Titan
An Ascential Technologies Company

Navigating the future of test and assembly: The imperative for automation intelligence

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From automotive transmissions and transfer cases to fracking pumps, electronic controllers, hydraulic actuators, and the compressors used in refrigeration units, the modern world depends on highly complex electro-mechanical systems, all of them containing dozens if not hundreds or even thousands of precision components that must fit together perfectly.

The lion's share of these devices are assembled by robots, dedicated machinery, or a combination of the above. And because fit and function are crucial to both product longevity and performance, in-process as well as end-of-line testing and inspection have become an integral part of any automated assembly system, ensuring that the finished device performs as designed and will not fail unexpectedly a few weeks, months, or years after leaving the factory.

Titan Systems, an Ascential Technologies Company, has played a big role in the development of these and many other automated assembly and test systems. For nearly six decades, our team of engineers, machinists, and software developers have delivered hundreds of such solutions to manufacturing companies around the world, all designed to increase customer

throughput and quality while addressing their unique challenges.

Less than great

One such challenge has received significant attention over recent years. The skilled labor shortage was already a problem before the COVID-19 pandemic. Now, it's far worse. This is especially true in the manufacturing industry, where the push to reduce (and in many cases completely eliminate) reliance on low labor cost countries—a.k.a. reshoring and nearshoring—has served to further exacerbate domestic labor struggles while highlighting the risk that comes with dependence on offshore suppliers.

The solution, of course, is automation. Robots and automated assembly equipment like that described earlier mitigate these risks while making companies more profitable and efficient. And yet, as anyone who's evaluated or even invested in such systems will tell you, not all automation is the same, nor do they deliver the same level of success.

Leveraging more data

Given our vast experience in testing systems, we've long recognized the importance of robust sensor and measurement integration. We learned that data is most useful when it's used to close the loop on the

assembly process, providing owners and operators with the information needed to make intelligent, proactive decisions. As a result, Titan can leverage our data acquisition and measurement skills to automate even the most difficult of tasks.

One example of this comes from a recent project with a well-known provider of hydraulic solutions to the agriculture and construction industries. The customer was in the process of reshoring a valve that was previously manufactured in China, in response to their end customer's demand for a local supplier. However, they needed to do so while reducing manufacturing costs so as to remain competitive. Previously, the valve was assembled manually, an operation that required a human touch to properly match the spool to the valve body bore, minimizing leakage and ensuring that the spool did not bind in the bore.

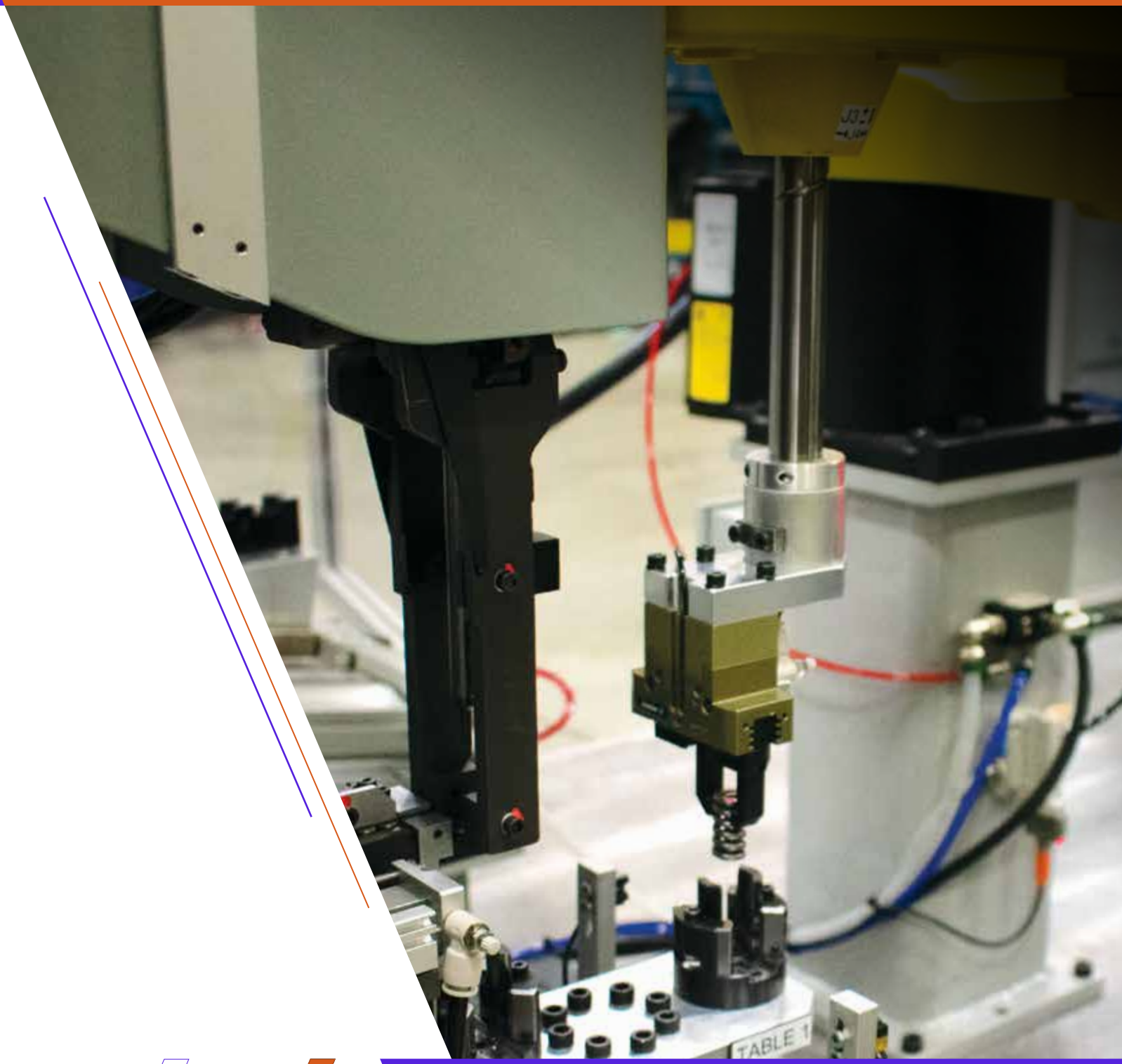
Titan Systems attacked the problem by integrating an inline measurement station within a robotic assembly line. Using automated gaging and data analysis, we were able to proactively fit-match the components prior to insertion of the spool into the valve body. This guaranteed that spools on the lower end of the tolerance band would not be used with bores on the upper end, solving the quality fitment challenge without human labor. By integrating process data acquisition and measurement with robotics, most of the labor was removed from the assembly process, allowing the customer to remain competitive.

This example also points to another trend in the industry—this particular OEM and many others have begun looking for a single source on their automated assembly and testing lines. Because it takes significant time to understand the customer's product in a very detailed manner, not to mention their corporate goals and requirements, it's easier to work with one supplier that can deliver an end-to-end assembly and test solution. Project management becomes easier, there's no need to educate multiple suppliers, and overall costs drop.

Of course, the ability to gather and analyze data at each step of the assembly process is equally important. The question then becomes: what's the most cost-effective and flexible way to achieve this?

PLCs vs PCs

For decades, manufacturers of these systems have relied on programmable logic controllers (PLCs) as their automation control mechanism. Specialized computers designed for use



"It will acquire human-like intelligence, further reducing dependence on the workers who are in increasingly short supply."

with industrial processes and machinery, PLCs execute predefined command sequences, critical in assembly equipment where the timing and order of operations is essential.

A more modern, open, and flexible alternative is the personal computer. PCs are less expensive than PLCs, with far more manufacturers and brands to choose from. Large streams of data are easier to manage on a PC. Programming software is readily available, including even some open source, which is free or at least much less costly. PCs also allow for fast data manipulation to help operators better visualize complex results.

It's for these reasons, among others, that Titan Systems uses PCs in practically all of its automated assembly and test systems. The transition began many years ago, and we have since developed a robust software platform that leverages more than four decades of product testing.

Conquering the data mountain

To better visualize the results, here's another example. At one of our customers, we recently deployed a system equipped with more than 500 sensors, 100 pressure transducers, and numerous force sensors, flow meters, and thermocouples, all of which feed data into a PC-resident database. Here it can be analyzed for trends, potential quality problems, and, most importantly, improvement opportunities, providing insights that would otherwise be unavailable. Try that on a PLC.

That's not to say PLCs are not needed. They are. Titan Systems uses them in areas where high-speed activation

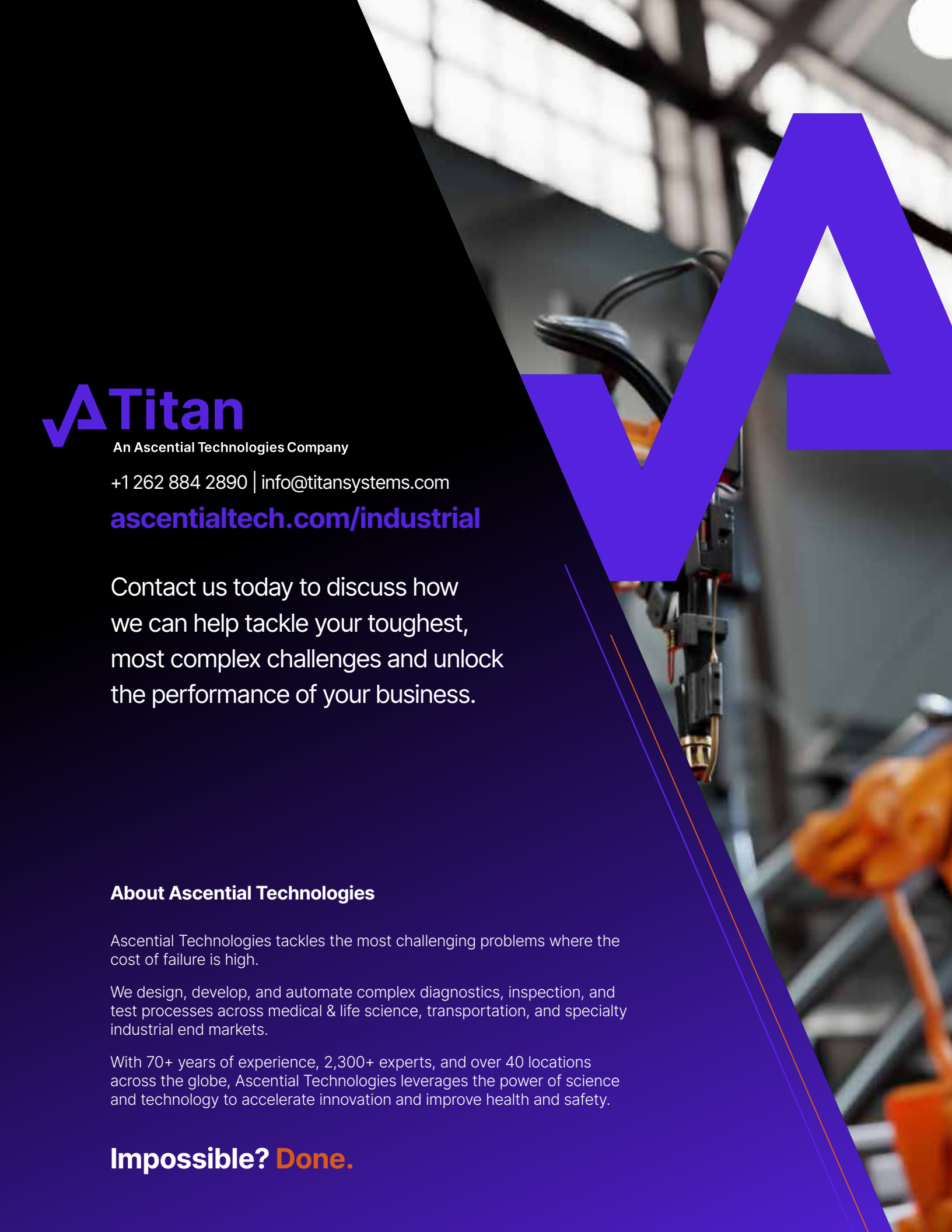
is needed—say, an emergency stop button, for example, or other function that calls for instantaneous program execution. But for data collection and analysis, PCs are clearly the way to go.

In summary, we see a reversal in the industry. Our customers tell us the same thing. The ongoing labor problem has raised the stakes—manufacturers must continue their quest to improve product reliability, increase flexibility, and cut costs, and the way to do that is through automation.

We're not talking about the traditional automation that has been available for the past decade or two, though, but rather intelligent automation—automation. This is automation that applies significantly higher levels of instrumentation and data acquisition, force and torque measurement, pre- and in-process part inspection using vision technology and other advanced metrology systems. And most importantly, provides robust process validation during product assembly, not simply checking it afterward and then reacting to the results.

Lastly, it's crucial to develop a feedback loop. If at any point during manufacturing any deviations or failures are detected, artificial intelligence and data mining can be leveraged to optimize the assembly process. The assembly line gets smarter as a result of this feedback loop and will, over time, become predictive. It will acquire human-like intelligence.

At Titan Systems, that's our mission. ✓



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Contact us today to discuss how we can help tackle your toughest, most complex challenges and unlock the performance of your business.

About Ascential Technologies

Ascential Technologies tackles the most challenging problems where the cost of failure is high.

We design, develop, and automate complex diagnostics, inspection, and test processes across medical & life science, transportation, and specialty industrial end markets.

With 70+ years of experience, 2,300+ experts, and over 40 locations across the globe, Ascential Technologies leverages the power of science and technology to accelerate innovation and improve health and safety.

Impossible? Done.