

Are tooling assets really worth managing?

The simple answer is yes, argues John Tremblay, Wind Energy Segment Manager for Snap-on Industrial...

Conventional wisdom within the wind energy sector says that millions of dollars in tool assets are lost each year. In addition, the hidden or less obvious results of poor tool management may actually have a greater impact on the bottom line, and also carry the potential for even more serious consequences. Until very recently however, wind project and maintenance tooling seems to have taken a back seat.

There are some legitimate reasons why wind energy has been slow to embrace tool management. With rapid market growth over the last several years, the pace of work has been so great that tools have often been pushed down the priority list and considered expendable. In addition, with a generally young and inexperienced workforce, the learning curve has been steep with little band-width for other than the task at hand. The good news is, as owners and operators look for creative ways to be more profitable, improved tool management is a fertile field of opportunity.

Costs

In other 'critical industries' the potential impact of poor tool management is recognized as being great. Just ask someone in the aviation, aerospace, or nuclear industries if it's important to know where tools are. Acronyms like FOD (Foreign Object Debris or Damage) and FME (Foreign Material Exclusion) are prominent in the vocabularies of these markets and refer to any substance or article alien to a system. Aircraft can be brought down due to damage caused by an unaccounted for tool.

Similarly, FOD in the form of a screwdriver left in a wind turbine electrical box could cause a short, which can lead to fire and end up becoming a YouTube video.

Consistent losses in productivity can also have a significant impact on the bottom line. Turbine downtime and the associated cost are measureable, but drilling down into how inadequate tooling and lack of control affected that number is not so straight-forward.

If you mention the term 'Bonus Climb' or 'Sport Climb' to a wind technician or site supervisor, the typical reaction is a knowing smile. Anyone that's maintained equipment has experienced not having that certain tool within reach when needed. That can often require climbing out from under whatever you're working on and walking to the toolbox, which can be aggravating. When in a wind turbine 250ft up tower and maybe 30 minutes from the shop, it's not so simple. Enter the "bonus" 500 ladder rung round trip to the truck if there's no one available to drive out there and send the item up.

Another version is when a tool is left in the nacelle or hub. When everything is put back in a bag without a method of simple inventory, a missing item may not be identified until back at the shop or working in another turbine. This has consequences from not having a tool required for a job, to the object running through the full wash cycle in the spinning hub, smashing the lights to pieces and ultimately hitting the Emergency Stop, shutting the turbine down. Industry veterans will

acknowledge a variety of additional scenarios in which productivity is impacted by a lack of tool control. So with all the possible pitfalls what is holding wind back?

The answer lies in one simple yet complex concept... culture. Industry culture, organizational culture, regional culture, trade cultures. These are the primary factors influencing work behaviors. So how do we change the tool management culture in wind energy? Rather than reinventing the wheel, adopting already established best practices is a good place to start.

Complete tool management

A robust tooling management program for wind energy includes multiple facets. Things like: calibration; identifying the right tool for each job; leaning and kitting of tools; designing custom kits for specialized work; employing a system for securing tools to prevent droppage; and incorporating various tooling asset management systems and software. Let's take a closer look at each of these.

Calibration

While wind energy does a reasonably effective job of tracking and maintaining tool and equipment certifications, there is always room for improvement. Calibration cycles referenced in standards are simply guidelines so there is some subjectivity and latitude afforded.

At least one OEM has placed relatively inexpensive (< \$1500 each) torque verification



Bench or wall mountable torque verification equipment can save time, prevent use of a non-compliant tool, and reduce overall calibration program cost.

equipment at each O&M facility. These units are used to regularly confirm that hand torque tools are within specification. Benefits include: extended time between calibrations; the ability to identify out-of-spec tools quickly; and more control over the calibration process which reduces cost and aggravation.

Right tool for the job

Ensuring the “right tool for each job” is a critical step. This requires a thorough process of evaluation, and sometimes the design and manufacture of special tools to maximize safety and ergonomics. An 80 gear tooth, long handle ratchet allows a technician to work more effectively in the space constraints of a nacelle. One wind OEM moved to this platform after a shoulder injury kept a tech out of work for over a week. Tools designed for critical work help prevent the common musculoskeletal injuries experienced by wind energy technicians.



Custom Tool for working on GE 1.5 Slip Ring Assembly. Many technicians have “home-made” versions that pose FOD risk.

Tight tolerances and robust design features found in quality tools can maintain a wrench’s grip on a fastener during extreme force, rather than slipping off and injuring a worker

or damaging equipment. Special thin wall or extra deep impact sockets designed and made from scratch by a tool manufacturer are preferable to modified tools. Any changes to a product after its made compromise the integrity and pose a safety risk, particularly in higher torque applications.

A review of any GE 1.5 technician bag will likely find a modified tool for working on slip rings. A ratcheting box wrench is typically paired with a cut down 10mm Allen wrench. Countless versions exist and work fairly well, however the non-standard tooling poses FOD risk and the potential for laceration due to burrs or sharp edges. Alternative solutions combining off-the-shelf tooling are available, providing improvements in safety, ergonomics and Foreign Material Exclusion.

Lean toolkits



Implementing a Leaning process can lighten toolkits and ensure that only the proper tools are being used.

For many years tooling has been supplied to wind energy companies in complete ‘sets’, i.e. wrench sets, socket sets. Upon review of these tools in the field it becomes quickly apparent that only some of the sizes are required. This begs additional questions: Why purchase tools you don’t need? Why carry the extra weight of tools you don’t use? Why carry an unnecessary tool and risk leaving it in a turbine?

Many organizations today have incorporated Lean and/or 5S into their businesses. These concepts apply quite well to tool management, in fact, the five fundamentals of a robust program are: Organization, Visibility, Security, Trackability and Accountability. Applying Lean and 5S to tooling assets along with a kitting component can lower cost, reduce weight and associated injuries, and help prevent FOD incidents.

Toolkit and vehicle inventory is unnecessarily cumbersome and time consuming. A single service truck inventory can take two



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technicians half of a work day. Custom kits with asset management systems allow quick inventory and identification of missing tools. A technician kit inventory can be reduced to less than a minute using a customized foam asset management system. In addition, incorporating laser engraving of tools can add to trackability and accountability.

Specialized toolkits

When performing component change-outs such as main bearings, a broad range of tools are required, many of which are not used on a regular basis. A typical scenario would be a couple of technicians spending an hour or more gathering the tools needed. It’s not unusual for something to be overlooked, which means at some point later, additional time and resource will be required to rectify the situation.

Some OEM’s and owners are designing and implementing custom toolkits for replacement of major components. Tools can be organized in job boxes or small conex containers and deployed from central facilities. This method ensures that the appropriate tooling with all required certifications is readily available, reducing downtime and associated cost.

TALKING POINT

Tools at height

At least one large wind facility owner / operator was able to identify a pattern of dropped tools. Another tells a story of the 14mm Allen wrench used to open the Hub Hatch on a GE 1.5 that was found stuck in the body of a turbine blade. A third recounts a dropped socket that somehow slid down a blade and was launched horizontally at high speed through the windshield and seat of a maintenance truck.

With elevation being another critical aspect of wind energy, securing tools should also be part of any tool management program. Tool drop can injure personnel and damage equipment, while causing delays. The most robust systems have mechanical attachment points on each tool that maintain or enhance the functionality.

Asset management systems and software

Whether in turbine construction, service or operations & maintenance, employing systems for tool management can contribute greatly to safety and productivity. Conex containers with tool boards, silhouetted foam in toolbox drawers, and asset management software for issuing, returning, tracking calibration and producing reports, can pay for themselves in a short time. On active jobsites, a tool container attendant is a worthwhile investment. Reductions in lost tools and time to inventory can be significant. Rather than shipping a container back to a central point for an extended inventory and tool replacement process, properly managed mobile tool containers can be moved to the next jobsite reducing freight and manpower expense.

Conclusions

One of the subtle aspects of this discussion is the realization that tool management is a bit of a science. On the surface, the concept of tools can appear to be very straightforward. However, consequences of overlooking even minor details can be extreme. It's always best when organizations and personnel work within their core competencies and wind energy companies are in the business of managing and maintaining turbines. Fortunately, as with any other specialization, there are resources available to support the development of dynamic and rigorous tooling programs. Tooling professionals have access to best practices, programs and facilities for the design and implementation of custom solutions that support improvements in safety, productivity and profitability by reducing injury, equipment damage, improper assembly and wasted time. ■

For more information, please visit:
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A robust system of tethering referred to as "Tools at Height" can help prevent injury and equipment damage due to droppage.



Turn-key Tool Management systems incorporated into conex containers have proven to reduce tool loss significantly and improve Productivity.