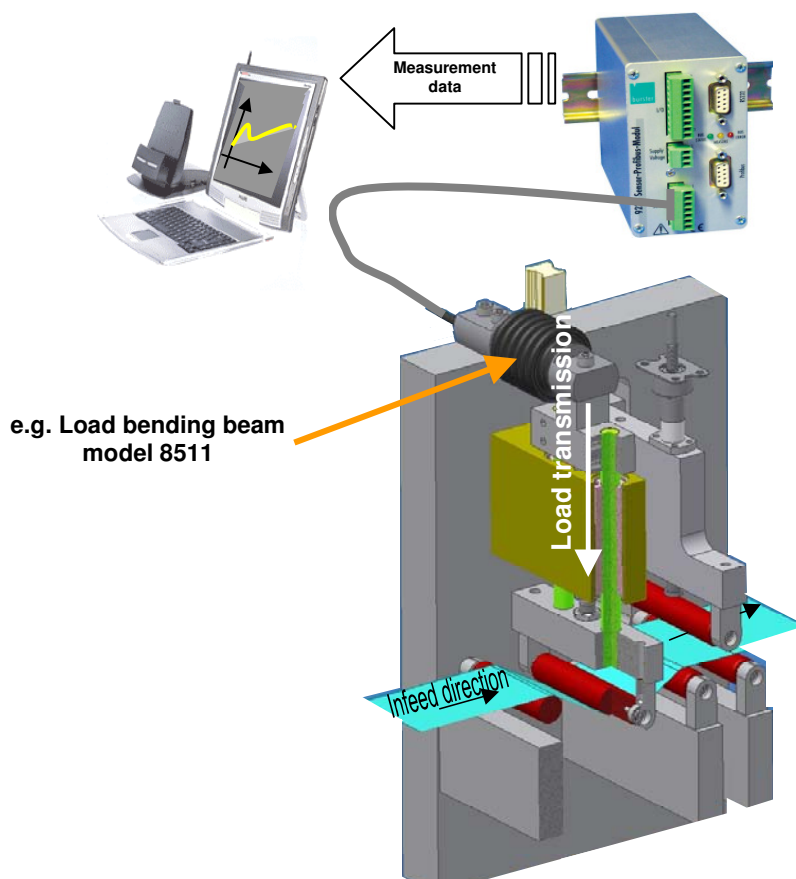
2. Tension measurement in paper manufacture processes

Task

Set-up of a measurement actuator for the monitoring and visualization of a conveyer line while loading paper. For the interactive visualization and the integration in an universal Fieldbus environment, the Siemens Soft PLC should be implemented with a Fieldbus card (Profibus DP). The visualization should comprise the entire measurement value progression and the top values (Max/Min).

Specific Requirement

No pleats or possible paper-rips can occur when rolling the paper. With recognition of a mistake, the drive must immediately be switched off in order to prevent possible impairments of the following production processes.



Solution

For the force recording the load bending beam model 8511 and for monitoring the Sensor Profibus Module 9221 is implemented. The bending beam with measuring range 10 N is used as a representation, however a simple adaptation is very advantageous and easily accommodated for this delicate paper quality monitoring. A complication-less binding into the existing Profibus control concept necessitates the use of our Sensor Profibus Module 9221. The easily integrated network with a selected baud rate up to 12 MBauds as well as shortest reaction times with MAX and MIN force infringement, (e.g. wrinkle effect through paper jam) predetermine the integration of this module.

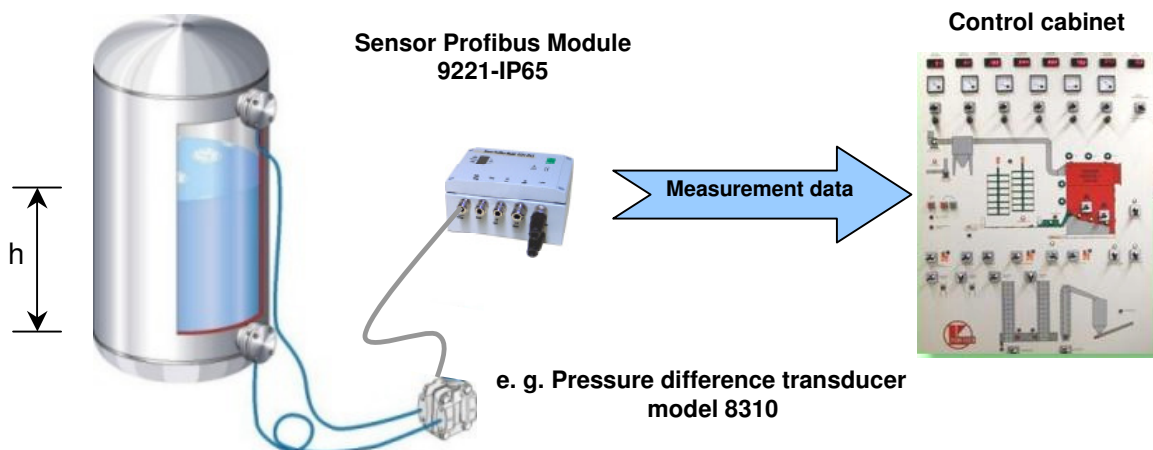
3. Fill level measuring and level monitoring

Task

Trust is good, control is better. Therefore the fill level control in a completed system should be realized with one 24 h level monitoring. This control is achieved when the measurement data should be transferred via Profibus with a transfer speed of 1,5 MBaud to a PC and stored.

Specific Requirement

Simplest installation work as well as a precise and durably reliable measurement values recording should be realized. It must be guaranteed that even in rough environment conditions the electronics are protected from exposure to water. Additionally, extensive diagnosis functionalities and long-range online-alterations should be supported with current control.



Calculation of fill level:

$$h = \Delta p / (\rho * g)$$

h = Fill level
 Δp = Pressure difference
 ρ = Density
 g = Acceleration of gravity

Solution

For the pressure recording a pressure difference transmitter model 8310 is used. It transfers the pressure difference signal 24 hours online to the waterproof Sensor Profibus Module 9221-IP65. The interface developed for highest precision claims records and monitors the measurement data accordingly. Afterwards the module transfers the measurement values obtained with a speed of 1,5 MBaud to the control cabinet with Profibus connection. The module supports the protocol Profibus DPV1, allowing central alterations to diagnosis criterion, which can be made during operation, both possible and easy. The adjusted calibration and configuration data (zero voltage protected) is deposited in an EEPROM, avoiding the need for reprogramming module, in the event of a power surge or disconnect.

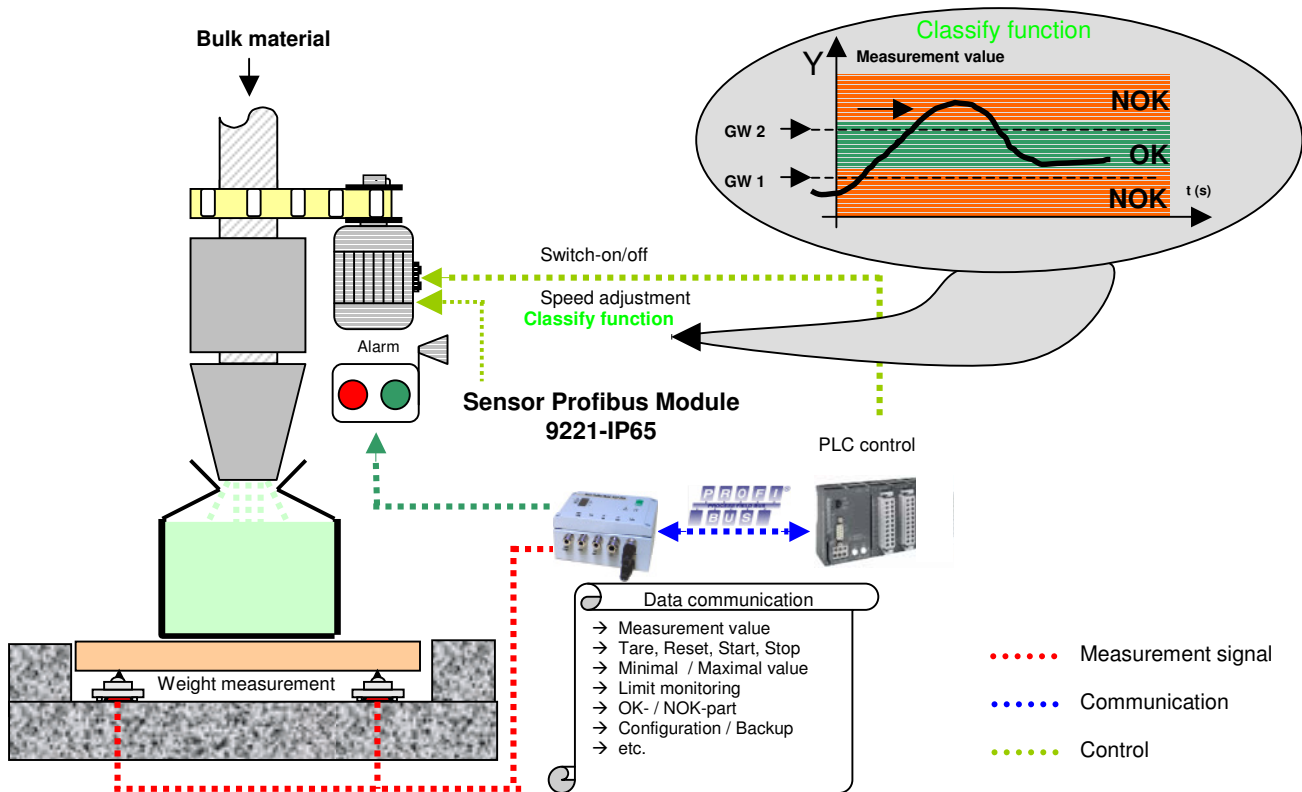
4. Weight measurement on a fill facility with monitoring and controlling system

Task

The total weight at a fill facility should be determined and with a stopping mechanism activated when the system's desired weight is achieved. The measurement values of the fill facility should be transferred with rank numbers and time to the paramount PLC Control (Step 7) in order to make possible further automation solutions.

Specific Requirement

With each new filling the dead weight of the receptacle should not be considered in the measurement of total weight. Thereby the tared value shall be accounted for with it in the background and also stored. The weight alterations shall be collected simultaneously through 4 parallel switched load cells and added and evaluated to a total weight.



Solution

Four parallel switched and standardized load cells are connected to the efficient Sensor Profibus Module 9221-IP65, which also acts as power supply. The load cells are protected from process related disturbances like side forces. The module classifies different fill stands and abides by the user definable switch thresholds GW1 and GW2 at the exits A1 / A2 / A3. The Sensor Profibus Module generates the necessary switch signals, accurately regulating the supply of the bulk material. Distance taring operations take place from the PLC unit to the module. The measurement data collected (e.g. total value, tared value and evaluation status) on the other hand are provided for the paramount PLC control for data logging.

5. Measurement of mechanical values at a completely automated motor vehicle test bed

Task

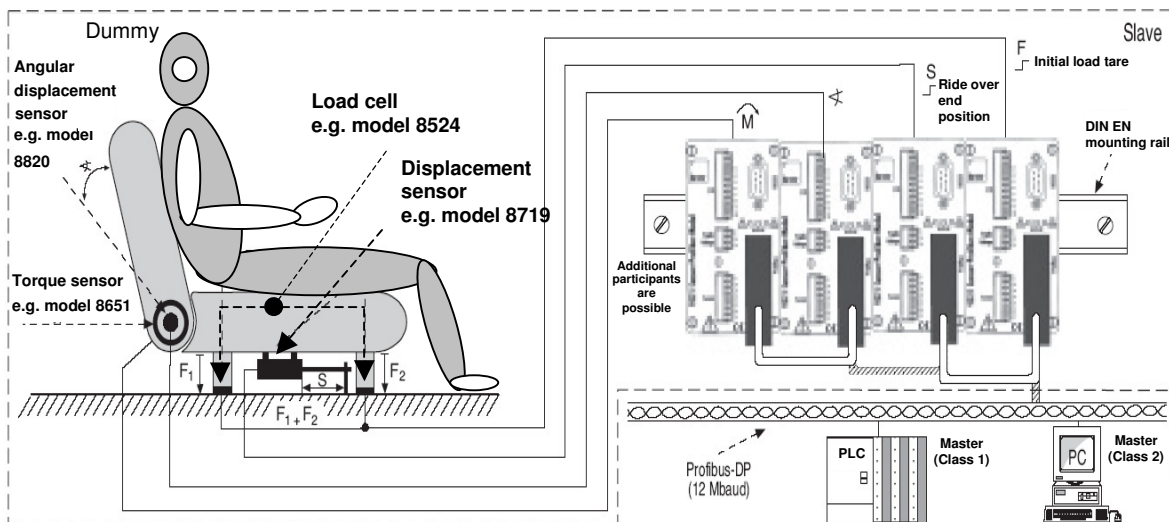
On a completely automated test bed motor vehicle seats should be checked for their encumbrance. The following features should be tested and recorded:

- Adjusting angle of the back
- Torque required for turning handle
- Total weight of the seat (with and without dummy)
- End position determination

In order to be able to make a well defined statement about the categorization of the motor vehicle seat, the measurement data must be recorded and networked and deposited together as test result on the Profibus level.

Specific Requirement

All test data should be transferred at the same time for storage, in order to obtain relevant samples of information for comparative logging of this test. A tare function is a consideration for mounted sensors addressing the issue concerning initial load (dummy load).



Solution

For the recording of all mechanical values following sensors are employed:

- | | | | |
|--------------------------------|---|-----------------------------|------------|
| • Adjusting angle of the back | → | angular displacement sensor | model 8820 |
| • Torque of the turning handle | → | torque sensor | model 8651 |
| • Total weight of the seat | → | 2 x load cell | model 8526 |
| • End position determination | → | displacement sensor | model 8719 |

All sensor signals are recorded by individual Sensor Profibus Module 9221. Concomitantly the modules display the sensors with voltage and evaluate their signals. The transferring of measurement data takes place in parallel via Profibus. The tare activation concerning a possible initial load, which can be modelled as a Dummy, takes place directly via simple PLC unit communication, over Profibus.

6. Measurement of motor vehicle coachwork rigidity

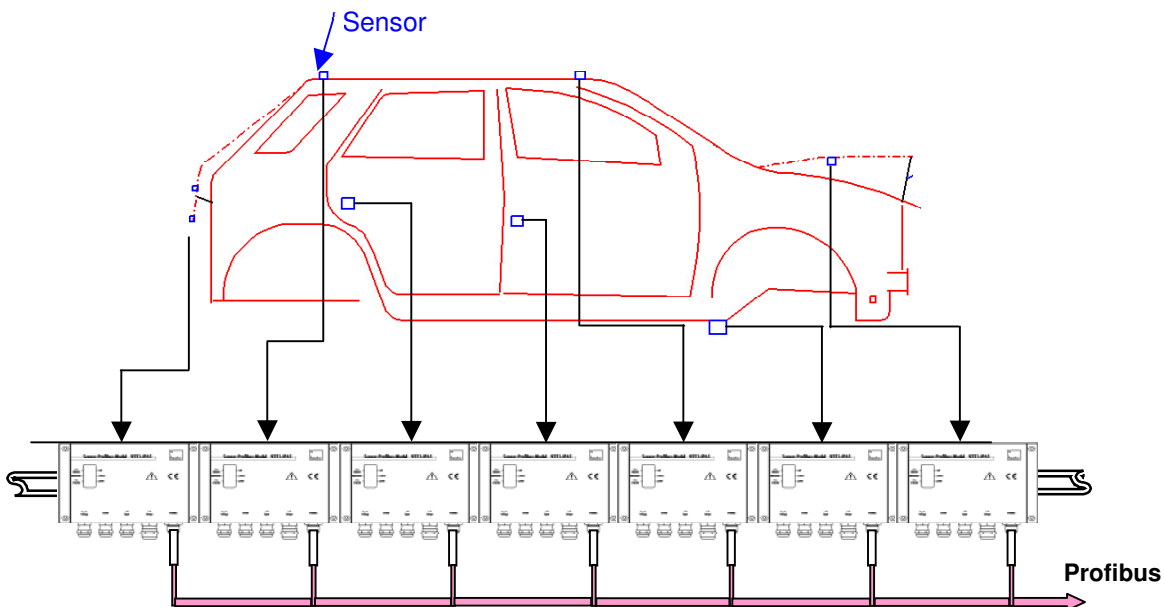
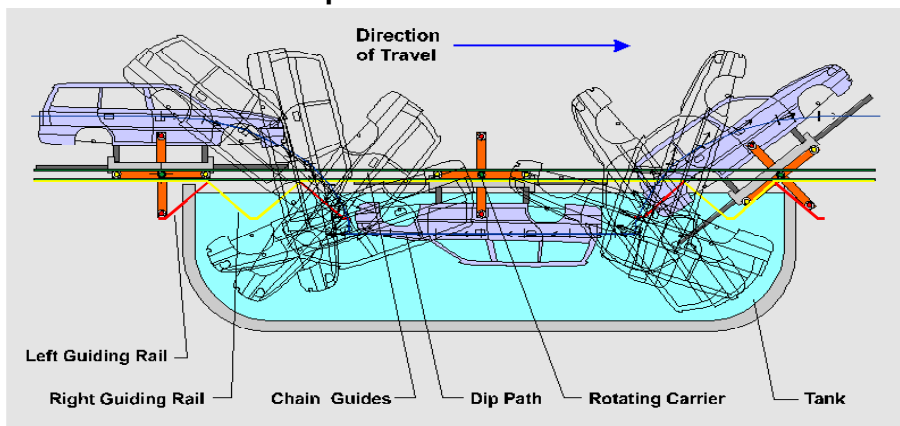
Task

Simulation of a vehicle accident with a collapse in water. Thereby the coachwork rigidity of the vehicle shall be determined and recorded for the protocol preparation.

Specific Requirement

The measurement system must be designed for 360°-rotation and for immersion in water. All measurement data must be sent bundled to the PLC control. The electronic measuring equipment should be protected from exposure to both dust and water.

Experiment measurement with 360°-rotation



Solution

In order to record the practical values of measurement of coachwork rigidity, 7 pressure transducers model 8103-2 (2 bar) are installed. When necessary under water cables are used. The pressure measured values are averaged by 7 Sensor Profibus Modules 9221-IP65 and prepared for storage. Afterwards the measured values for each test point are transferred via Profibus with a selectable transfer rate up to 12 Mbaud.