The Path to Industry 4.0

Integration is better than isolation. Collaborative systems that communicate across functions enable the smart factory designs that are fundamental to industry 4.0. Information sharing across systems with different functions is a necessity to optimize effectiveness; especially at handoff points between operations.

Crucial components of information sharing that enable smart factories are different types of measurements including:

Force   **Pressure**   **Torque**   **Weight**

Group Four provides integrated measurement chain solutions across systems that easily integrate into your PLC or HMI. Integrated digital measurement systems are the foundation of the smart factory, which is a cornerstone for industry 4.0.

Industry 4.0 is a reference to the fourth industrial revolution that takes the computerization and automation of the third industrial revolution and monitors and controls components of the supply chain such as robots and machinery via IOT, 'Internet of Things'. The supply chain integration goes beyond individual operations of the supply chain, but also integrates with ERP systems to allow for a level of resource planning previously unimaginable.

Many industry 4.0 articles and discussions focus on the tremendous advantages and opportunities we have from complete integration; however, most operations are not at the point of complete digitized measurement of all supply chain functions, and have more immediate challenges with first establishing digitization of factory floor functions, interconnecting those functions, and automating communication and handoffs between these functions.

The digitalization of the factory floor is the first step toward the smart factory, which is a cornerstone of industry 4.0.

The challenges of digitization of the factory or shop floor are often understated or not communicated in an easily attainable manner for many if not most manufacturers. Too many solutions recommend a significant replacement of existing production equipment versus modification of in-place systems to allow for upgrade and digitization.

Group Four's measurement chain solutions allow for a staged approach to digitization, and reasonable milestones to achieving a smart factory.

While it is easy to recommend brand-new, all-digital measurement solution that provides out of the box integration with your HMI or PLC (and Group Four offers this)… this approach does NOT consider legacy investments or the proposition of upgrading older systems to be integrated with the digital smart factory environment.

Group Four provides measurement chain solutions that allow for integration of analog measurement systems with digital systems.

The following illustrates some of Group Four's combinations of measurement systems that allow for the end goal of digital measurement, without the need to throw out legacy investments.

For this example of an integrated measurement chain, let us take the example a large-scale bakery operation that has a multitude of different digital and analog measurement systems integrated in one HMI for controlled production and packaging of its baked goods.

The bakery has 25 tanks of mixed dough. These 25 tanks are fed the primary ingredients of flour, water, salt, and yeast. The vats issue the mixed dough to a conveyor system for baking, cooling, and packaging.

The tanks in this system are old pieces of machinery that were manually fed, and integrated via manual process to the baking system. Group Four was tasked with providing an end-to-end measurement system to bring this legendary baking factory greater measurability, and automation, integrated into the central PLC.

The Group Four Measurement Chain:

      1. Digital input for the flour, water, salt, and yeast fed to the 25 dough tanks..

2. Each dough tank was measured by a 4 point analog system at its base. Some tanks used weigh modules, and some used other load cell combinations. Group Four took the export signal from each foot into a JB4 junction box.
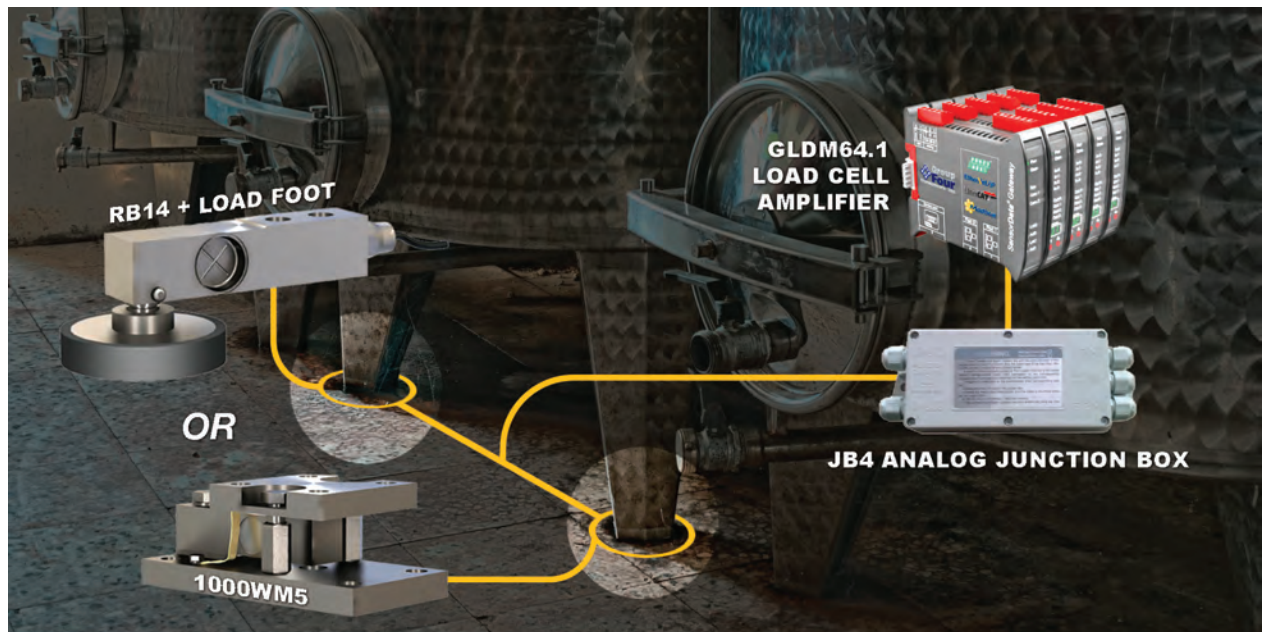
3. Each JB4 Analog Box feeds to an LDM signal conditioner that is connected to a universal gateway, and a precise measurement of mixed dough is fed onto the conveyor.

4. The conveyors, with the precisely measure vamount of dough are baked and cooled.

5. Finished baked goods are loaded on to smart-scale trays and measured for packaging. Similar smart scales can be used in final packaging.

6. All of the analog and digital measurements are cleanly cabled and integrated into one control system that feeds the Allen Bradley PLC:

All systems in the Group Four measurement chain process are cleanly integrated, with single cabling between systems and functions, into one point of measurement and signal conditioning, right into the smart bakery PLC. The resulting benefits are numerous and include quality control, consistency of measurement, identification of production error, and initial inputs and outputs are communicated to the ERP for automated planning.
The above described measurement chain was made possible without replacing old production mechanisms, digitizes analog inputs, and integrates conditioned signals into one system.

4	25x4	2	1	PLC
Ingredients, 4 Digital SPF5	Mixer, 100 Analog WM5	Finishing and Packing Scale, 1 Digital SBSSPD, 1 Analog GBSA	1 box 26 GLDM 1 Universal Gateway	1 point integration to Allen Bradley PLC

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