Trimble

Heavy investment. Heavy expectations. Heavy scrutiny.

How to pinpoint the best positioning solution for heavy industry autonomy

Where in the world ... ?

It's not news that autonomy in heavy industry requires that machines know precisely where they are at all times. The story here is where these machines work, which is often where the sun doesn't shine and satellite signals don't reach – under bridges, in tunnels and in dense urban environments, to name a few places. Even more challenging, with applications and repercussions this big, accuracy is needed down to the centimeter.

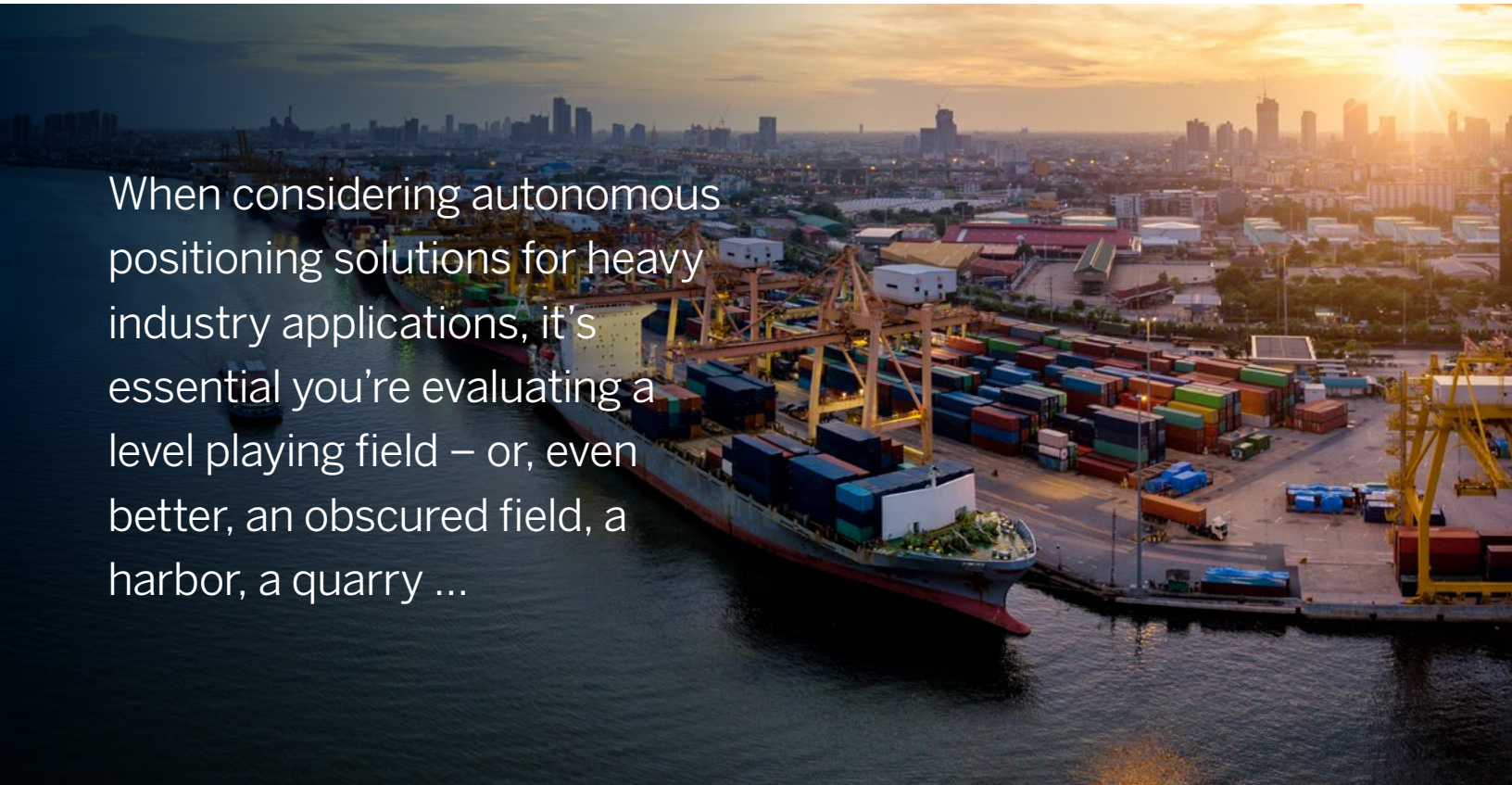
So how can you ensure highly accurate, uninterrupted, trusted positioning in often suboptimal and even subterranean environments? It starts with finding the right positioning-solution partner.

Don't be clouded by open skies

Here you are. Another demo in a parking lot or open space with a company showing off how great their positioning solutions work and how economically they're priced. There's a bunch of swag to take home. Maybe it's even catered.

Friendly warning: Get your head out of the clouds. When considering autonomous positioning solutions for heavy industry applications, it's essential you're evaluating a level playing field – or, even better, an obscured field, a harbor, a quarry ...

Many generalized positioning providers offer lower-cost solutions that deliver high accuracy in open-sky environments. But unless your customers only build tarmacs or drive-in theaters, they're going to face precise positioning challenges that include signal obstructions and interference. And when connectivity and positioning is lost on the job, excuses and dollars saved during purchase won't mean much.



Finding place of mind

When evaluating positioning solutions, be sure they can deliver the following heavy industry essentials on the job – not just on paper.

- **Accuracy** – Meters might as well be miles when it comes to positioning accuracy in heavy industry. Fusing GNSS measurements, global correction services and a variety of inertial and sensor data ensures centimeter-level positioning and accurate orientation – even in environments where autonomous solutions typically struggle. And make sure your solution provides multidimensional positioning, both horizontal and vertical. One without the other isn't very valuable.

- **Availability** – Signal access simply can't be lost. Ever. Under any circumstances. Premium RTK and PPP solutions reliably work in typically challenging environments where satellite line of sight can be impaired, such as beneath tree canopies, under highway overpasses and in dense urban areas. Advanced systems can also identify and remove unwanted multipath signals, ensuring unimpeded positioning accuracy just about everywhere.

- **Integrity** – Find a high-fidelity solution that delivers position and orientation information that autonomous systems and machines trust to ensure their uninterrupted operation. It's important to know that lower-cost receivers and antennas can be easily jammed or spoofed (yes, heavy industry hackers). Find solutions that feature higher-end components and embedded security.

- **Immediacy** – Overcoming latency is paramount when it comes to real-time machine control. A position may be very accurate, but if it is delayed for even a very short period, it has little value to system performance and safety. Nearly instantaneous results and high update rates are required.

Relationship advice

Understanding that it's not enough for a positioning partner to deliver reliable, consistent, centimeter-level accuracy only in open-sky environments is a start. Now let's go further. Delivering uninterrupted, trusted, centimeter-level accuracy even in satellite-obscured environments isn't enough. Not on its own, at least.

The partner behind the technology and components is just as important. For immediate and long-term success, a proven, stable business that will help you and your customers throughout and beyond purchase and integration is worth its weight in gold (or whatever your customers might mine, move, or make). Here are a few things you should seek in a heavy industry positioning partner:

Breadth of products

Prioritize positioning providers with global reach that offer a broad product portfolio – not just GNSS receivers. Look for companies that provide component-, board-, and box-level solutions; antennas and an array of other products ranging from entry-level to high-end systems.

Product availability and support from one comprehensive source ensure ease of future additions and integrations for you as well as all elements of your customers' investments worldwide.

Easy integration

Steer clear of restrictive single-vendor paths. There's no way of knowing how your and your customers' businesses will evolve over time.

A partner that sells into various verticals will offer solutions that easily integrate into a cohesive infrastructure, regardless of platform, simplifying future system evolutions and upgrades. Make sure your providers' positioning solutions seamlessly fit into your customers' existing tech stacks and that they offer a flexible portfolio designed to meet diverse application needs and enable easy interoperability.

Built for your business

From help integrating software to setting up hardware, a strong support team is invaluable. You're going to want a provider with a global support infrastructure set up to help you as a heavy industry OEM or integrator, as well as to help you support end customers everywhere.

Ask if potential partners provide OEM integration-specific support. Many companies sell millions of components but aren't equipped to handle smaller OEMs or integrators that have much lower purchase volumes – maybe less than a hundred products per year.

Additionally – and this is a big one – find a partner that will collaborate with you to solve your and your clients' specific challenges rather than forcing you to fit their off-the-shelf solutions. Your partner should flex to your business, not vice versa.

Safety focused

Functional safety is essential in autonomous solutions. Prioritize partners with certifications such as ASIL and ISO, which are strong indicators of how seriously they value safety in their culture and in the solutions they deliver.

Invested

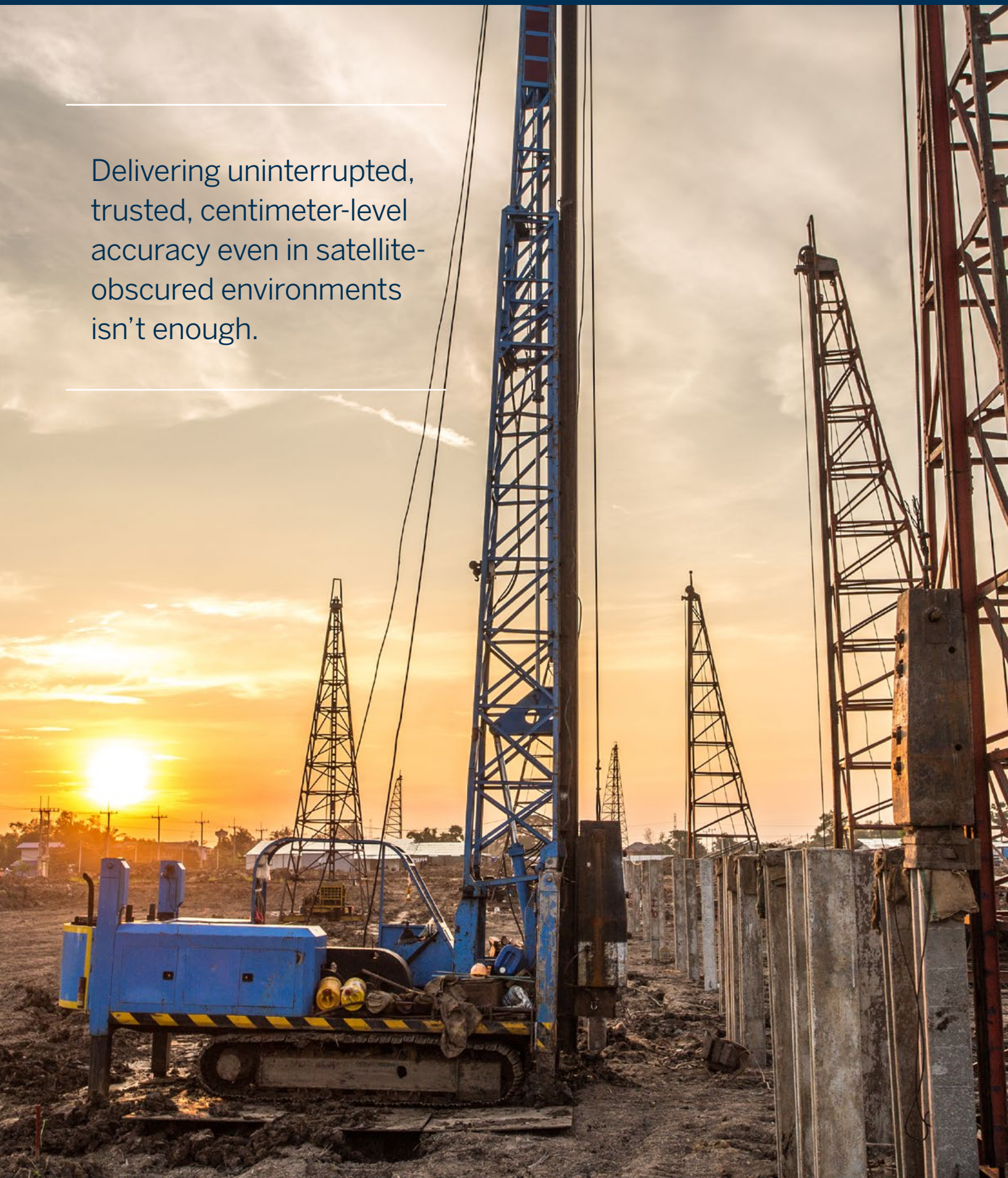
A lot of companies work in "autonomy," but heavy industry isn't like driving on the open highway. Beyond applications, heavy industry machines work for extended periods – decades in many cases. You'll want a company that will last throughout their life cycles.

Seek companies with decades of domain experience, and ones that continually reinvest in R&D. Companies with many patents in the space speak to their history of innovation.

Eco-conscious

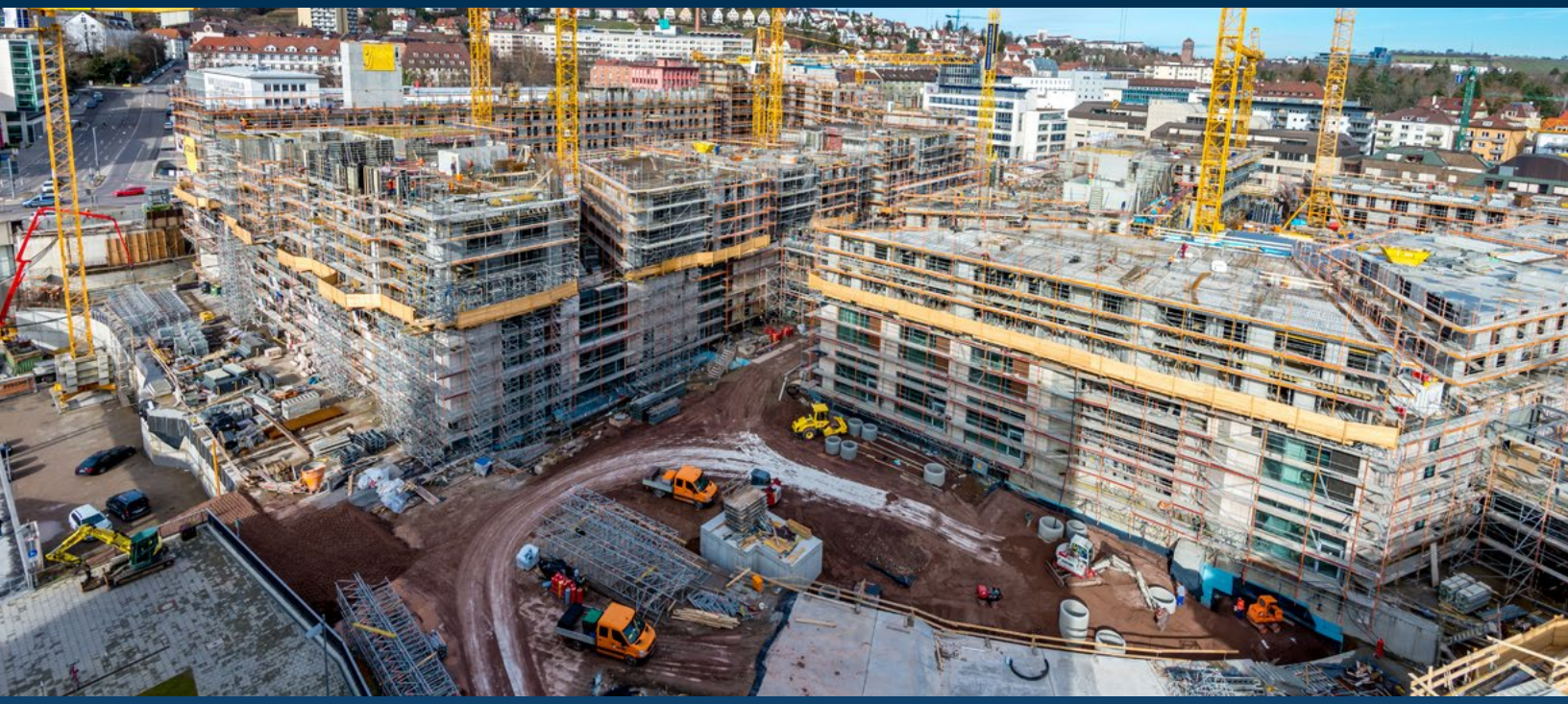
It's worth considering a partner that is earnestly invested in the planet's well-being. A company committed to sustainable practices will not only help you meet your sustainability targets but also produce products built to last, which translates into measurable long-term ROI.

Trimble



Delivering uninterrupted, trusted, centimeter-level accuracy even in satellite-obscured environments isn't enough.

Trimble



Heavy industry autonomy @ work

The next wave

Read how a large shipping company uses highly precise position and heading information to overcome seafaring labor shortages and to autonomously and safely navigate their large vessels in busy harbors.

Reaping success

Discover how an agricultural machinery and services pioneer incorporates stable, reliable, highly precise positioning to achieve its growing goals while minimizing the burden of heavy labor.

Pole position

Learn how one company is leading the way in modifying existing pile driver machines to autonomously find precise locations and then using autonomous machines to drive posts to the correct heights and orientations in remote and challenging geographies worldwide.

Compacting emissions and costs

Review a recent study that analyzes how horizontal steering control for soil compactors helps maximize precision and productivity – avoiding costly rework while driving overall sustainability by reducing fuel consumption and cutting CO2 emissions.

Visit **autonomy.trimble.com** to begin evaluating whether Trimble is the right fit to help you grow your heavy industry business success.