

Cordless Fastening in Smart Manufacturing:

Everything you need to know in selecting the right cordless system to enable and optimize your connected factory.



Solutions are in *our* DNA.

As the pace of manufacturing continues to accelerate, so does the pressure to adopt Industry 4.0 and smart connected solutions. Tool manufacturers have been working tirelessly to offer the most advanced technology and innovative solutions as assembly plants strive to meet demands and become the factories of the future. Navigating through the noise and making decisions around new tooling systems can seem daunting, especially when your first priority is to keep your assembly lines running smoothly.

Today's fastening solutions are no exception to the accelerated pace of smart, connected manufacturing. As needs have become more complex, the solutions are following suit. Tools perform the simple function of tightening but must do so with exceptional precision, accuracy and traceability. Add to that, the sophisticated manufacturing processes of today, and it's easy to see that engineers and operators have even more to consider when choosing the right tool for the job.

Cordless fastening tools have been gaining popularity and user acceptance on assembly lines over the last decade for many reasons. By keeping versatility, traceability and connectivity top of mind, choosing the right cordless fastening system doesn't have to be complicated.

VERSATILITY

Cordless systems are the most versatile assembly systems on the market. Cordless tools can provide improved ergonomics, safety and flexibility over their corded tool counterparts. Cordless tools can run without a controller, on a dedicated cordless controller, on a hybrid controller that runs both corded and cordless tools or communicate directly to a manufacturing execution system (MES) using an application programming interface (API). This production flexibility allows users to repurpose, replace, or relocate tools very quickly and easily. In addition to traditional production lines, cordless tools are a great solution for rework stations, repair, MRO and as backup tools for corded tools that require maintenance.

TRACEABILITY

Most of today's automated production lines use flexible manufacturing systems to assemble multiple products and versions on a single line, making traceability and error prevention critical to a successful containment strategy. Cordless tools offer complete traceability and error prevention features at every level of the assembly process. Using spatial systems, barcode scanners and socket trays, or a combination of those, are just a few ways manufacturers can address their unique tracking and containment needs.

Spatial Systems // Leveraging user-defined geofencing parameters, spatial systems track the tool location and application and prevent users from working ahead or moving the tool out of the work zone. Spatial systems can be classified in three levels: station level, application level and bolt level.

Station Level // Station level error prevention can be achieved using many available tags on the market. Most of these tags operate on ultra wide band (UWB) frequencies. UWB is a great solution for this because it does not require "line of sight" (like bolt level tracking), and UWB does not operate on the same frequencies as the tools do, which is 2.4 – 5.0 GHz.

Application Level // Another advantage of spatial systems is that they can have a moving geofence with relative positioning to a vehicle. This means that if a tag is attached to a datum point on a vehicle, the system can detect if the tool is in the right location relative to the vehicle. On assembly lines where productivity is king, timing is everything, and any error is costly, geofencing is an optimum solution.

Bolt Level // Bolt level tracking systems can track movement of a tool in six (6) axes, which includes traditional X, Y and Z axes, as well as pitch, roll and yaw. You can use the position of the tracker as the starting point and create an offset to where the tool will contact the fastener. This allows the users to know exactly where the tool output is, within +/- 1mm, and set tolerance zones on each of the axes depending on the application.

Typically, bolt level tracking systems would be used to enable or disable the tool based on location; however, users can also use the input of location to output a rundown strategy. This means if you are tightening 2 bolts with two different strategies in the same workspace, the tool can switch applications based on the locational input from the tracking system. Most bolt level systems run on Infrared to triangulate the position of the tool, which means it is important to limit interference within the line of site between the tool tag and the tracker.

Barcode Scanners & Socket Trays // Cordless tools can also be outfitted with a barcode scanner to scan the serial number, or VIN, before performing the rundown. Socket trays can be used to indicate the correct socket and/or extension to be used, or combining both of these with a positioning system, you can link all of the information: VIN/serial number, rundown results, socket used, position tightening occurred, and date/time, to provide the highest level of error mitigation. Several manufacturers that have gone completely cordless have implemented a system that looks like this to error proof their process.

CONNECTIVITY

Cordless tools require a significant amount of connectivity to operate effectively, and many would suggest that connectivity is the most critical consideration to evaluate when choosing the right cordless tool for your line. In its simplest form, this looks like: the tool gets the rundown strategy from the controller, the tool performs the rundown, the tool sends the results back to the controller and the controller sends those results to the plant.

In a lean production environment, where every vehicle coming down the line could be, and likely is, different, it is critical to maintain connectivity at all times. Varying models, trims and applications in a single plant are produced “just in time,” which adds to the complexity for assembly and importance on reliable connections. Today’s cordless assembly solutions have been developed to mitigate risks associated with data protection and connectivity.

Data Protection // To address manufacturer concerns, many cordless tools have automated data buffering capabilities that store thousands of rundowns in the event that a Wi-Fi connection is lost. Once connection is re-established, the tool will send the stored data to the controller. Some tools even have back-up buffer batteries that will keep the tool and Wi-Fi card powered on and connected to Wi-Fi during a battery change. This is

especially useful in low takt time environments, as it prevents the need for tool reboot, reconnecting to Wi-Fi and receiving rundown strategies from the controller.

Connectivity Options // Leveraging different wireless communication options ensure tools stay connected. Cordless electric nutrunners can operate on both Wi-Fi and Bluetooth. Wi-Fi is available in both 2.4 GHz and 5.0 GHz, and Bluetooth is available in version 4.0. Other devices in the market run on Zigbee and Xbee, which are also forms of Bluetooth operating on the 2.4 GHz band. About 80% of plants today run on Wi-Fi, while about 20% run on some form of Bluetooth. In other words, communication flexibility gives users the option to keep tools connected and avoid interruptions.

Running Devices on only 2.4 GHz // A Cautionary Tale

Many devices run on the 2.4 GHz frequency band. One particular instance worth mentioning is a situation in which tools were losing connection during shift change. A certain bank of tools were continuously dropping in and out of the network at the same time each day. It was determined that very old, poorly shielded microwaves were the cause. Each day, as the first shift workers were heating their lunches, the microwaves were emitting a 2.4 GHz signal, which interrupted the cordless devices connected to that Wi-Fi frequency band. While 2.4 GHz provides the best range for tools in a plant, it does not penetrate through physical objects and is susceptible to interference from other devices. Knowing the advantages and disadvantages to each method, and planning your work cells appropriately, will keep you from having connection issues in your plant.

Cleco CellCore™

Cordless tools, such as the new Cleco CellCore nutrunner, provide the versatility, traceability and connectivity that customers expect, while error-proofing processes and outcomes.

Cleco's new CellCore Cordless Assembly Tools are smart, durable and designed to withstand the toughest environments. The lightweight ergonomic design reduces operator fatigue while delivering state-of-the-art power, weight and balance. A large user interface makes it quick and easy to program rundowns on the tool without a controller.

CellCore is the most versatile, easy-to-use cordless tool in the industry. Users can program up to 10 rundown strategies, called "FastApps," directly on the tool in standalone mode. Users can also pair CellCore tools with Cleco's new mPro200 controller. By pairing the devices, users can easily capture data in real time and program advanced rundowns within a much more compact footprint.

As the manufacturing industry continues to evolve and become more advanced with the adoption of Industry 4.0 and smart connected solutions, cordless technology provides an obvious advantage. Increased output, improved safety and reduced complexity are just a few reasons why many assembly lines are making the switch to cordless. Industry 4.0 is within reach and implementing the right cordless assembly solution is taking factories to the future now.

ABOUT CLECO® PRODUCTION TOOLS

Cleco is a global leader in manufacturing and delivering world-class assembly solutions including DC electric and pneumatic assembly tools, and pneumatic power motors. Cleco's tools enhance user productivity, safety and comfort and are supported around the world. Founded in 1894 as Cleveland Pneumatic Tool Company in Cleveland, Ohio, USA, Cleco's expertise is the culmination of 120-plus years of delivering assembly tools and systems for a wide range of applications in the automotive, energy, aerospace and general industries.

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