

STANLEY
Engineered Fastening



Battery vs Pneumatic Tools:
How going cordless is changing
the manufacturing game

Leaders across industrial and manufacturing sectors are transitioning to electric hand-held tools to keep up with a dynamic, rapidly-changing industry.

Why Now?

The manufacturing industries are having a watershed moment. With massive growth projections in the solar, wind, and ground transportation industries, a shift toward greater efficiency and sustainability is coming into focus. Similarly, a new generation of industrial manufacturing facilities is moving away from energy-intensive pneumatically-driven hand tools in favor of their battery-operated electric counterparts. As innovations in the electric tool market deliver lighter, more powerful tools with long-lasting batteries, what once seemed impossible now looks inevitable: a cordless tool-dominated industry.

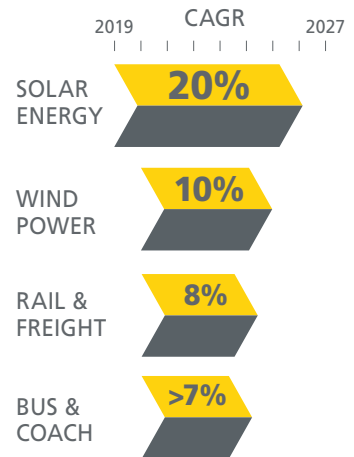
With current growth moving steadily upward, the renewable energy market is a massive driver of growth in the electric tool industry. As demands increase and costs drop, the upward trend shows no sign of slowing. In 2019, renewable power generation produced 9% of the world's energy; by the first half of 2020, it accounted for 10% of global electricity production.

As nations work to meet the 2015 Paris climate agreement, those percentages will likely surge in the coming years. According to a recently published Allied Market Research report¹ experts forecast the global solar energy market will grow at a CAGR of 20% from 2019 to 2026. The wind power market is also ramping up and should grow at a CAGR of just over 10% between 2020-2027, according to a Market Research Future report².

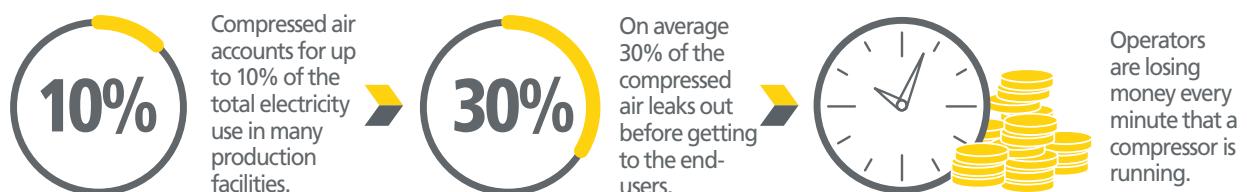
Meanwhile, post-COVID concerns about air travel and reducing emissions are spurring growth in the ground transportation industry-driving demand for bus, rail, coach, and trailer manufacturers. According to a 2021 Train And Components Global Market Report³, the freight and passenger rail car and component industry has a forecasted CAGR of 8% between now and 2025. Increased urbanization and demand for electric bus fleets are stimulating the bus market, and a Mordor Intelligence report forecasts a CAGR of almost 8% between 2020 and 2026.

In each of the aforementioned markets, increasing demand is putting pressure on manufacturers to increase capacity, which offers an opportunity for making critical upgrades to outdated equipment and building new state-of-the-art facilities. In either case, forward-thinking manufacturers are pushing for increased efficiency-an advantage cordless handheld tools hold over those that are air-driven. The newest generation of cordless tools is free of past limitations: they deliver more accurate torque, dependability, and repeatability than ever before.

GROWTH PROJECTIONS BY INDUSTRY



THE REAL COST OF AIR





Cut the Cord, Cut Costs

In the past, pneumatic tools promised a high enough level of consistent power to justify the costs of maintaining and monitoring the systems driving them. Today, as energy costs increase and pressure mounts to improve operational efficiency, their cost to benefit ratio is vastly diminished. It has been estimated that generating compressed air accounts for up to 10% of the total electricity consumption in many production facilities. Considering that on average 30% of the compressed air leaks out before getting to the end-users, operators are losing money every minute that a compressor is running.

In addition to the high volume of air wasted in air-driven production line systems, there are also considerable adjacent costs associated with pneumatic systems. The hot, wet, oily air that compressors produce has to be conditioned to avoid contaminating downstream machinery. The oily condensate produced by compressors is also expensive to dispose of properly. To maintain an acceptable level of efficiency in an air-powered system, a significant amount of monitoring and maintenance is required, incurring further costs.

Site-specific installations pose an entirely different set of concerns.

Making the decision to go cordless, Jason Hetherington of Easiaccess, the UK's largest manufacturer of modular ramps, explains, "We're very limited once we get to a site, sometimes we don't even have power available." In addition to eliminating hazardous trailing air lines across public walkways and the need for an independent electric source, he adds that "We needed something that could be carried into the site, used quickly, and carried out again." With a battery that lasts an entire work week, cordless riveting tools were the clear choice for Easiaccess installations.

By some estimates, shifting from compressed air tools to motor-driven tools can result in energy savings of up to 95%. A recent case study⁴ published by the Department of Energy determined that the ROI of replacing pneumatic tools with battery-operated ones at an automotive assembly plant was 17.3% per year. A 2018 University of Minnesota study⁵ determined that pneumatic power tools use around seven to thirteen times more energy than electric motor-driven power tools, and motor-driven tools have become even more efficient since then.

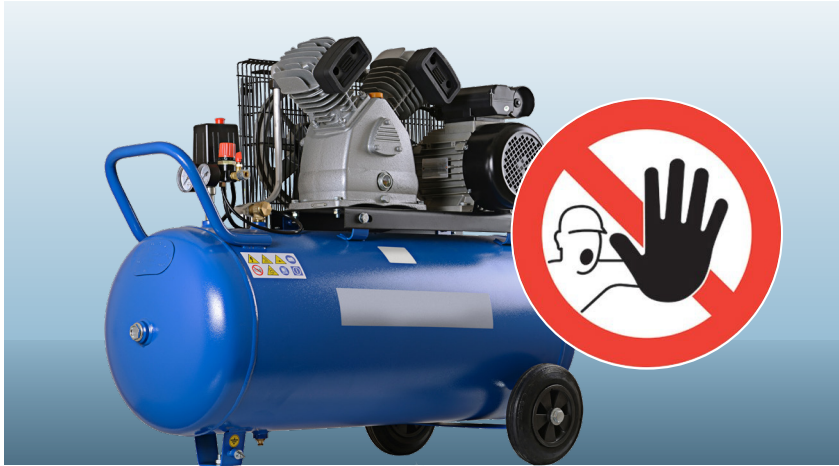
Cordless hand tools are more cost-efficient in manufacturing operations for a few key reasons. The maintenance costs of motor-driven tools are negligible, and they

are extremely energy-efficient, with none of the wasted energy found in air-driven systems. Companies also enjoy a lower incidence of workplace safety incidents caused by the hoses attached to air-driven tools—meaning less liability and less potential risk of expensive payouts.

Environmental Impact and Compliance

Cordless tools produce better working conditions than air-driven tools, from reduced noise production to improved air quality. Motor-driven tools are considered "cleaner" because they don't generate oily byproducts like pneumatic systems. The oil-free operation of motor-driven tools also means that there is no environmentally hazardous waste to manage, such as the oily wastewater from industrial pneumatic systems.

As environmental regulations change, compliance can be costly for production facilities using air-driven tools and can require expensive equipment upgrades. This is an ongoing issue in both the US and the EU. But the bottom line is that these changing standards are not designed to punish industry—they are a necessary part of improving air and water quality and achieving national goals in emissions reduction.



Considering that on average 30% of the compressed air leaks out before getting to the end-users, operators are losing money every minute that a compressor is running.

Because they use such a small fraction of the energy as pneumatic tools, battery-operated hand tools offer a clear-cut path towards greenhouse gas reduction.

Versatility

While there are many arguments in favor of cordless tools anchored in calculations and projections, perhaps the most compelling reason is the most easily visible: they offer unmatched versatility and mobility. Cordless tools are untethered to a centralized air system, making them easy to take to remote sites-of particular concern with large solar installations and wind turbine construction and maintenance. Within a facility, the lack of a cord allows operators freedom of movement and increased ergonomic efficiency.

The mobility and advanced features of this new generation of battery-operated tools also give operators the ability to be used to assemble multiple products on a single line. Smart tools provide adjustable settings and performance tracking features that make it possible to shift from one task to another with the same tool. Error prevention features ensure that every single stroke or pull is precise and to spec, reducing manufacturing defects.

Last, but certainly not least, interchangeable batteries that can be

used for various different tools are a massive innovation in the cordless tool world. A new generation of cordless tools is designed to be “one battery fits all,” meaning that with the same battery you can operate both a fastening tool and a wide range of other tools, offering flexibility and convenience. This ability to use one battery in scores of different tools offers the manufacturing industry opportunities for cost saving and versatility.

Cordless Tool Adoption by Industry

While cordless tools are gaining traction in every market, from landscaping to home construction, the end-users of cordless equipment who have the largest impacts are in the manufacturing industries. Unlike individual consumers, commercial manufacturers use the same tools day in day out and need them to be efficient, reliable, and precise. Cordless fastener tools represent one of the fastest-growing segments of the battery-powered tool market, for a number of very sound reasons.

Ground Transportation

Urbanization and efforts to curb carbon emissions are driving demand in the bus and train industry, with a

special focus on electric options. The declining cost and rising efficiency of batteries are facilitating market growth, and government incentives ensure that this trend will endure.

While some coach manufacturers are household names, a flurry of up-and-coming producers is currently coming online. Many newly-designed facilities will opt to use cordless tools in their operations, but established producers are also beginning to transition. “They’re a lot more maneuverable because you are not dragging the air line,” says Philip, a coachbuilder at Alexander Dennis Ltd., Britain’s biggest bus builder and the world’s largest manufacturer of double deck buses. In addition to having a surprisingly long battery life, the Alexander Dennis team found that the light, agile tools were easier to get into tight spaces with. “You couldn’t get in, because of the air line. These give much better access.” The large profiles of the materials used in coach assembly make it difficult to work around the restrictions of an air line, and give cordless fastening tools a distinct advantage.

Truck Trailers

An oft-overlooked segment of the transportation industry is the trailers used for surface transport of goods over long distances. A Research

and Markets 2021 report⁶ estimates the global semi-trailer market was around \$29.5 billion in 2020 and is projected to grow to \$41.2 billion by 2025, at a CAGR of 5.6%. This market is growing as trucking companies incorporate telematics technology to optimize logistics and as changing environmental regulations drive demand for more lightweight trailers. Trucking companies, pushed by stricter emission regulations, are leading manufacturers to assemble trailers using higher percentages of lightweight components.

Solar Energy Generation

The growth in renewable energy markets is underpinned by the rapid expansion of solar grid utility technology. Over the last decade, solar has grown at an average rate of 42% in the US, and between 32% and 50% annually from 2006 to 2017 in Europe⁷. This growth is due to federal policies and tax credits, declining costs, and demand for clean energy rising across both the private and public sectors. Solar installation often occurs in remote off-grid locations, necessitating battery-operated tools.

Alex Martinez, construction manager of a 158 megawatt solar installation project built by NEXTracker in Aguascalientes, Mexico, attests to the practical application of using

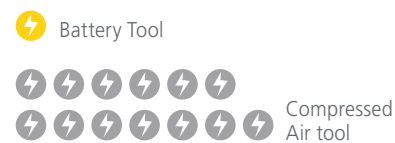
battery-operated fastening tools on the project site. "It increased our efficiency tremendously," he says, adding, "We have removed the need for a compressor, generator, hoses, gasoline, and oils." Josif Josifov, the site manager overseeing the 450,000 panel installation agrees, "Before, we needed three people to move the generator, the compressor, and the hose. Now, just one person with two or three batteries-that's it!"

Wind Turbines

Wind energy is a steadily growing segment of the renewable energy market, thanks to growing initiatives toward reducing greenhouse gas emissions while expanding production capacity. Projected to grow at a CAGR of 10% over the next five years, demand for manufacturing, installation, and maintenance will also increase accordingly. Fasteners used in wind applications are generally considered safety-critical, and accessing the bolts requires tools that allow technicians to move freely around the large components of these systems. Many of the internal fasteners inside wind turbines are in difficult-to-reach spaces, requiring tools with the flexibility to be easily maneuvered.

Director, Product Management, Global Tools & Automaton at Stanley Sean McGain-Harding explains,

ENERGY CONSUMPTION



Pneumatic tools use 13 times more energy than electric motor-driven power tools

"Like solar power projects, much of the assembly work on wind power installation takes place in remote locations, without easy access to compressed air to power pneumatic tools. The additional hurdle with wind power installation is that much of the assembly work on the turbines takes place hundreds of feet in the air." By McGain-Harding's estimation, cordless power tools are critical to this industry on a logistical basis alone. But there are also technical reasons why cordless tools make sense in these circumstances. He elaborates, "The exacting joint clamp force specifications on wind turbine components means that tools that have smart capabilities-and that can be set to work to precise tolerances-are key to minimizing on-site errors".

User Experience

There are few places where user experience is more important than in the manufacturing world, where tool users are subject to long hours of repetitive motions. Cordless hand



tools offer improved ergonomics, allowing users to maneuver in all directions without having to “fight” with air hoses to do their jobs. Data from a McMaster University study⁸ comparing battery-operated and pneumatic tools suggests that the use of cordless tools reduces the demands on the forearms during use.

But battery-operated tools also offer other workplace safety improvements over pneumatic tools. Researcher Michael H. Weier recently published a study⁹ positively correlating hand-arm vibration through the use of pneumatic tools with permanent hearing loss-independent of noise exposure. In addition to vibrational concerns, air hoses present a trip hazard and when damaged cause serious injuries. Jason Junkers of Windpower Engineering & Development says, “Recent battery-powered wrenches provide solutions to the trip hazards and vibrations of conventional power tools.”

Electrical motor-driven tools also offer improvements outside of operator safety; electric hand tools provide sophisticated user oversight in manufacturing. Advanced battery-

powered tools allow the use of SMART features, such as process monitoring, for industry 4.0 and traceability. Programmable functions and digital performance tracking increase confidence in work quality. Alerts let operators know when fasteners are inadequately tightened or torque specs are not met-ensuring consistent quality and reducing manufacturing defects.

Market Trends

The current trend in manufacturing towards electrical motor-driven tools is also reflected in the overall market forecast: a CAGR of over 9% is expected from 2019-2025 in the cordless electric tool market. The key factors fueling strong market growth are the surging rates of construction in emerging economies and increased adoption rates of cordless fastening tools in industrial settings. Between residential building, commercial construction, and infrastructure development, global construction is expected to reach a CAGR of 9.2% by 2024¹⁰. During the forecast period, increased standards in green building regulations coupled with high manual labor expenditures will lead to a surge

in demand for cordless power tools.

Director, Product Management, Global Tools & Automaton at Stanley Sean McGain-Harding is quick to point out that while pneumatic tools will likely always have a place in the manufacturing industry, “A new generation of fasteners and cordless installation tools have been developed to meet the needs of remote sitework. As demand in the alternative energy generation sector increases, it drives demand for cordless installation tools. Our goal is always to provide the most efficient, reliable, and durable solutions to the challenges our clients face.”

New Trends, New Tools

With demand for cordless tools in manufacturing at an all-time high, several fastener models are rising to meet the moment.

The latest in cordless blind rivet technology, the **Stanley PB2500 Smart**[®] is designed for use in appliances, bus and coach, solar, and white goods applications. It features easy-to-use process monitoring to minimize defects and maximize productivity in industrial assembly

SWITCH & SAVE

95% ENERGY SAVING

Some studies show energy savings of up to 95% by shifting from compressed air tools to motor-driven tools



Much of the assembly work on wind power installation takes place in remote locations, without easy access to compressed air to power pneumatic tools plus the assembly work on the turbines often takes place hundreds of feet in the air.

With demand for cordless tools in manufacturing at an all-time high, several fastener models are rising to meet the moment.

processes and is particularly useful for safety-critical mountings such as handles and seating. Capable of holding up to 500,000 pieces of data, the integrated touchscreen displays rivet counts, an OK/Not OK message after each rivet placement, and other live data. The PB2500 Smart® can install up to 1,100 steel open-end fasteners on a single charge.

The first-ever battery-powered speed fastening solution, the **Stanley SB25PT-05®** is engineered to significantly improve productivity in rail, bus, and coach production lines. The cordless, long barrel design increases operator mobility and allows access to narrow spaces. All interface equipment of this speed fastening gun is compatible with its pneumatic predecessors, meaning that the mandrels, follower springs, and nose jaws can all be interchanged between tool types—allowing users to transition to battery-powered tools without incurring any additional costs. A magazine-fed fastener speeds up fastening processes, and the speed rivet system produces zero waste.

The much-anticipated **Stanley NB08PT-18®** is the first battery-powered blind rivet nut tool in the Stanley Engineered Fastening range. Ideal for HVAC, domestic appliances, bus and rail coach manufacturing operations, a touch-operated screen provides live rivet counts and other poka-yoke capabilities. Stroke and force settings are programmable, ensuring consistent, rapid, precise rivet placement. The NB08PT-18® features toolless quick-release nose equipment, enabling the same tool to mount multiple sizes of blind nut rivets



with only a quick front-end change. Capable of installing 900 blind nut rivets on a single battery charge, the quick slide battery installation means almost uninterrupted use between battery changes.

Each of these innovative tools is lightweight and features exceptional ergonomics designed to reduce operator fatigue. They function quietly, reduce vibration in joint applications, and use DEWALT® lithium-ion batteries interchangeably which allows for versatility and cost savings.

STANLEY ENGINEERED FASTENING CORDLESS TOOLS INSTALLATION RATES

PB2500 Smart®



1,100  Steel open-end fasteners

NB08PT-18®



900  Blind rivet nut fasteners

How Soon is Now?

The world is changing, and industry is changing along with it. The traditional adherence to pneumatic production tools is loosening as battery technology makes lighter, stronger, and more sophisticated hand tools more cost-efficient and competitive. While older operators may be attached to air-driven tool systems, a younger generation of technicians is embracing these cordless tools without hesitation.

In the coming years, it will be possible to observe how early adopters of cordless technology in manufacturing and industrial applications reduced costs and improved overall productivity. In the meantime, the trend towards going cordless will continue to gain traction as innovations make tools more dynamic, less expensive, and more efficient every year.

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AVDEL

INTEGRA™

NELSON™

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POP™

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Assembly Technologies

TUCKER™