

Press Force Monitoring & Analysis

Allow us to apply our over 29 years of experience in press monitoring to your assembly applications. Hand, Pneumatic, Air-Over-Oil & Hydraulic presses are compatible with our monitoring solutions, which include sensors & data collection solutions.

Looking to Upgrade Your Process?

DIGIFORCE(R) - Universal Press Monitoring Solutions

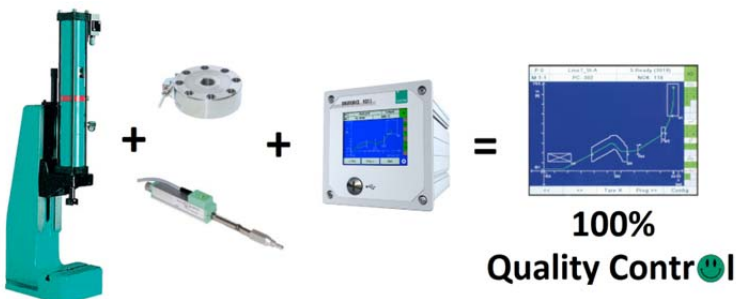
In today's automated manufacturing environment, no operations quality control can be left to chance. We've applied our experience in pressing operations and wide selection of sensors with flexible tools that will allow you to acquire signatures in order to define the process pass/fail criteria. These monitoring systems have evaluation tools that can be used to differentiate between a good and bad signature, while quickly providing feedback to the PLC.

Turn Key Solutions: Sensors, Cables & Data Collection



Assembly processes come in different forms. Components can be welded, riveted or press fit together. A press fit assembly uses interference fit to force two components together. A part that is slightly larger than the hole it is to be inserted in. If the assembly is to stay together there must be a certain amount of interference. Historically, the quality of fit was determined by measuring the push out force required to “dis-assemble” the part. This destructive testing method measured the quality of the process on a whole but did not address the quality of individual parts.

The practice of measuring the “press in” force has allowed for 100% checking of parts while being assembled.

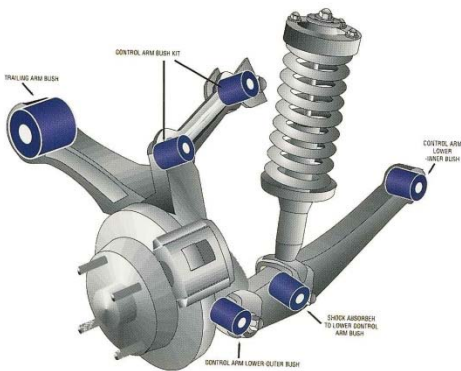


We have a number of solutions targeted at monitoring force vs. displacement of a pressing application. A typical system will use a load cell appropriately sized for the application and a displacement sensor to measure the entire travel of the pressing operation. These sensors are fed to an instrument that collects the measurements, plots them and compares them to a “good” signature.

The same basic concept works for an application with loads as small as measuring the assembly signature of small plastic components in a medical device assembly, to the large forces required to assembly large bushings for Industrial vehicles.

The types of load cells and displacement sensors are wide and varied and defined by the forces and distances to measure. The instrument comes in various forms dependent on the types of evaluation and the complexity of the signature.

Applications



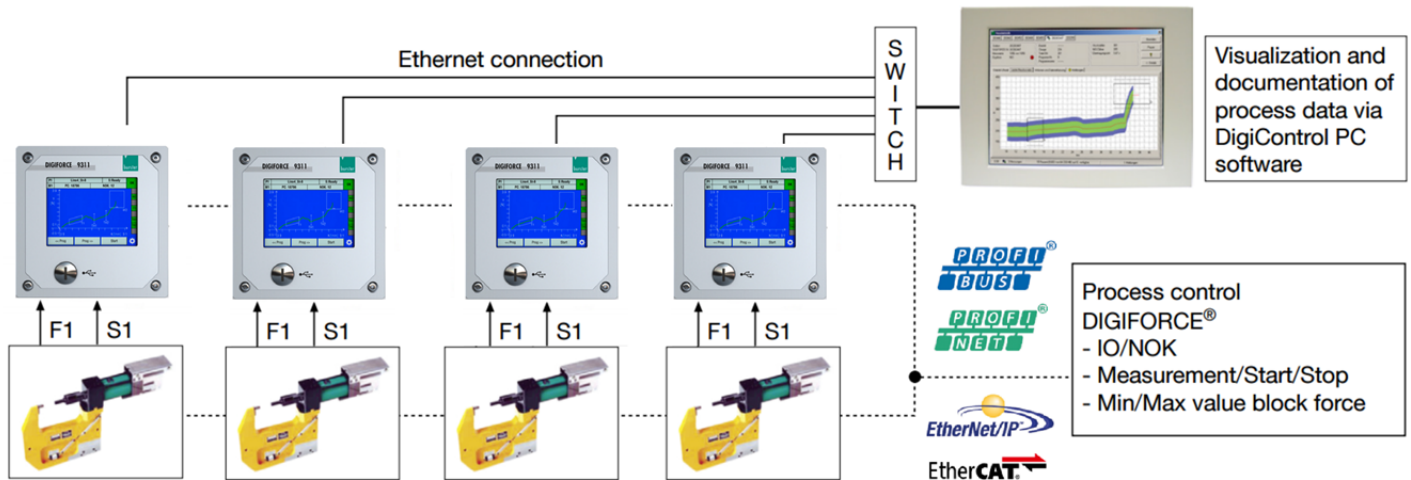
- Suspension Bushings Insertion
 - Pressing Dowel Pins in Transmissions
 - Insertion of Bearings in Transmission Ring Gears
 - Check Valves in Pump Housings
 - Retaining Pins in Cam Shafts
 - Hardware Clinching for Metal Fabrication
 - Stamping, Bending, Flanging, Coining & Hemming of Sheet Metal
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System Overview

The typical system requires the following elements:

- Sensors
- Cables
- Mounting Hardware
- PLC Interface
- Data Collection Software on an Industrial PC

Whether you have a single press station or many, we are able to connect via Ethernet TCP/IP to any network or PC. Not only do we report to the PLC Pass/Fail, but we also can send Part Tracking via Serial Numbers over the PLC Interface.



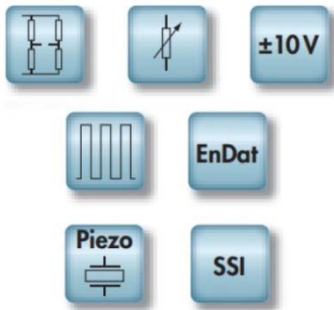
World Class Sensors

Analysis is most accurate when good data is used, so first you have to start with the sensors. Depending on the range, accuracy, tooling/mounting, etc. the right sensors need to be chosen for the job.

We have a wide selection of load cells that are easy to integrate with hand presses, pneumatic, air over oil & hydraulic presses. Pancake, S-Type, Load Button, fatigue rated, miniature & even Piezo-electric, visit our load cell page to browse our selection.

When it comes to displacement sensors, typically potentiometers and LVDT's are used to capture the displacement of the press arm. If a very high precision is required over a long distance, we can use Encoder as well. We have a wide selection of quality distance sensing options.

Amplification & Data Acquisition

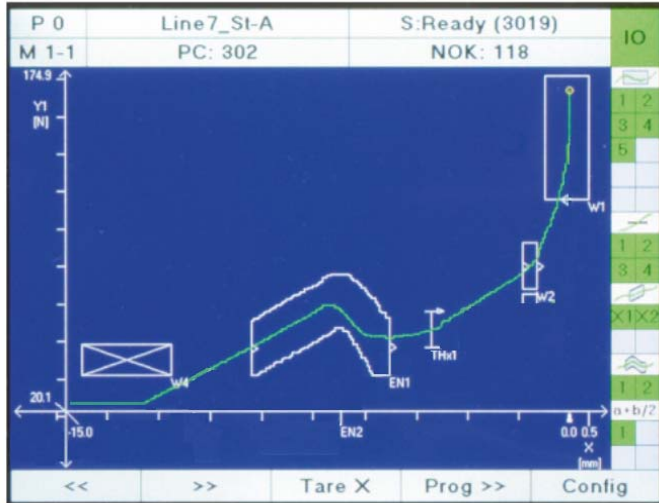


All of our Press Monitoring Solutions have built in signal conditioning (otherwise known as amplification) to handle the sensors needed to get the right information. We can accommodate Strain Gauges & Piezoelectric Force Sensors, as well as Potentiometers, Voltage Output Sensors, SSI Serial & Encoders, giving you flexibility in your solution.

Having 16-bit resolution, high accuracy and quick scan rates of up to 20 kHz, especially vital for applications such as stamping presses. This precision allows you to acquire clean, usable data.

Active measurements are triggered either on displacement or load levels, which starts synchronous X&Y pair measurement. Switch Points, real-time signals used to update the PLC, indicate whether measurements are exceeding set signal levels to provide feedback for PLC control.

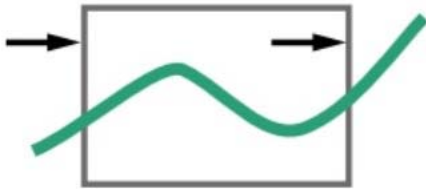
Superior Evaluation Techniques



The evaluation phase follows immediately after the measurement. In this phase, DIGIFORCE® judges the newly acquired measurement curve with the various evaluation elements that have been used to define the difference between good and bad parts. If any of these criteria are not satisfied, the measurement is classified as BAD (NOK), otherwise it is rated as GOOD (OK). Through the Fieldbus interface the PLC is updated of the OK or NOK result and numerous process-related values.

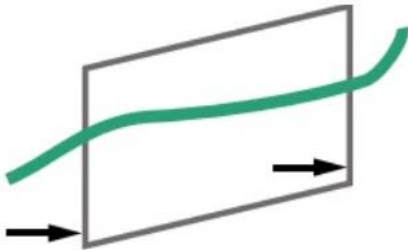
If the incoming parts to be pressed are made to their specifications, the signatures will be similar, although no two presses are exactly the same. This is why flexible evaluation tools are needed, we need to check the interference fit while ensuring we are not failing good parts unnecessarily.

In addition to the traditional evaluation windows or boxes with defined entry and exit sides, the DIGIFORCE® controllers also have thresholds, trapeziums with both X or Y alignment and tolerance envelopes at their disposal. These evaluation elements also have calculated values for local maximums & minimums, area under the curve, bending point etc. which can then be combined with mathematical operations and for greater analysis flexibility.



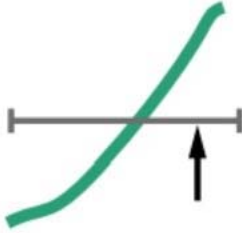
Traditional Windows

The Window evaluation element ensures that the curve enters and exists through specific sides of its rectangular orientation. The entry/exits are definable as entry/exit and can be allowed to enter one or many times. These windows also have the option of being called "Online", meaning when the curve fails to adhere to these rules the PLC is instantly updated via status bits on the output.



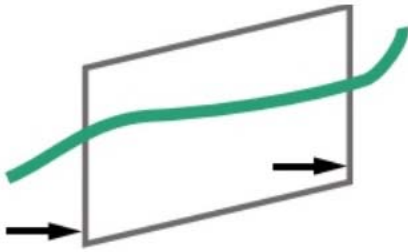
Trapezoidal Windows

The DIGIFORCE® offers the type-X and type-Y trapezium windows, which allow for easy criteria generation for sloped portions of curves.



Thresholds

The threshold evaluation element provides a simple gateway that the curve must pass through. It can be placed as an type X when there are a XMIN and XMAX, and type Y when there are a YMIN and YMAX. This can be used to ensure that a minimum push in force is met, at a well defined seated depth



Tolerance Envelopes

The DIGIFORCE® controllers allow you to sample a distribution of press force curves and place a custom tolerance envelope at the push of a button. The simple interface allows the user to define how much deviation from the curve sample is allowed, as well as for which X interval. Having both tight and loose fits are critical to the successful implementation of this feature.

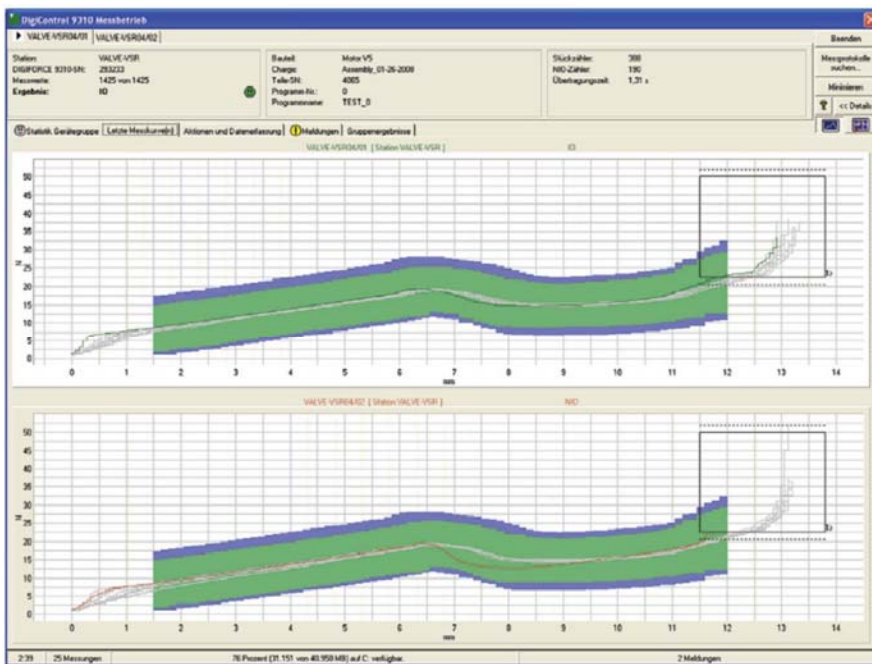


Simplifying Measurement & Control

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Automated Data Collection

The same software used for configuration of the sensor calibration, triggering, etc. is also used for the data collection aspect while providing a full featured display of measurement curves. This can be loaded on any Windows Based PC and can store information of multiple presses with part tracking and time stamps. This software also supports program backup and data retrieval, while providing a quick look up for all evaluation results statistics.



Simple Report Generation

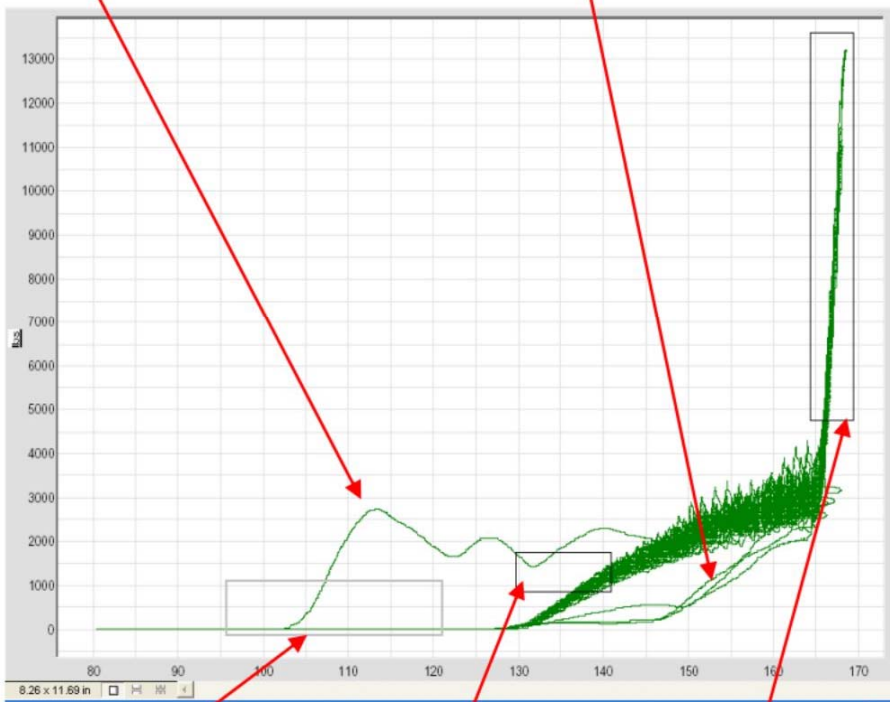
The data review wizard provide the ability search through your data history based on station, part number, serial number, date, time & OK/NOK result to quickly pull up data for review & report generation. Output formats for excel & PDF are available as standard.



Case Study: Bushing Press for Suspension Control Arm

A "Mis-aligned" Insertion Component, produces a Force vs Displacement Profile, that is distinctively different than that of the Acceptable Insertion Profiles

A large Outer Housing produces lower Insertion Forces than that of the Acceptable Insertion Profiles over a portion of the range of the Insertion Displacement .



Data Window #1
 "On-Line" Immediate
 Stop of Press Operation
 Curve must enter at the
 left and exit to the right

Data Window #2
 "Pass Through"
 Curve must enter at
 the bottom and exits
 to the right

Data Window #3
 "Block or Final Force"
 Curve must enter at
 the bottom and must
 not exit.

Available Solutions

Digital Indicators

Although rarely used, a single channel digital indicator can be used to monitor and capture the peak force of the load cell as the parts are assembled. This low cost solution will only work in specific applications where the part does not bottom out and the actual peak is a reliable indication of the interference fit. This does not take into consideration the displacement at which the peak force occurred.



Forcemaster 9110 - Ideal for Hand Presses

A low cost two channel system measures the load vs displacement and compares the signature to a series of “gates” and thresholds, in press stations where there is no PLC present. This 9110 is popular with manual hand press assemblies as the instrument gives audible and visual indication of pass fail to the operator. Programs are recognized by inserting cards with chips similar to those seen on bank cards and this allows for an infinite number of programs.



Digiforce 9311

This workhorse is an evolution from the popular **9310** model, with upgrades of increased resolution, more programs, auto evaluation generation and EthernetIP. This is the standard for press force monitoring, with easy to use menus, a touch screen interface and a beautiful visual display of the signature curve and process results. Stay Tuned for more details coming soon!



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Digiforce 9307

This feature rich instrument has many additional evaluation techniques to go with its higher A/D resolution and faster sampling rates. It also has the ability to perform multiple “y” measurements against a single “X” input. This instrument excels in applications where higher measurement resolution is required or the signature is complex.