Defining Assessment Metrics – How Standardization Enables Meaningful Productivity Tracking and Comparison

Global demand for energy continues to increase, and so does the number and scope of industrial projects in the field. As projects are getting larger, the time allotted for execution is becoming more and more limited, while the available labor pool is stagnating or even shrinking. In addition, the cost and operational impact of delays and schedule slippage cannot be overstated.

It is therefore logical for companies to look for ways to improve productivity. Whether it is by casting a wider net for manpower, implementing automated fabrication processes, or streamlining their installation and erection methodology, the underlying drive remains consistent: finish more work in less time.

However, even though the requirement to provide exhaustive and extensive documentation of all fabrication and installation processes provides a plethora of data, it can be challenging to identify actual bottlenecks and problems in the project cycle, or determine the best approach to resolve them. The problem, paradoxically, is not too little data, but too much. For a single fabrication shop this is already a challenge. For larger projects involving multiple parties this problem is exacerbated by the fact that the data are often reported in different formats, using different or inconsistent definitions or assessment criteria, or putting the focus on different aspects of the project cycle.

Because of that, it is hard to directly compare different EPCs or perform a deeper analysis of developments across multiple projects.

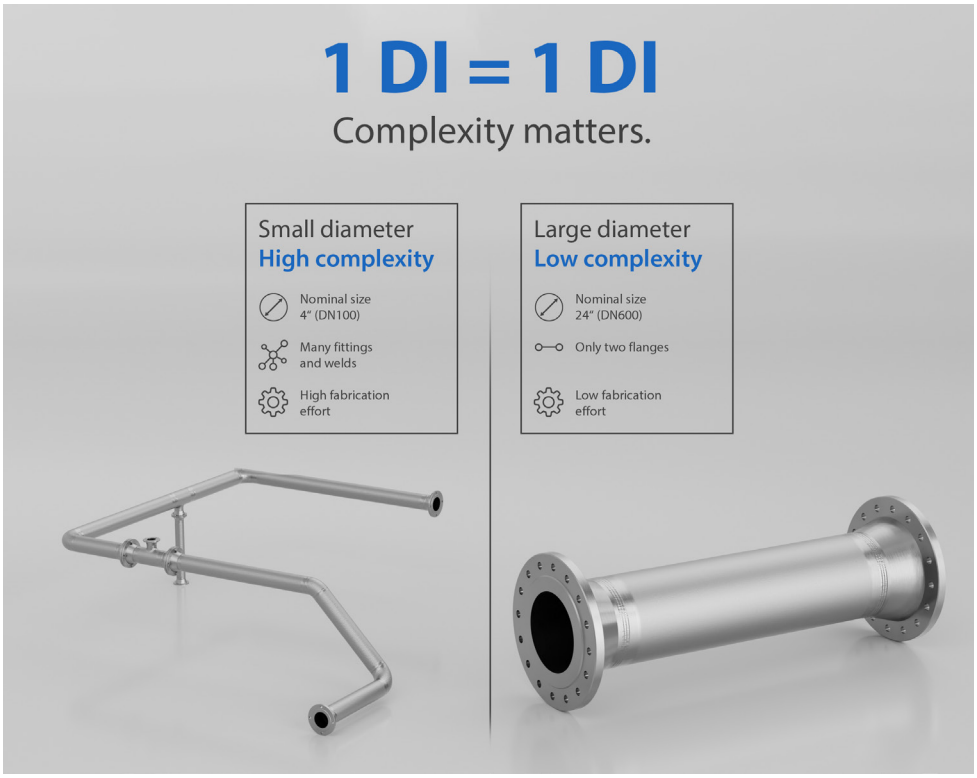
In order to achieve consistent and comparable data, however, the first step has to be defining and standardizing the metrics. This starts with something as simple as a DiaInch, as there are at least three different definitions of DiaInch:

1. A simple equivalent of NPS to DI (1” NPS = 1DI, 2” NPS = 2DI, etc.). This is the most common definition for many fabricators.
2. A definition based on the actual outer diameter (1” OD = 1DI). However, since 1” NPS is not the same as 1” OD there will



be discrepancies, especially in smaller bore dimensions, where the difference can be even higher.

3. Factored Dia-Inch, which includes factors such as material type and wall thickness, with more complex joints factoring higher than simple ones. However, while this last definition is much more reliable when it comes to assessing the complexity and scope of a project, there still is no generally accepted standard definition of what factors should be considered, and how they should be weighted. There are some publications, such as PFI's TB-10 "Guidelines for Calculating Factored Weld Diameter Inches for Project Reporting," but they are recommendations and their use is voluntary.



But while a lot of companies use DiaInch as a metric to evaluate project volume, assess productivity, and plan their budgets, they rarely examine their definition of DiaInch, and whether it accurately reflects the criteria they want to measure.

When it comes to measuring productivity, a lot of companies then use man-hours per DiaInch (mh/DI) to calculate manpower needs or plan daily workloads. But in addition to the uncertain definition of DI, and the problems inherent in disregarding the impact of material and schedule, the next problem is in defining what is being measured.

Does a statement such as "0.8 man-hours per DiaInch" include the handling and set-up time? The time required to prepare the necessary documentation? Or is it purely the arc-on time for a welder, or the actual cutting time for a saw, without any other factors that affect the machine's or worker's performance and productivity? If a welder can weld a 2" joint in 12 minutes, but only has a 20% arc-on time every hour, spending the rest of the time waiting for material, handling material, checking drawings, or filling out documentation, what is the correct number? Is it 0.5 man-hours per DiaInch (one 2" joint per hour), or is it 0.1 man-hours per DiaInch (one 2" joint in twelve minutes welding time)?

The problem is that neither value is wrong, they are just measuring very different things. One is measuring the efficiency of the welding process, while the other is measuring the productivity and potential output of the welder inside the framework and system he is operating in. Both are important, because a large discrepancy can indicate that the means to improve productivity is not to speed up the welding process, but to increase the arc-on time of the welder, allowing him to weld more pieces per hour, rather than reducing the time spent welding a single joint.

All of these examples are meant to highlight one important aspect of every improvement and optimization project: Before you can implement improvement measures, you need to identify your problems, so you know what you need to improve. To do so, you have to establish one consistent standard of measuring, reporting, and evaluating your data. If you can then implement this standard with subcontractors or suppliers, you will be in a position to compare them on a level playing field, identify bottlenecks and challenges, and assess the effectiveness of the measures you take.

Another advantage of having a generally applicable standard that all activities are subject to, is that it is much easier to assess the requirements for specific projects. It becomes possible to estimate available and required capacities, which allows for better resource planning and scheduling. A vendor can see whether he needs to increase specific capacities, and a project manager can determine whether a subcontractor qualifies for a project or not.

This is not a simple, easily implemented change that will immediately take effect and transform your business. It will be a long-term, drawn-out process. There will be institutional resistance, both internally and externally, as people tend to cling to methods that they are familiar and comfortable with, adopting an "If it isn't broken, don't fix it" mentality. However, the system is broken, and it needs fixing.

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