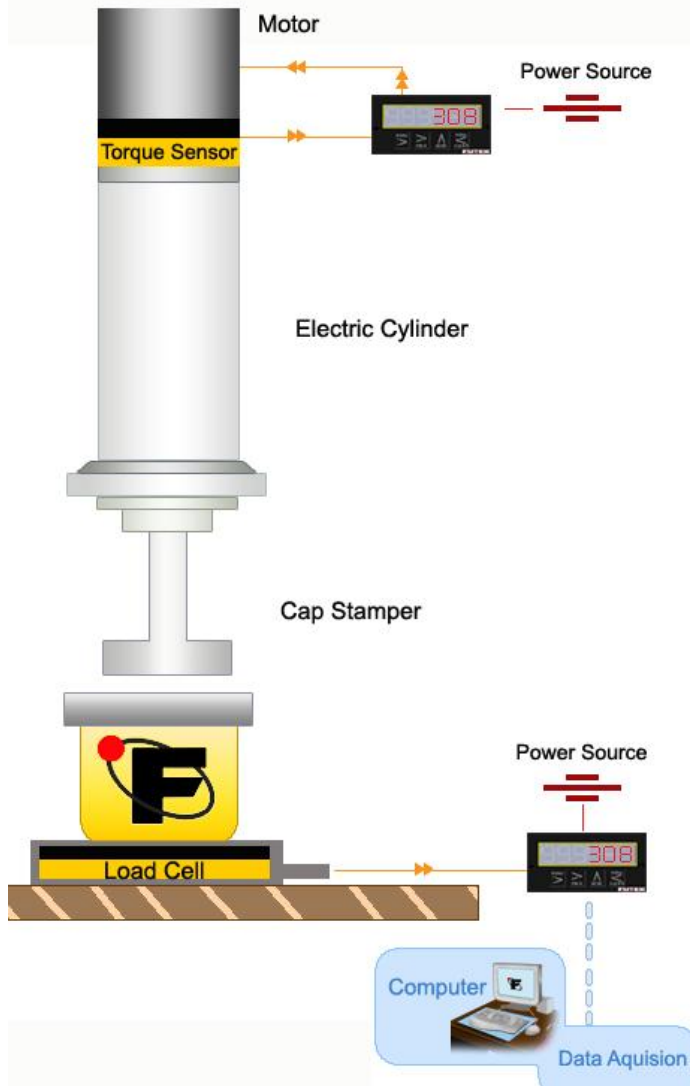


# FUTEK Load Cell sample applications

## Sample 1 : Stamping

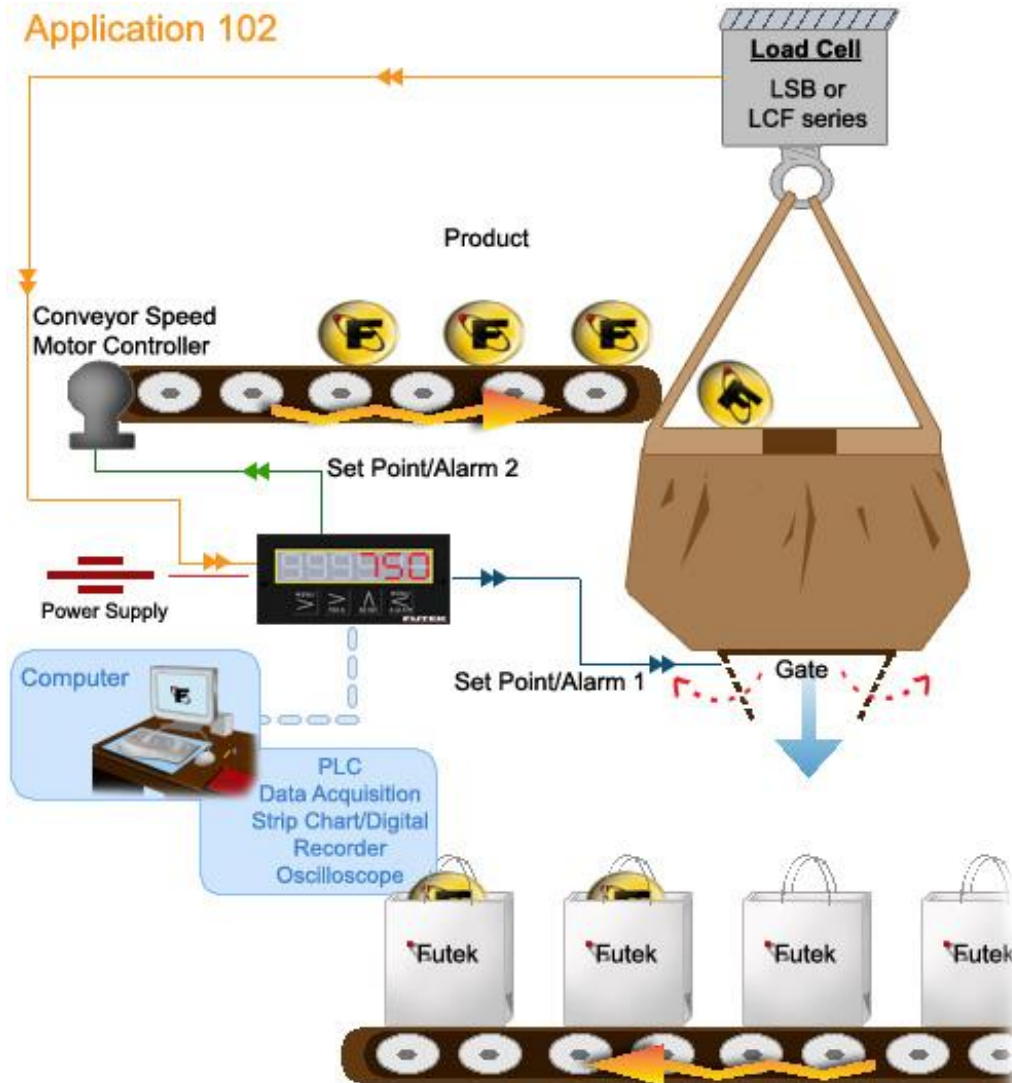
Application 116



Different types of sensors / transducers can be used simultaneously in order to improve quality during manufacturing or production processes. Below, a torque sensor attached to a motor at the top of a stamping operation monitors the amount of torque being exerted in order to stamp the cap on top of the bottle. The load cell at the bottom is used as a quality measure. It monitors the applied forces to detect and prevent excessive force due to misalignment or other causes. If the torque or load displayed falls outside an acceptable window, the operator will be alarmed to make some adjustments in order to ensure the final product is not defective.

## Sample 2 : Bag Filling Machine

### Application 102

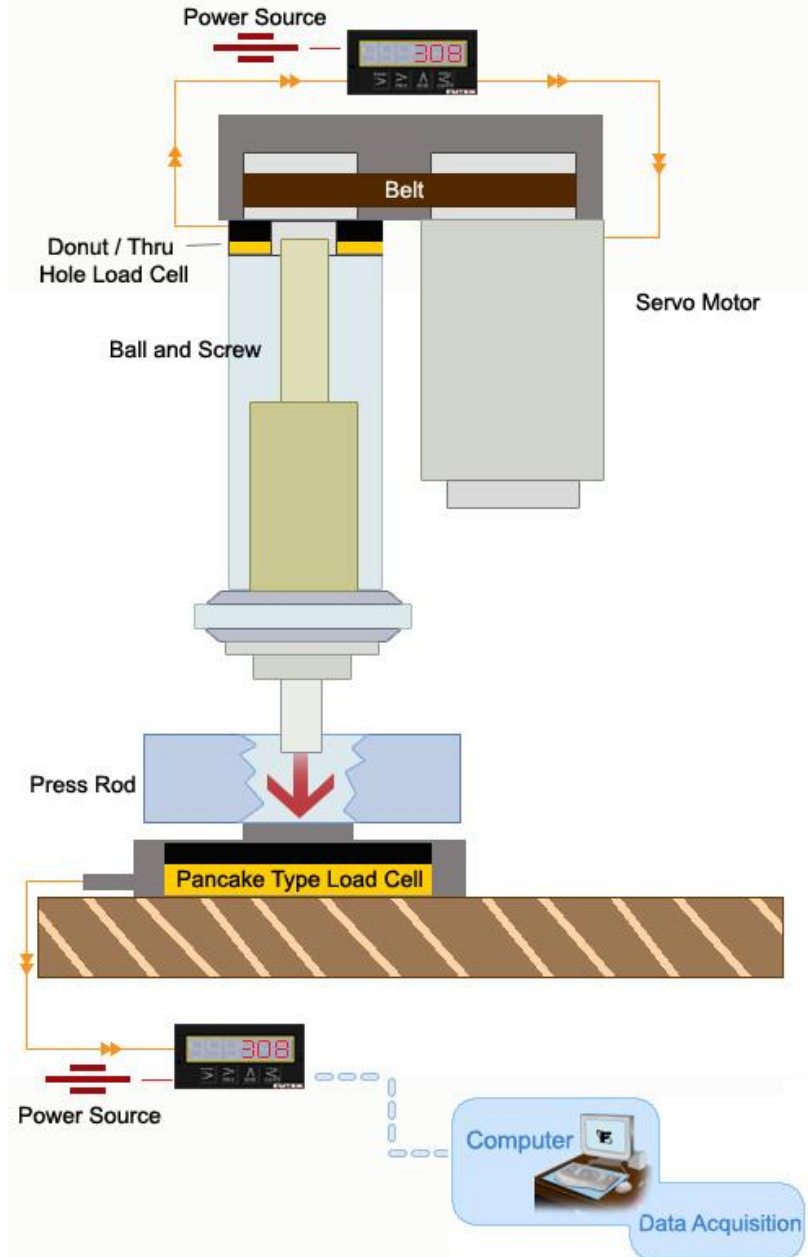


FUTEK load cell system can be used in an automated assembly-line bag filling application. As shown the upper conveyor loads parts into a hanging container. The container is connected to a load cell. The load cell monitors the weight of the container, once it reaches the preset weight the upper conveyor stops or slows down and the container gate is released to feed the bags on the lower conveyor. Then it closed the gate and will restart the upper conveyor for filling process again. FUTEK instruments can control both gates & the conveyor using 2 separate alarm set points or analog output and plc or computer system.

### Sample 3 : Closed Loop Feedback

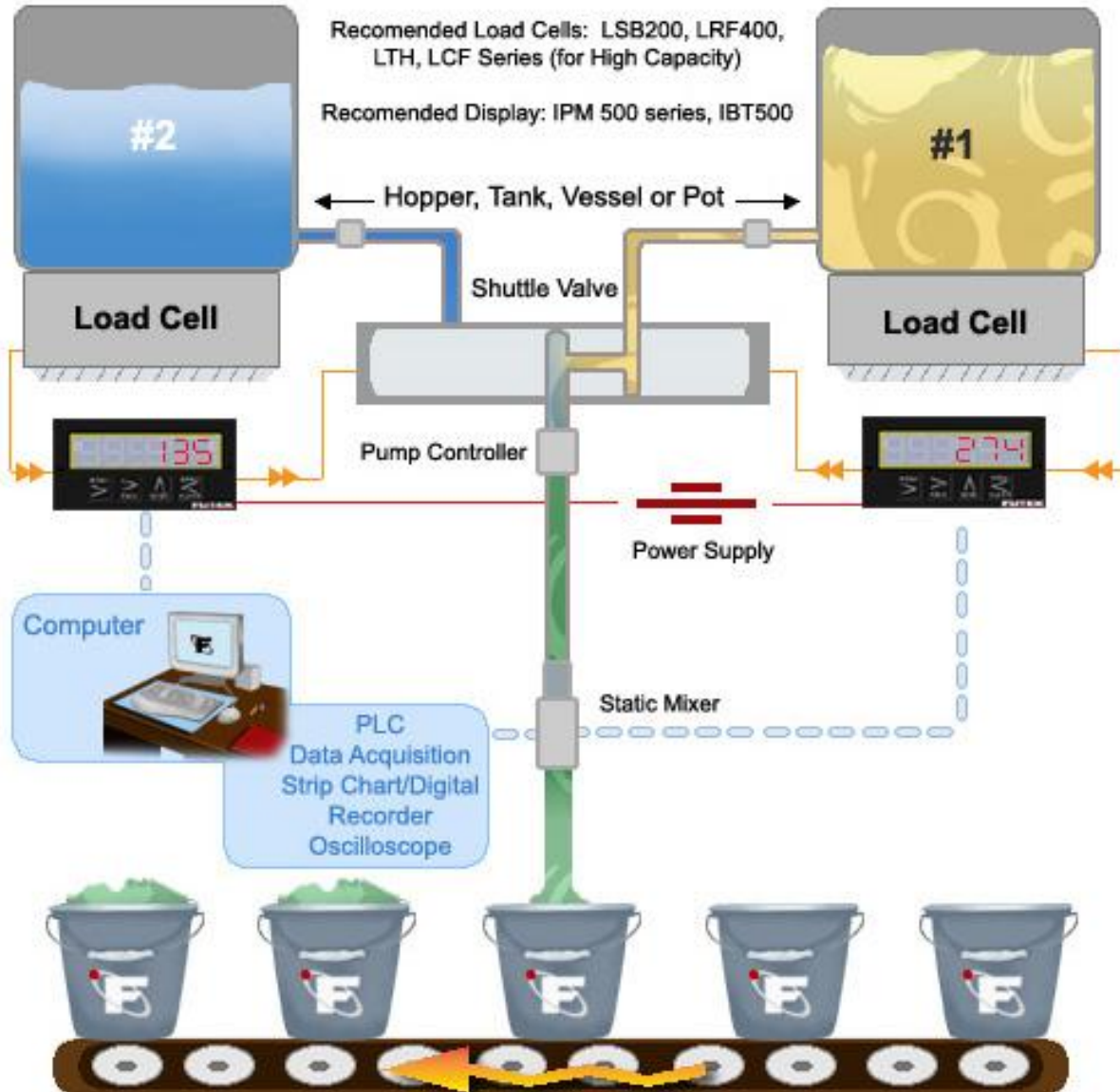
The diagram below is a good example of closed loop feed back operation. It shows how donut / thru hole load cells and pancake load cells can be used in insertion / press applications for precision assembly during the manufacturing process. The donut / thru hole at the top monitors the required load while the pancake load cell at the bottom checks and verifies the actual load being applied in order to control alignment for smooth insertion.

Application 110



## Sample 4 : Dual Tank Level Controller

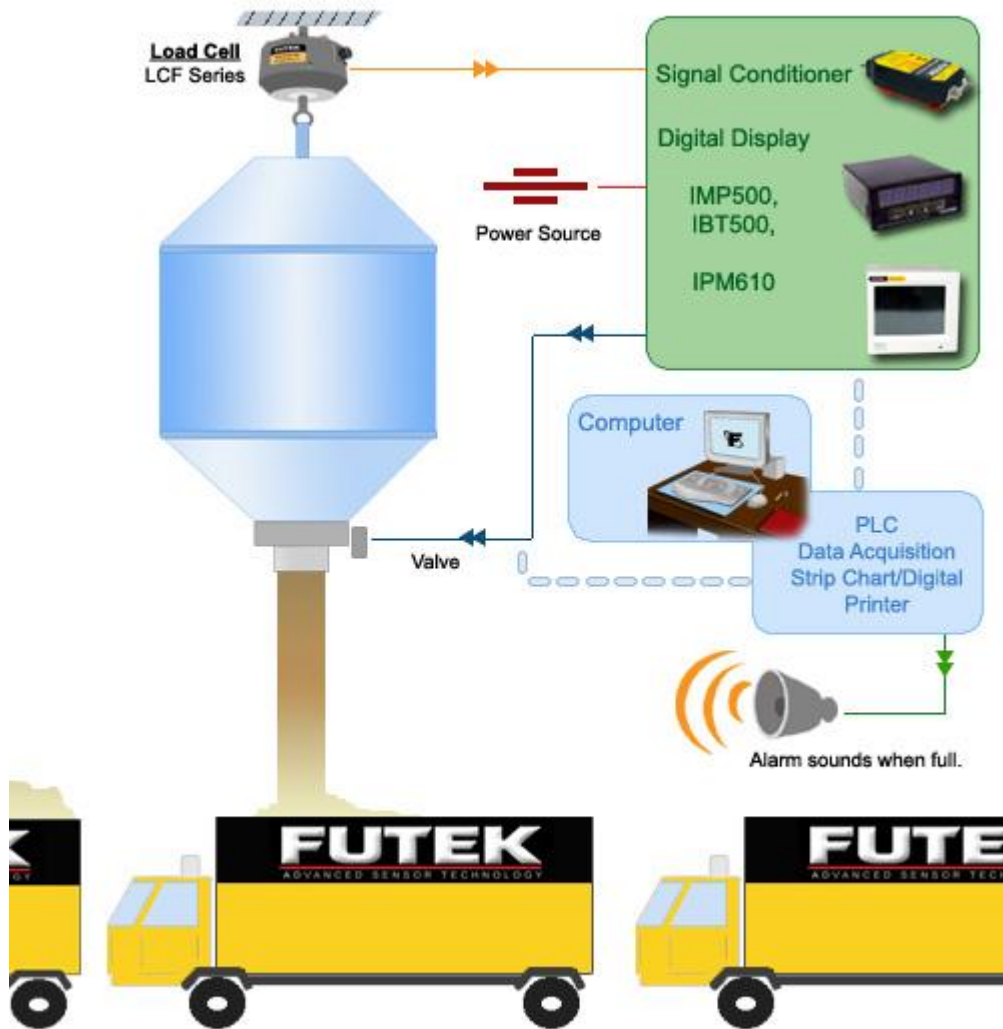
### Application 101



As illustrated in this application the volume of a single or multiple container of any shape or form can be monitored and controlled during an automated process using load cells and instrumentations to display the values while activating or deactivating the system as required utilizing the instrument built-in alarm set point or interfacing with a PLC computer via instrument Analog output or RS232 & USB.

## Sample 5 : Tank Dispensing

### Application 103

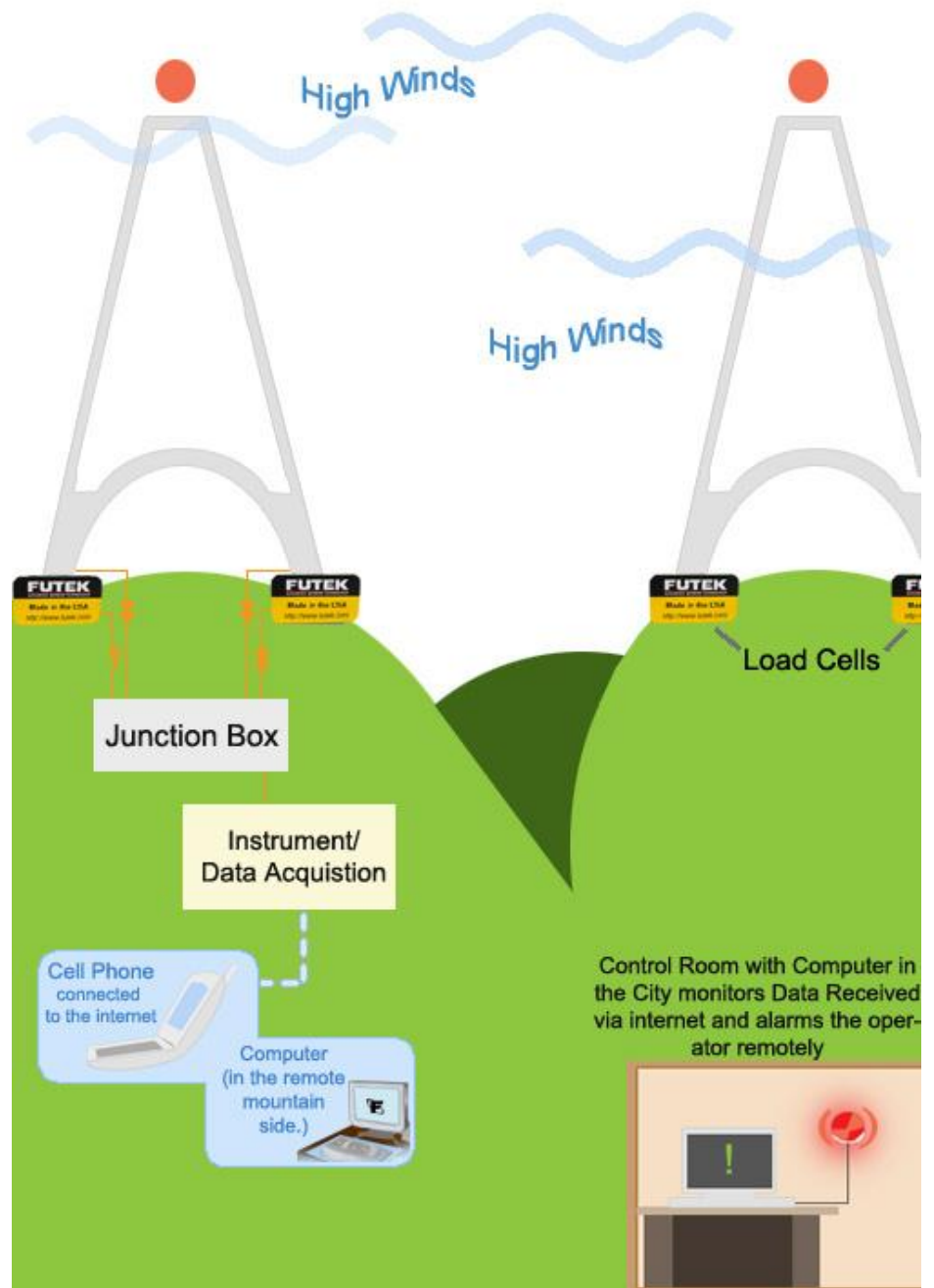


In this application FUTEK load cells are used to control material distribution while monitoring the tank level. The load cell with in-line amplifier can be directly connected to a plc or computer for feedback control or one of the FUTEK instruments with set point alarm or analog output option. A sound alarm can be connected to the plc, computer or the display to Alarm when the process is completed or the tank is full or empty.

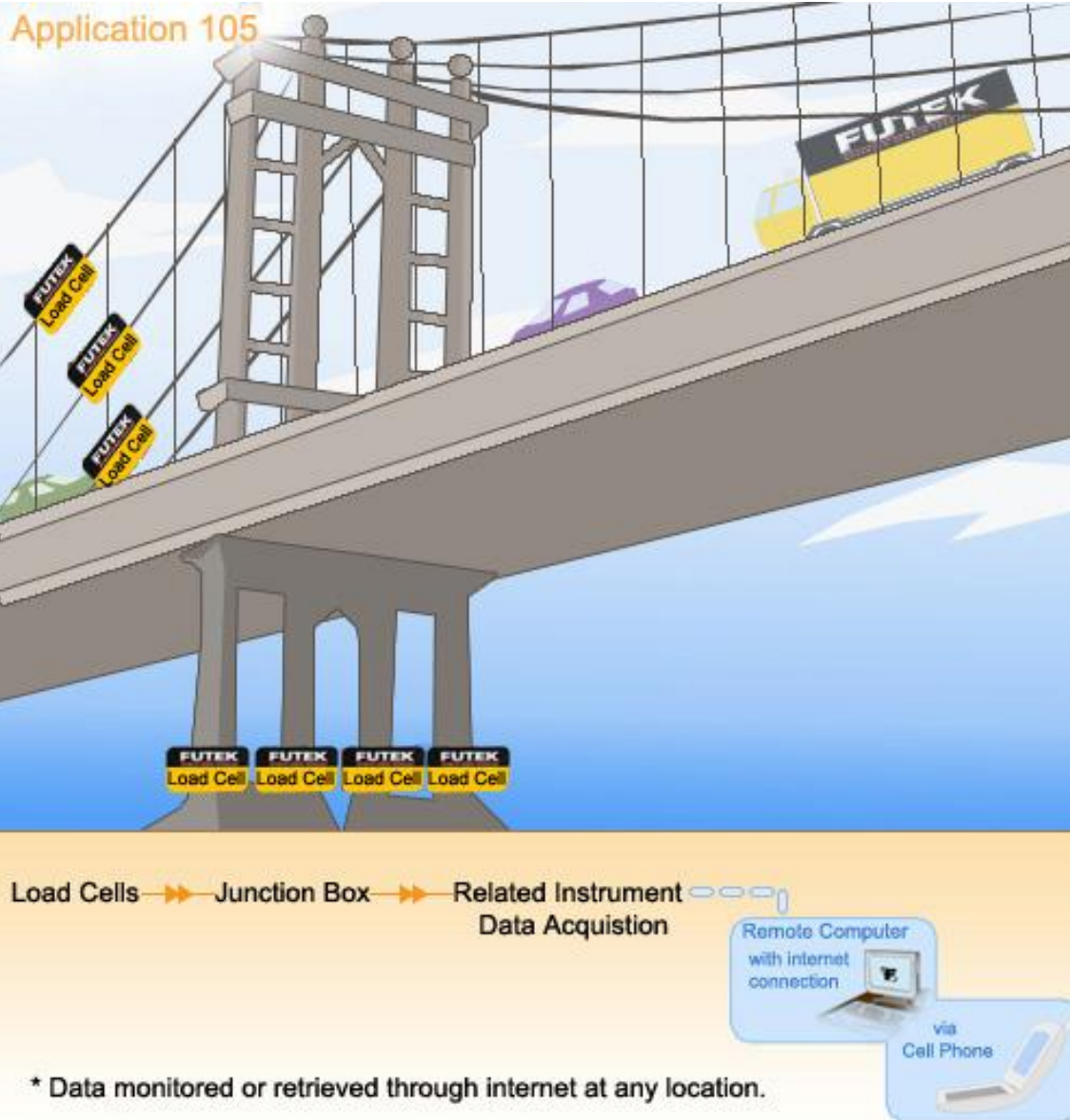


## Sample 6 : Wind Tower

Utilizing a single or multiple load cells, you may monitor all stresses induced due to high wind activities on the towers located in remote areas. The load cells via a junction box are connected to inline amplifier and data acquisition computer system to record all data and make it available through internet connection via a cell phone. Therefore all activities can be monitored through the internet anywhere and at any time.



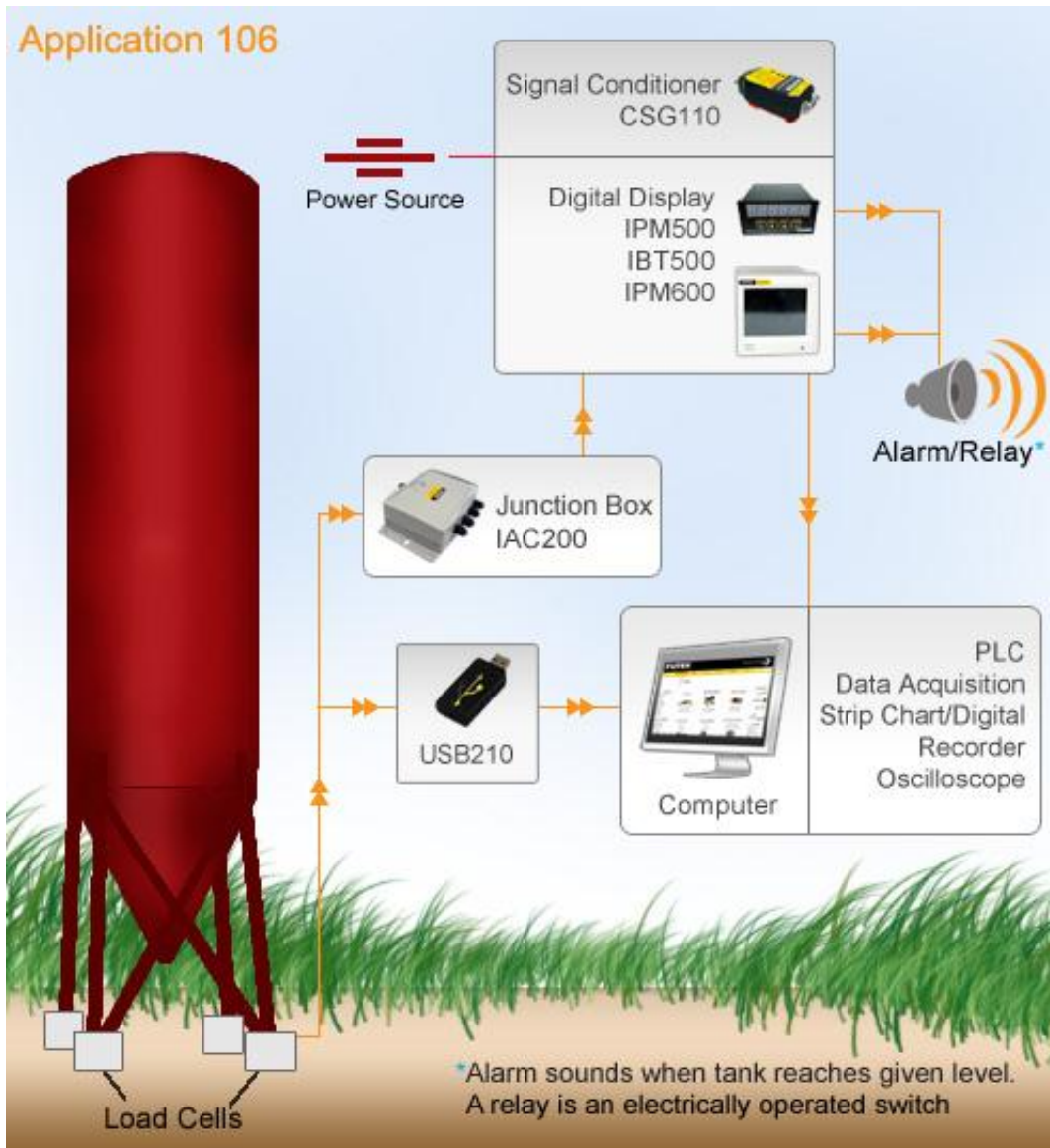
## Sample 7 : Suspension Bridge



FUTEK load cell and instruments can be used in suspension bridges. Our load cells can be installed on the cables to measure the tension and stress applied to the cables under various traffic conditions. They can also be installed under the post of the bridge to measure the compression the bridge experiences under various conditions. Data acquired will be sent to a data logger or data acquisition system using FUTEK Junction Box and related instrument. Remote management of data via internet or cell phones can be achieved.

## Sample 8 : Tank / Silo / Hopper

### Application 106



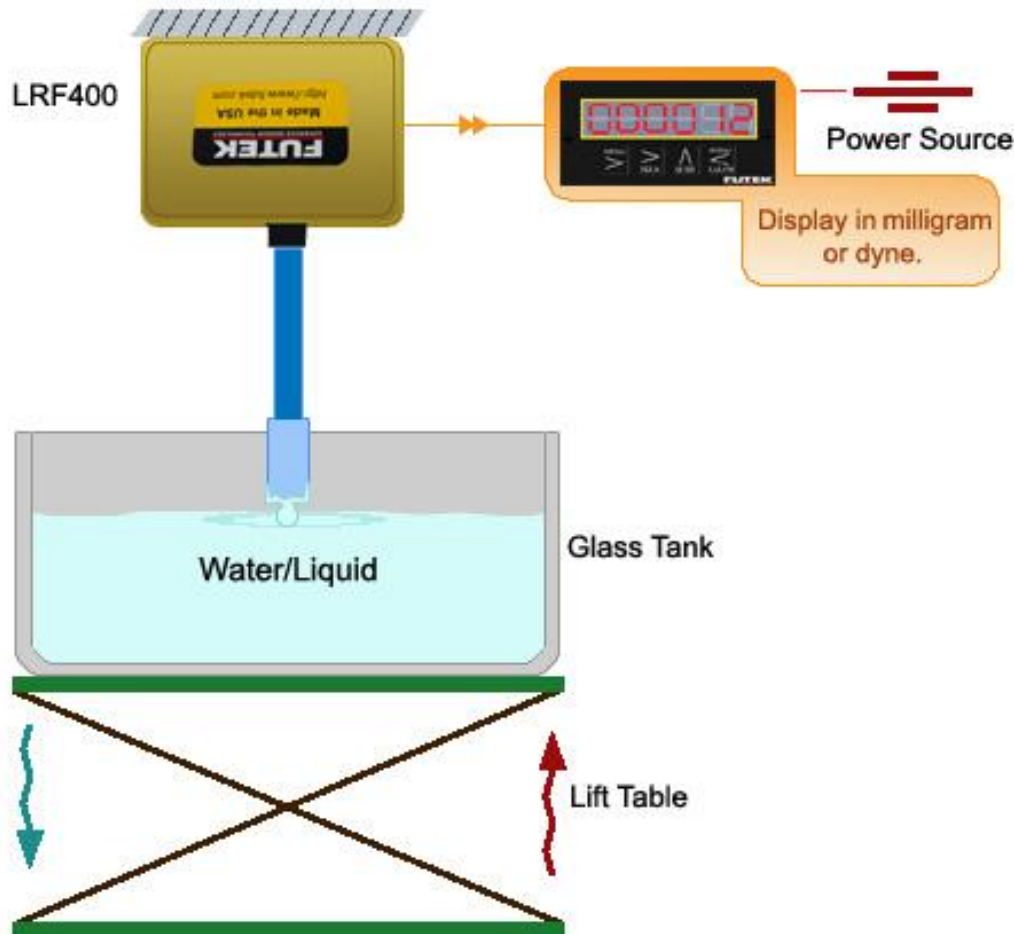
Load cells can be placed on the legs of a silo hopper or tank in order to monitor how full it is. When more than one load cell is used, a junction box is needed to average the load of all the load cells and provide one output which can then be connected to a computer or plc using a signal conditioner or digital display to show the output. The system can be automated so an alarm will sound once the tank reaches a certain level. It can notify someone via email when the tank is full, empty, or at whatever level the system is set at. The application can also be setup to trigger another tank to fill it when it reaches a given point. The way it notifies a user can vary, but the overall application is the same.



## Sample 9 : Viscosity / Liquid Separation

### Application 107

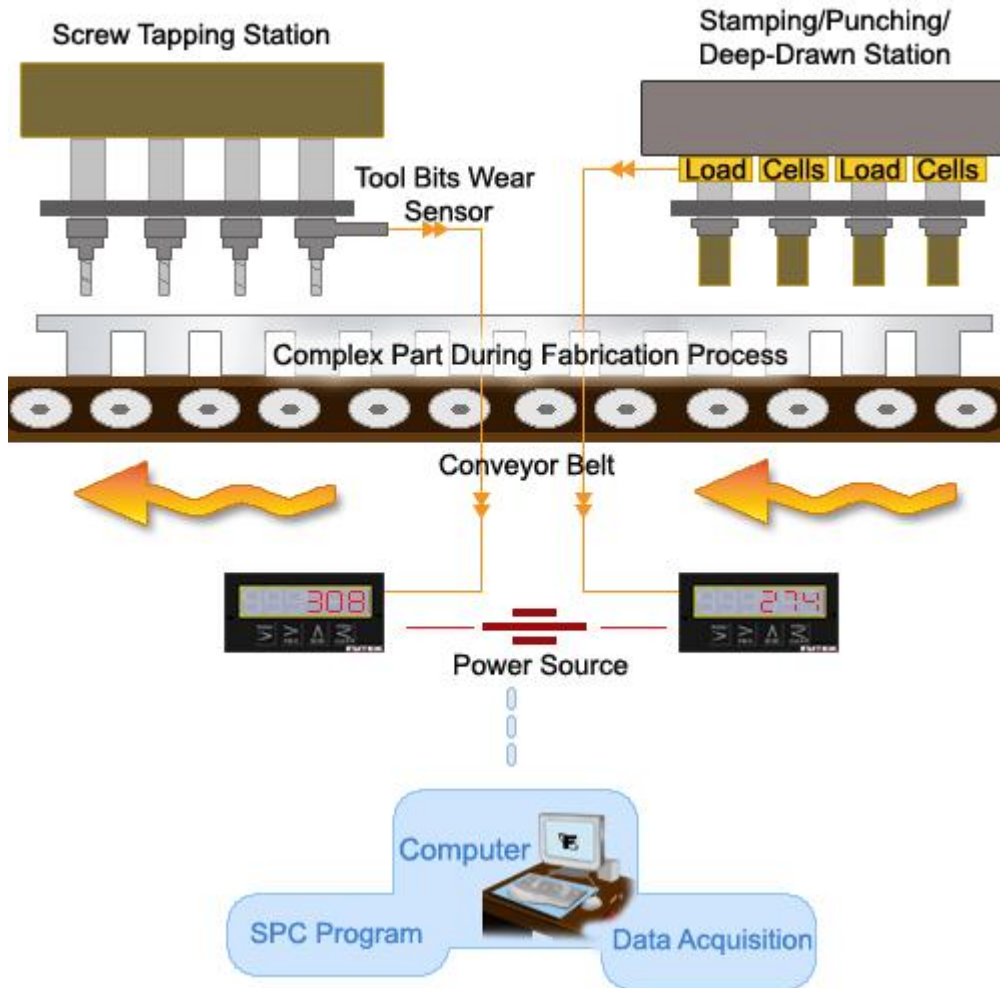
\* MIT & NASA Utilize Futek Sensitive Dyne Sensor to measure water or liquid separation forces.



This particular application is used in batching or mixing of multiple chemicals. By measuring the viscosity, you can determine when to stop adding a liquid to the mix. As shown here, the table can be lifted so that the probe reaches the liquid in the tank. The probe can also be brought down into the liquid. Once the probe is in the liquid, a certain amount of tension is required to pull the probe back out. The thicker the liquid, the higher the viscosity is and the harder it is to pull the probe out. The load cell measures this tension and transfers the data to a display. Both MIT and NASA (Glen Research Center Cleveland) have utilized Futek's Sensitive Dyne Sensor to measure water or liquid separation forces.

## Sample 10 : Assembly line / Automation

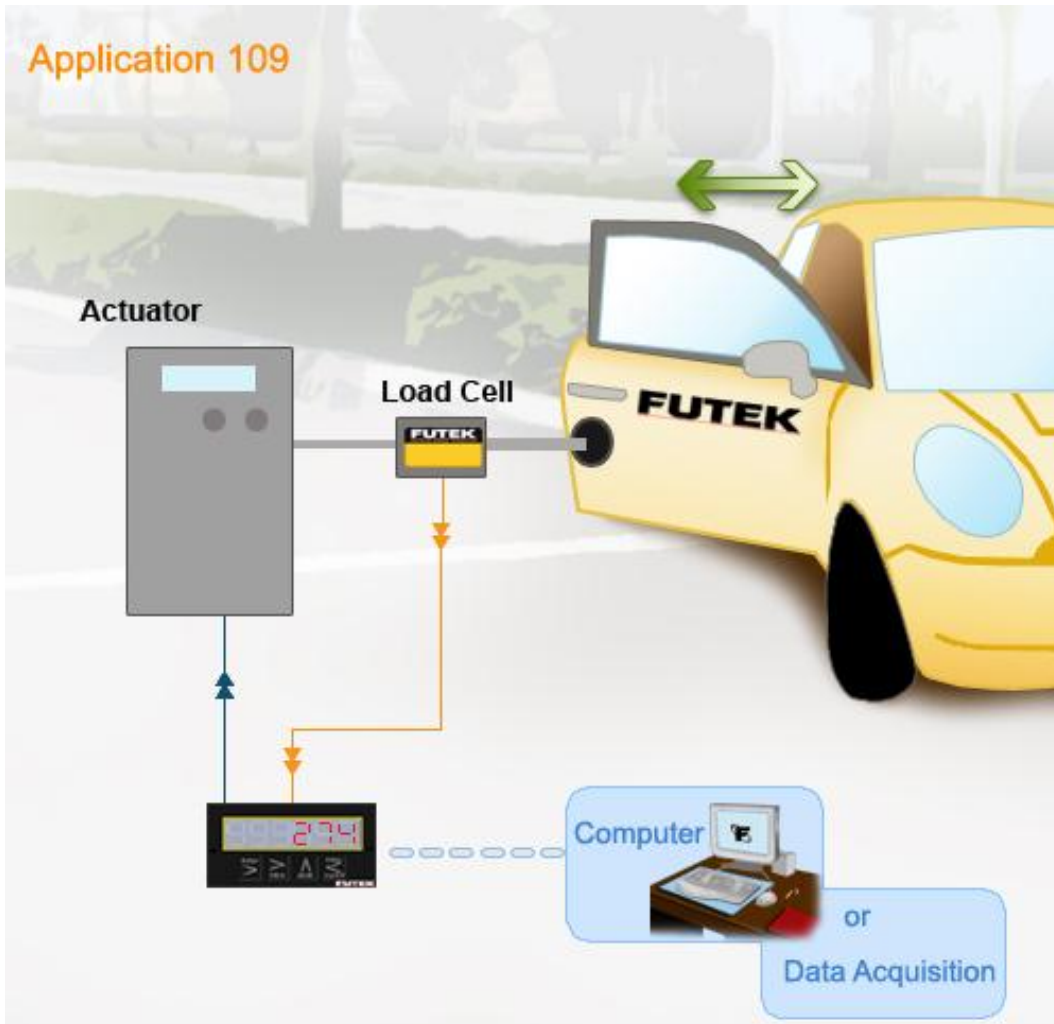
### Application 108



Below is a common assembly line lineup. It is a conveyor based assembly line where a piece of sheet metal is traveling through several operations. The first step is the stamping / punching station in which the specified load is being monitored. When the tool gets dull, the load gets out of its accepted range and notifies the user that its time to change the tool.

Next, in the tapping station, the tool is monitored by measuring an accepted torque / force range. In both cases the information can be provided in digital format and sent to a SPC (statistical process control) for further analysis.

## Sample 11 : Car Door Test

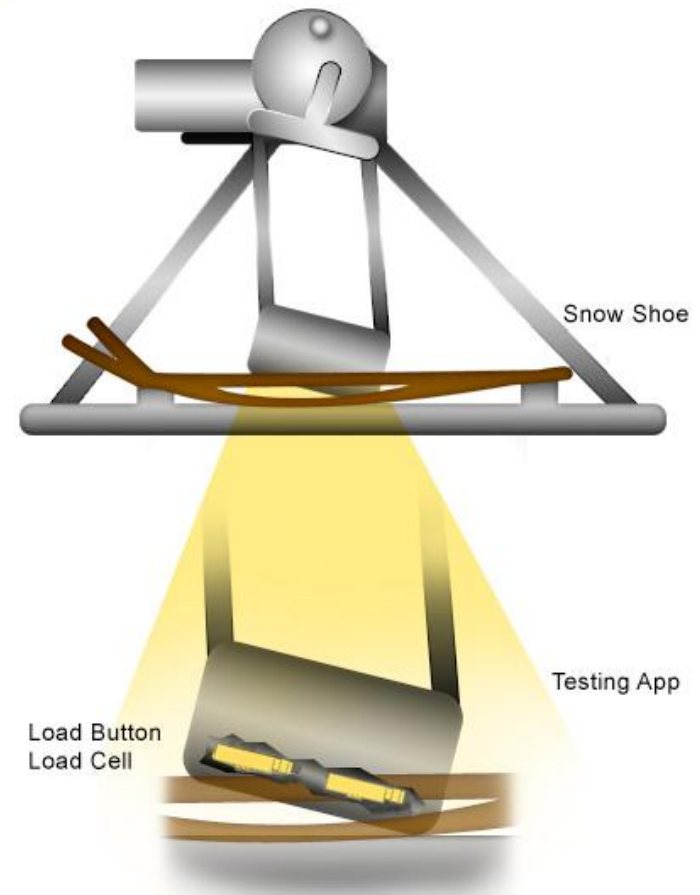


In this particular application, a car door is being tested. This test can be used to determine whether or not the door could function for a certain time period, or how long it will last before it fails. It works by using the hydraulic / pneumatic actuator to open and close the door within a given amount of time. The force that it uses to open and close the door is controlled by the load cell. This information is then recorded and analyzed for further assessment. There are many applications for load cells in the automotive industry. Feel free to contact us for further assistance.

## Sample 13 : Snow Shoe Test

FUTEK has recently come across a very unique and creative test stand to simulate loads created during walking. In this particular application 2 FUTEK load buttons are used to measure the force on the toe and heel movement on each foot one step at a time. The application is simulated through a metal type module to test the endurance and simulate walking in snow for shoe test cycles. The maximum load force tested on each foot is approximately 80-100 lbs.

Load Button load cells may be used for a number of applications but are commonly designed for Press, or Inline compression applications and are also ideal for research and testing applications.



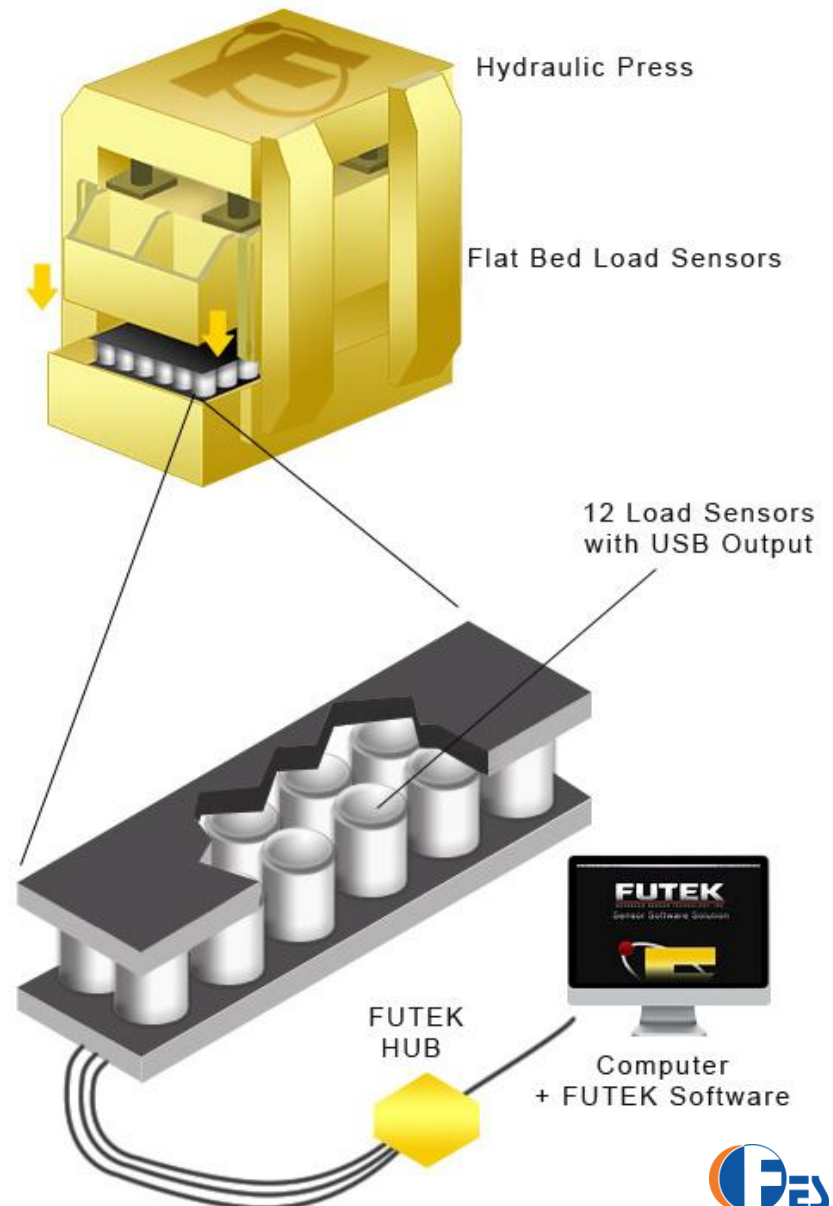


## Application 123

### USB Load Cell Application -Hydraulic Press

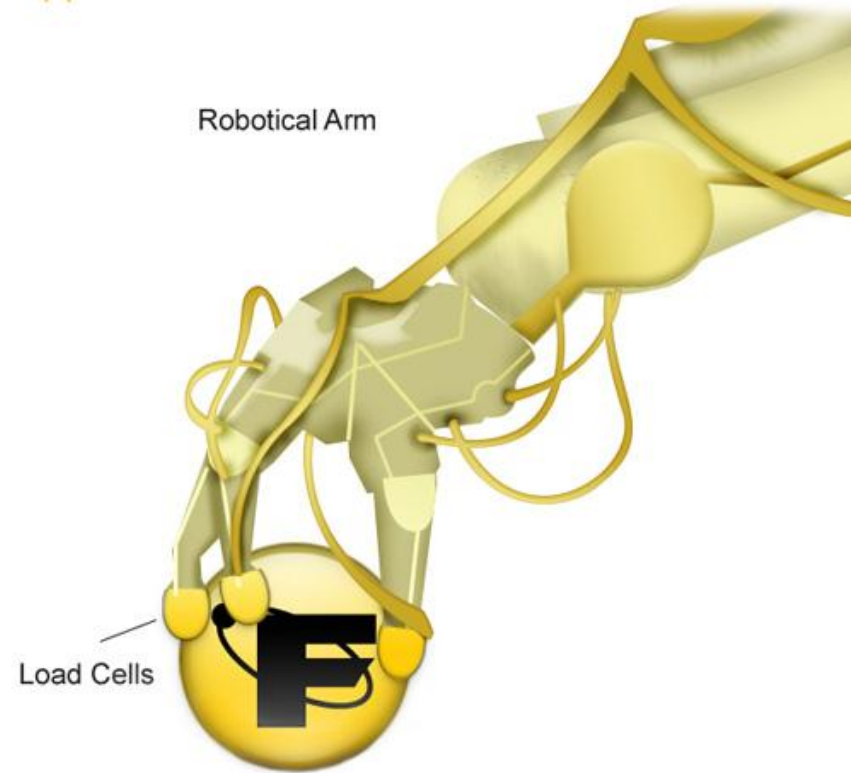
#### Sample 14 : Hydraulic Press

In the process of automating hydraulic or pneumatic presses for feedback control, traditionally one load cell was used even for heavy duty presses with a few million lbs. of load capacity. As illustrated in the enclosed diagram, multiple FUTEK load cells with built-in USB interface can easily be utilized. This approach not only simplifies the installation & handling, but also minimizes the total cost, eliminating the need for a customized sensor. In addition, it will allow the operator to check the uniform loading of a large platform while monitoring the output of each sensor individually. It also makes troubleshooting much easier, and the system will still be operational when any sensor is removed for repair or replacement. The FUTEK USB sensors, combined with FUTEK USB software utilized on a PC, will allow the development of a cost effective intelligent system without the use of multimeters, amplifiers, or data acquisition.



## Sample 15 : Miniature Load Cell

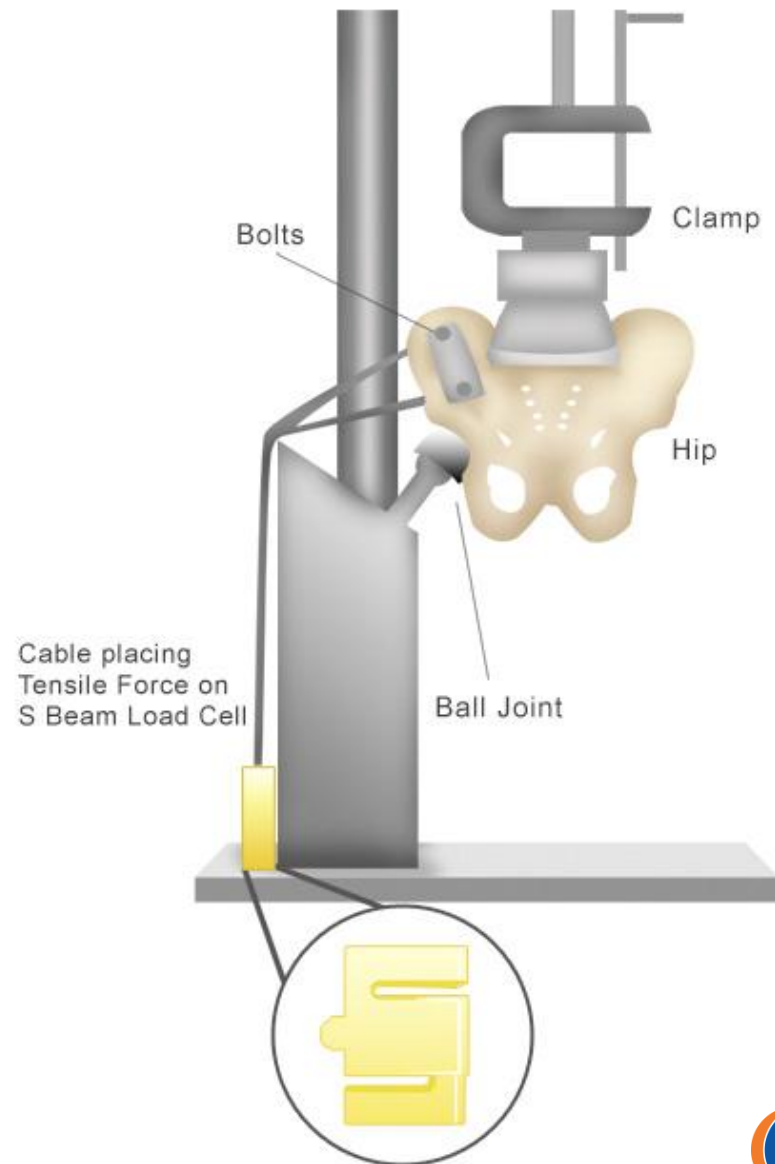
The world of Automation, Mechatronics, Musculoskeletal and Prosthetic Testing is quickly advancing and the integration of Miniature Load Cells and Transducers in this technology is growing each year. As the illustration shows, Miniature Load Cells can be mounted to the tip of the robotic arm and integrated to measure tensile and compression forces of objects as they are picked up or held.



## Sample 16 : Musculoskeletal Testing

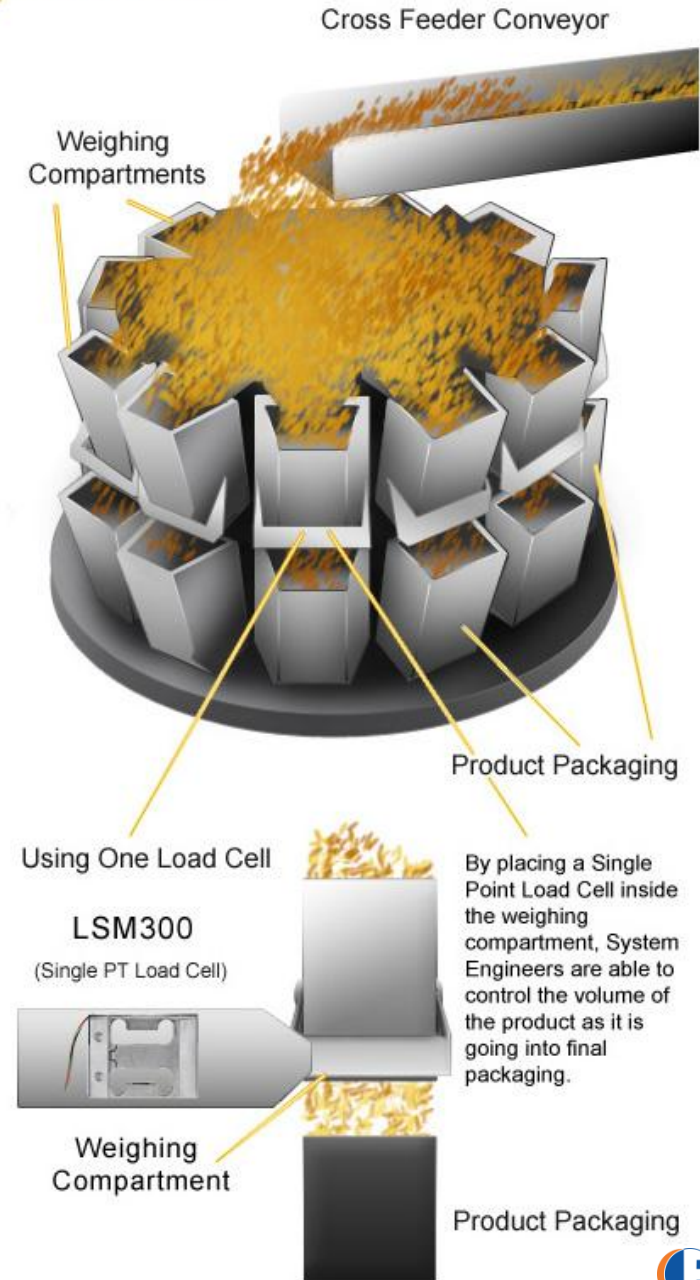
### Application 125

The field of Musculoskeletal Testing or Biomechanics often utilize Force Sensor (aka Load Cells) to gain a greater understanding in the dynamic variables affecting balance, posture, and neuromuscular control of spinal load. As the illustration shows, a S Beam Type Load Cells can be mounted onto a flat surface where a cable or steel string is connected at the top of the sensor. The other end of the cable is assembled to a hip or any free moving bone structure that is mounted for movement. As the bone is moved a tensile force is applied on the S Beam Load Cell. In such a setup, the S Beam Load Cell can be connected to a Digital Display or PC where the measurements can be recorded.



## Sample 17 : Food Packaging

Its very common to use Force Sensors, Torque Sensors, Pressure Sensors or Load Cells in Food Manufacturing (Process Control) to automate the production lines. Using various sensors, the production engineers are better able to control the process and improve overall quality. In the illustration provided below a cross feeder conveyor is distributing the food into weighing compartments. By placing Precision Load Cells underneath the weighing compartment, the volume of product/food can be controlled as it is going into the final product package. The Precision Load Cell used in this application is also commonly know as a "Single Point Load Cell". These are specifically produced for OEM usage where a high volume of sensors are needed. The load cell would be used with an in-line amplifier which can then be directly connected to a plc or computer for feedback control or one of the FUTEK instruments with set point alarm or analog output option. A sound alarm can be connected to the plc, computer or the display to Alarm when the process is completed or the tank is full or empty.





## Sample 18 : Force Testing / Material Testing / Concrete Crush Test

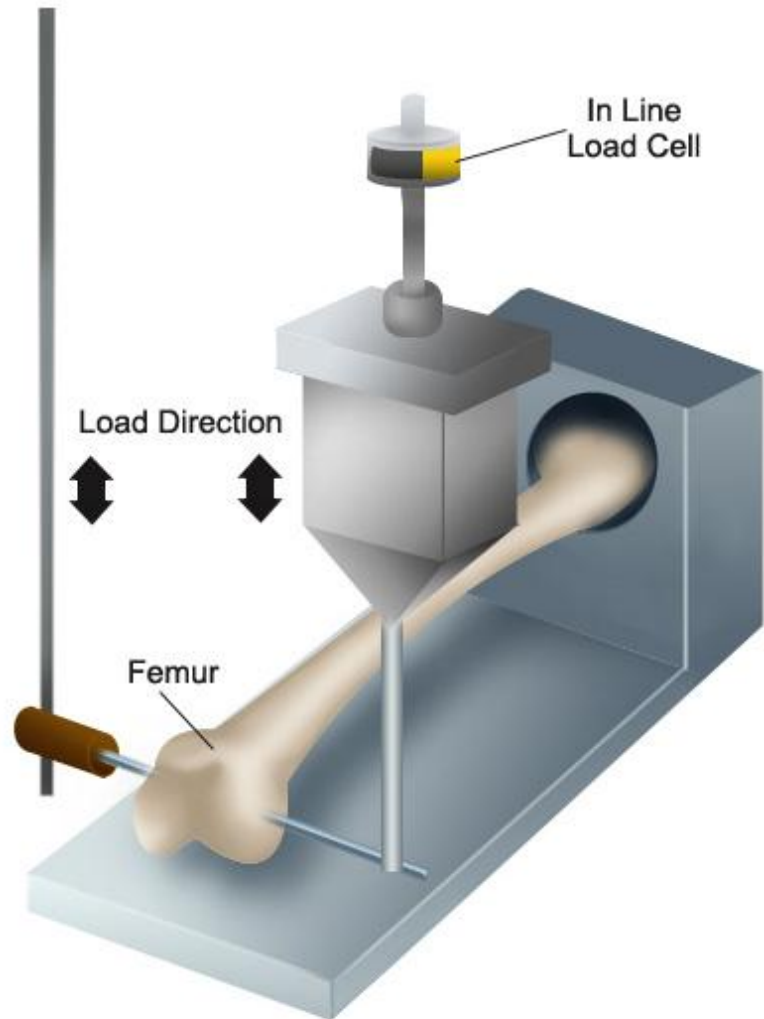
### Application 128



FUTEK Advanced Sensor Technology, Inc. (FUTEK) has expanded their High Capacity Load Cell series by adding the LCA600 Load Cell to their product line. The LCA600 is now part of the FUTEK Load Cell series, expanding the high capacity load cell range. The LCA600 is offered from 100,000 lbs to 300,000 lbs. in capacity. For an even higher capacity range of up to 1million lbs. please see the LCA700 High Capacity Load Cell model. The LCA600 compression type Load Cell is most commonly used in calibration press type applications but can also be used in a wide variety of industries.

## Sample 19 : Biometric

### Application 129



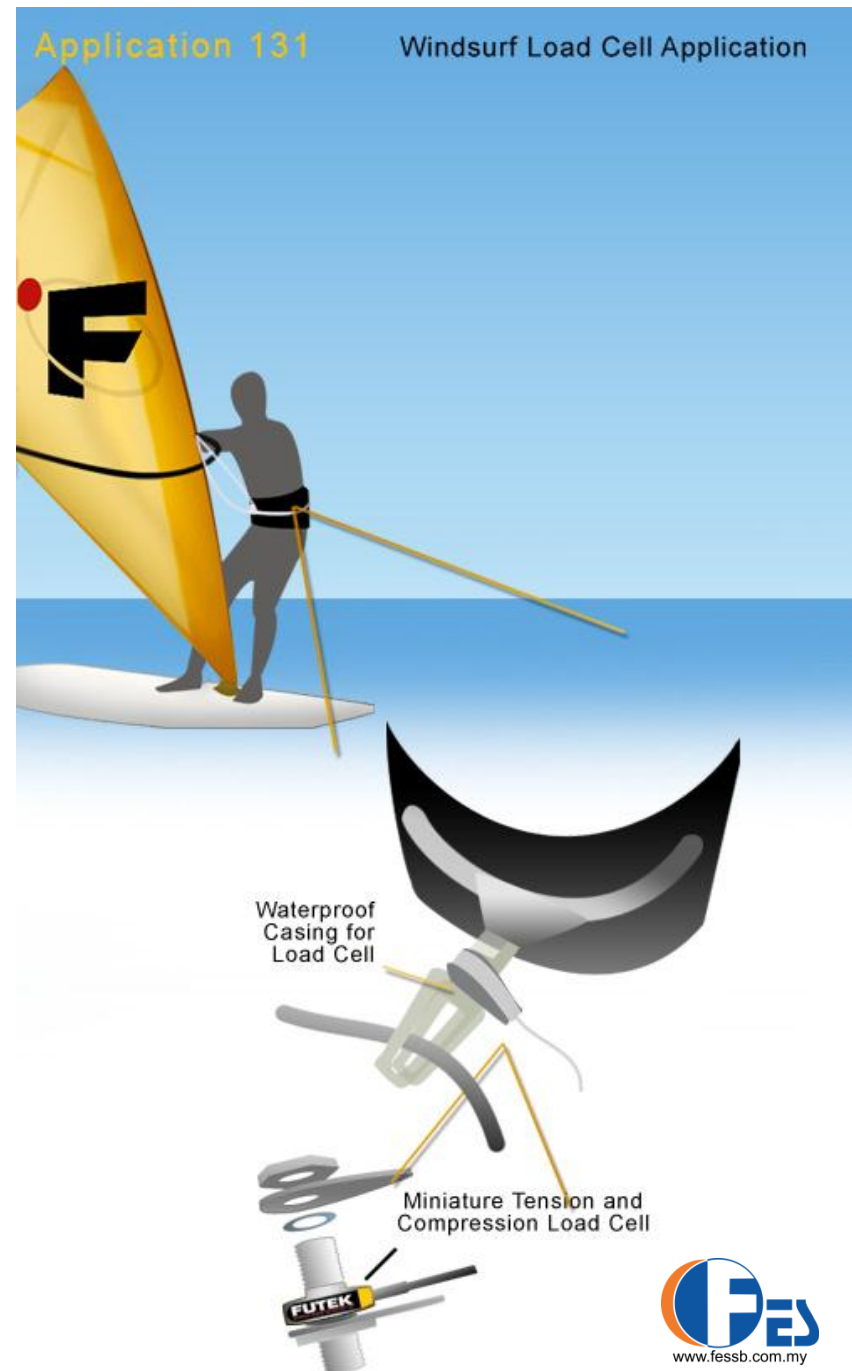
The field of Biometrics involves applications where the testing of bone strength and detection of axial force in human muscle tissue is tested in order to obtain critical data in testing. Illustrated in the diagram is a typical application using an In-Line Load Cell to predict pathologic fractures on long bones; in this case a femur is being tested by applying force in two directions.

Designed for general research applications including the fields of medicine, industrial ergonomics and sports science, the In-Line load cell makes an ideal sensor for research and testing applications.

## Sample 20 : Windsurf

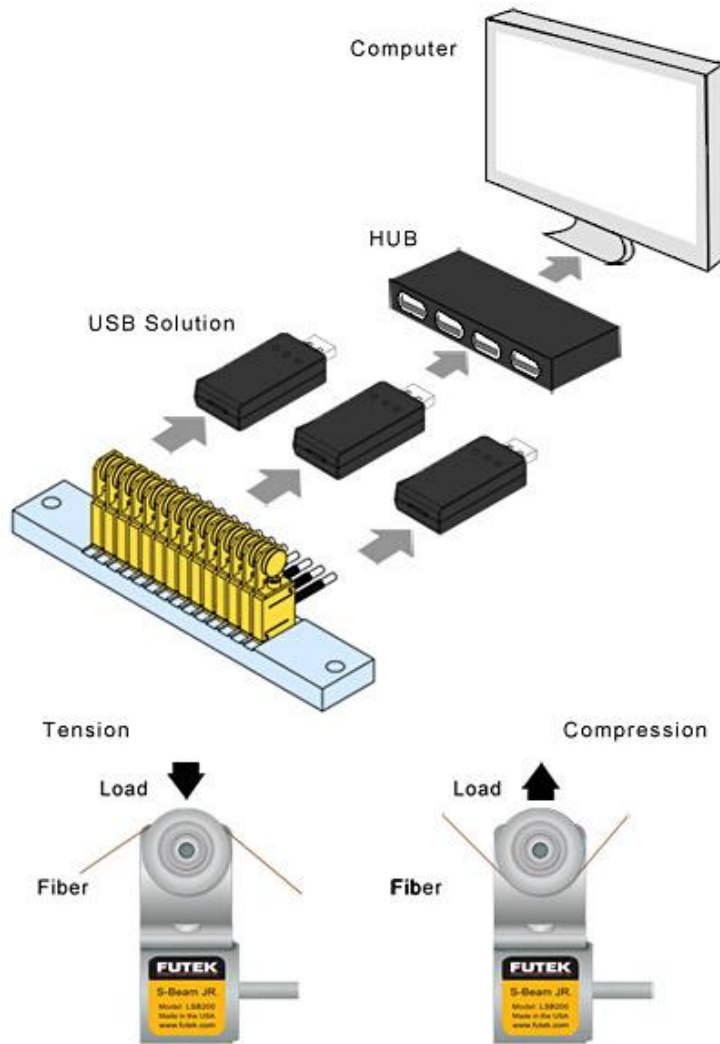
Working in the Sensor manufacturing business allows us to participate in the most unique applications. This particular application uses FUTEK's LCM200 In Line Load Cell to monitor tension on a windsurf. The sensor is attached to a belt which is worn around the user's waist and connected by a cable to the sail. With the force of the wind and tension between the cable and the load cell, the user is able to measure the force of wind on the sail.

In Line load cells may be used for a number of applications but are commonly designed for general research applications and is an ideal sensor for research and testing applications.



## Sample 21 : Wire Tension / Compression Measurement

### Application 132



Monitoring Tension Wires can be effectively done using the proper Load Cell or several Load cells as illustrated in the above diagram. For this application FUTEK Engineers utilize a LSB200 with a custom designed fixture to measure the force that the wire is applying onto the Load Cell. For ease of connectivity, a USB output option was added to the Load Cell where the system can monitor 8 to 16 channels with 1 software (FUTEK's USB Software). For this application the LSB200 Load Cell (S-Beam Jr.) can be used for both Compression and Tensile measurements.

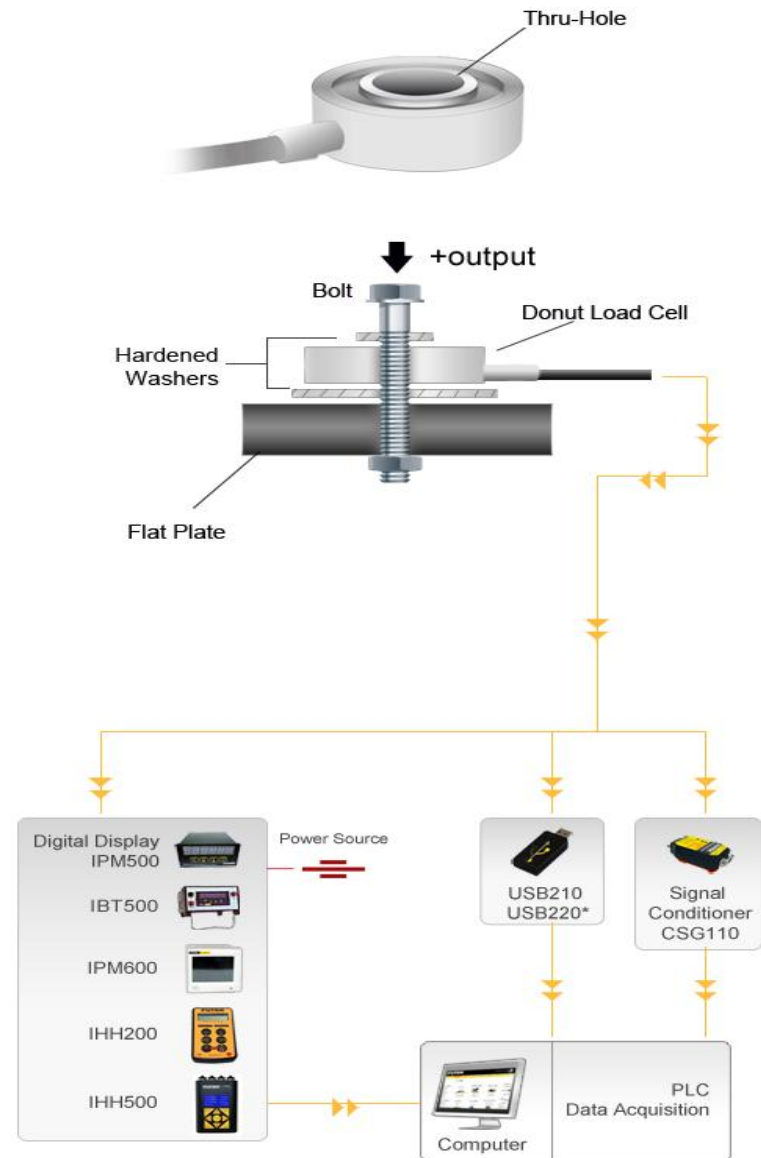


## Sample 22 : Bolt Fastening / Clamping Measurement

Donut Load Cells, like the FUTEK LTH300, are most commonly used in force measurement bolt fastening. The LTH300 thru hole/donut load cell is a compression miniature load cell designed for space limited bolt fastening force measurement. The LTH300 is available in diameters ranging from 1/8" – 3/8" giving a wide variety for applications where bolt force is being measured. A typical bolt tension application requires a load cell to obtain the data output of the force being measured. The purpose of bolt tension applications is to apply and maintain a desired tension on a fastener, stud, or bolt. As illustrated in the image below, FUTEK's miniature donut load cell serves as a perfect option for this type of application. Donut Load Cells are also useful for measuring compression such as Press, or Inline compression applications.

Application 133

Bolt Fastening Measurement

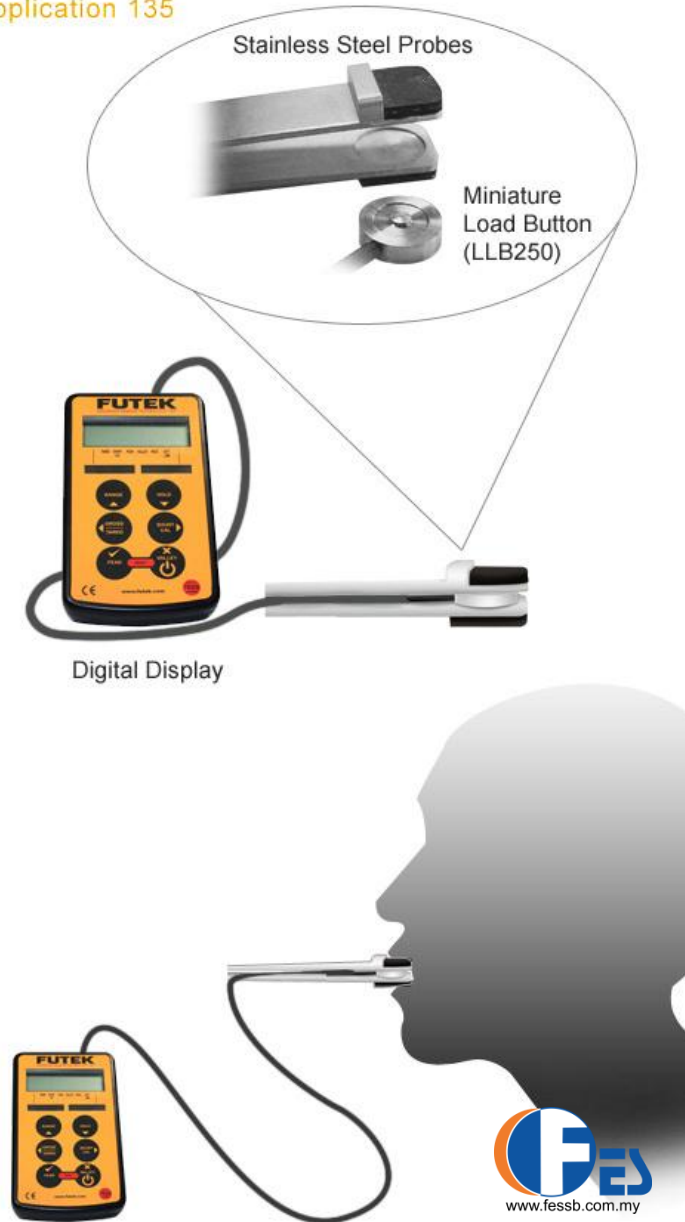


## Sample 23 : Bite Force Application for Dementia Study

FUTEK's Load Button Load Cells are unique and separate themselves from most Load Buttons in the industry, known for their high accuracy. Our Load Button series carries an extensive line of load cell sizes including a line of miniature Load Button Load Cells. Load buttons may be used for applications such as press or inline and compression applications. Our Load Buttons also offer a wide range of capacity capabilities ranging from 50lbs – 50,000lbs. With high accuracy, miniature sizes and a large capacity range, our Load Buttons are seen utilized in several applications.

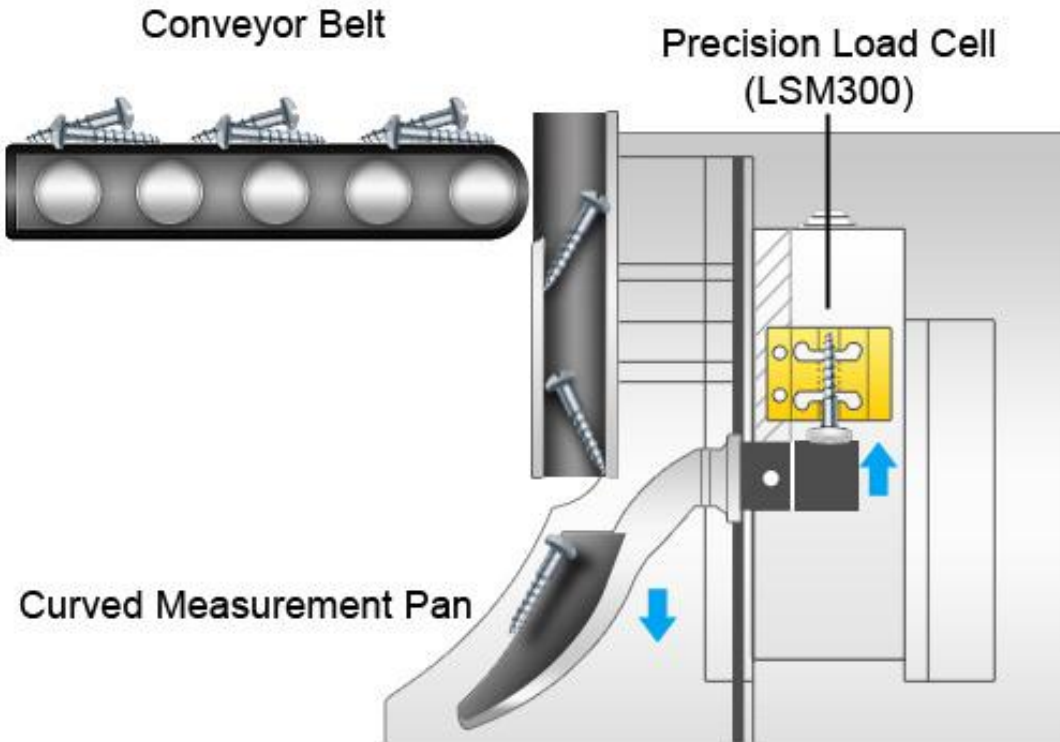
In our illustration below, the FUTEK LLB250 miniature Load Button Load Cell was used in a testing application by researchers at VU University in Amsterdam, Netherlands. Researchers used the LLB250 to measure the bite force of senior citizens in a research project for dementia. A stainless steel probe was used for the front teeth. The LLB250 was placed in the probe to measure the force of the bite and could also be placed in other probes in order to measure the force of molar teeth of the subject. The LLB250 250lb. version was chosen due to its compact size and height making it a perfect candidate for this application.

### Application 135



## Sample 24 : Mass Flow Meter

### Application 137

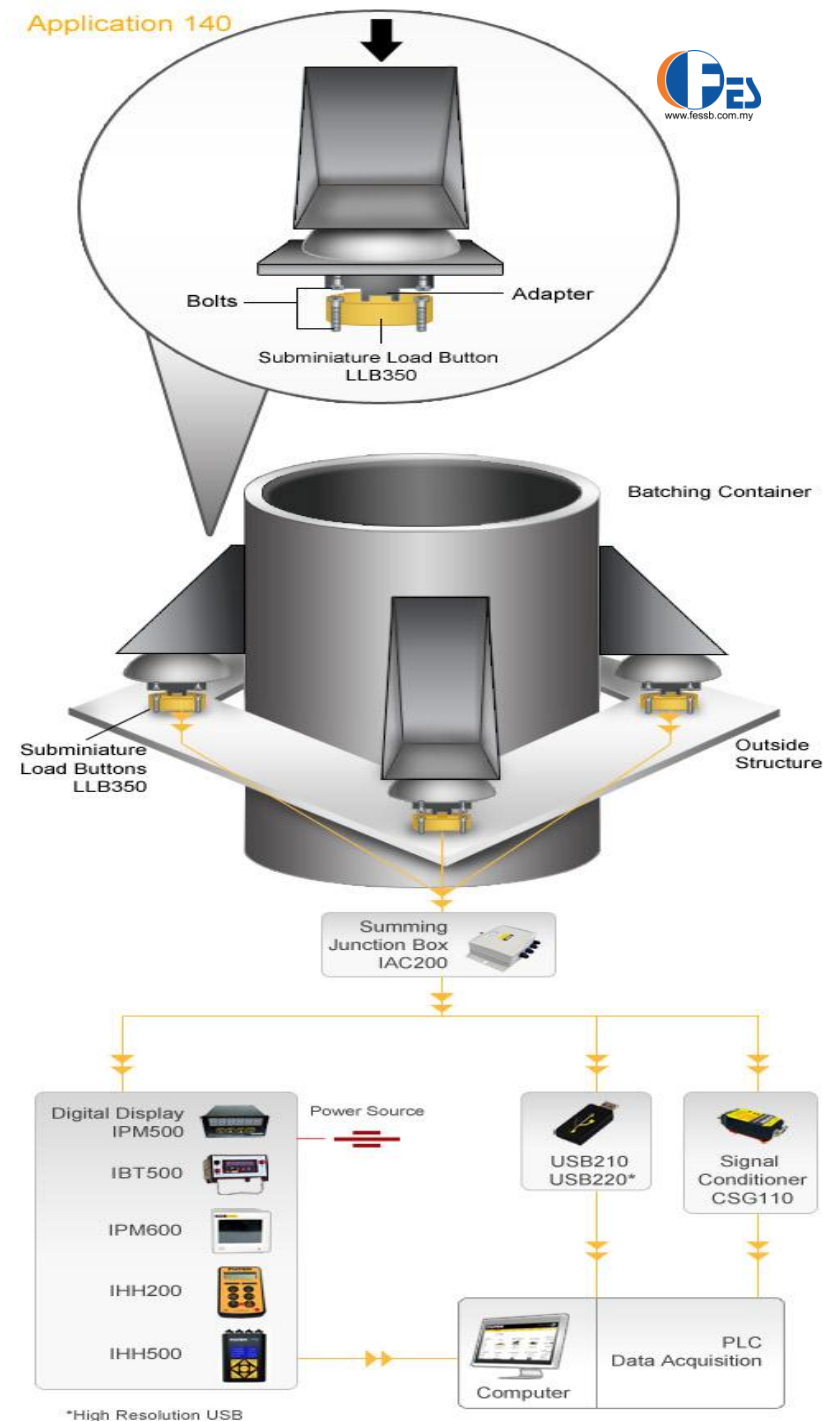


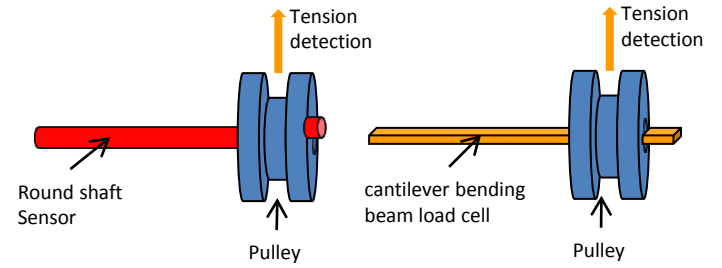
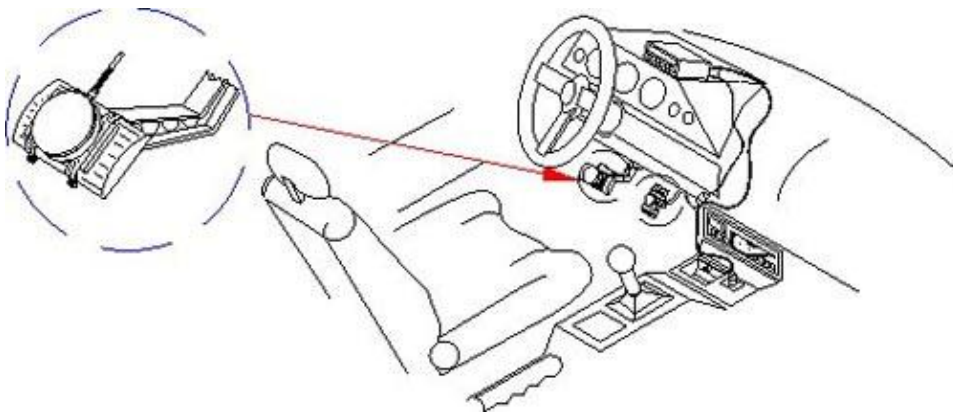
FUTEK's side mount load cells are particularly geared for OEM applications in both tension and compression. Featuring a single point design, the Side Mount Load Cell Series provide easy installation and durability for the some of the most challenging applications. The LSM300 Precision Load Cell which is also known as the Belt Buckle Load Cell was used in the application illustrated to measure the mass flow of solid particles in a process line. Eastern Instruments, a company that manufactures devices that measure and control the flow of solid particles and gases used the FUTEK LSM300 to do just that. The sensor was attached to a counterbalance assembly and the force sensing point is then connected to the structure of the flow meter to give the output.

## Sample 25 : Batch Weighing

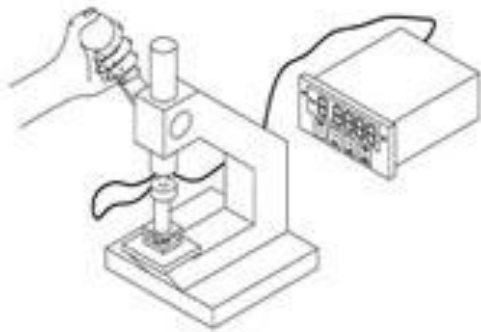
FUTEK's [Load Buttons](#) are fitted for endurance weight measurement applications. In this particular application, the [LLB350 Load Button](#) is being used to measure the weight of a container's contents. The typical mounting for the LLB350 in batch measurement applications is to thread or bolt the Load Button to a foundation and then place an adapter upon it. As the batch is added to the container, the adapter begins to press down on the Load Button, causing a signal output. Each signal then streams to the Summing Junction Box, [IAC200](#), which gathers the three signals and averages the load output. This averaged load can then be sent to a Digital Display, Handheld Device, or USB Solutions Kit.

A unique aspect about this container's design is its midsection mounting. Fastening the legs at the center of the container helps minimize side load variables. This is important to take into consideration when variables, such as wind, can affect the distribution of the contents, thus causing the signal average to fluctuate.

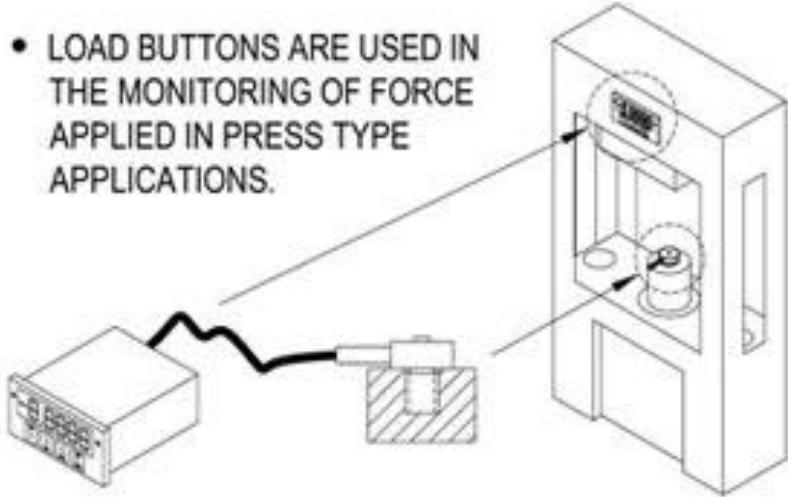




- SENSOR MAY BE USED TO MONITOR FORCES IN AN ARBOR PRESS



- LOAD BUTTONS ARE USED IN THE MONITORING OF FORCE APPLIED IN PRESS TYPE APPLICATIONS.



**COMPACT PARALLELOGRAM SENSOR  
SIDE MOUNTED (LSM300)**

