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LEADING THE CHARGE IN ENERGY-EFFICIENT ROCK-BREAKING SOLUTIONS

PETRAM TECHNOLOGIES

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ROCK BREAKING TECHNOLOGY OF THE YEAR 2025

This award is in recognition of **Petram Technologies'** stellar reputation and trust among customers and industry peers, evident in the numerous nominations we received from our subscribers. **Petram Technologies** emerged as the **Rock Breaking Technology of the Year 2025** after an exhaustive evaluation by an expert panel of C-level executives, industry thought leaders, and our editorial board.

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LEADING THE CHARGE IN ENERGY-EFFICIENT ROCK-BREAKING SOLUTIONS

As cities grow, their infrastructure must evolve. Maintaining and upgrading critical systems often means working in complex underground conditions where precision is essential. Whether replacing aging gas pipelines, expanding geothermal energy production, modernizing power grids, or constructing new buildings, breaking through rock efficiently and safely is a top priority.

Traditional jackhammers, once the go-to tool for such tasks, are far from ideal in today's urban environments. They are too rough for delicate work near gas lines and cable networks, dangerously loud—especially at night—and can threaten nearby structures. Moreover, they consume vast amounts of energy and generate high carbon emissions, making them neither efficient nor sustainable.

A breakthrough in rock-fracturing technology was needed, and the answer came from an unexpected place—space exploration.

Enter Petram Technologies

Seven years ago Petram exclusively licensed a patent by Auburn University funded by NASA, Petram began its journey to revolutionize energy-efficient rock fracturing. The initial extraterrestrial mission aimed to develop the most efficient method to break lunar rocks without explosives and with limited energy sources—an environment with no atmosphere, extreme temperatures, and limited resources.

That mission led to Petram acquiring its first patent and bringing in the scientists involved , sparking a revolution in excavation.

Soon, the company's expertise found a crucial application in specialized underground rock breaking, positioning Petram Technologies as a leader in areas where conventional rock-breaking methods are inefficient, costly, and environmentally damaging. Whether breaking through dense bedrock in a crowded city or enhancing the permeability of subsurface formations for water wells, the company's solutions deliver safer, faster, and more sustainable results.

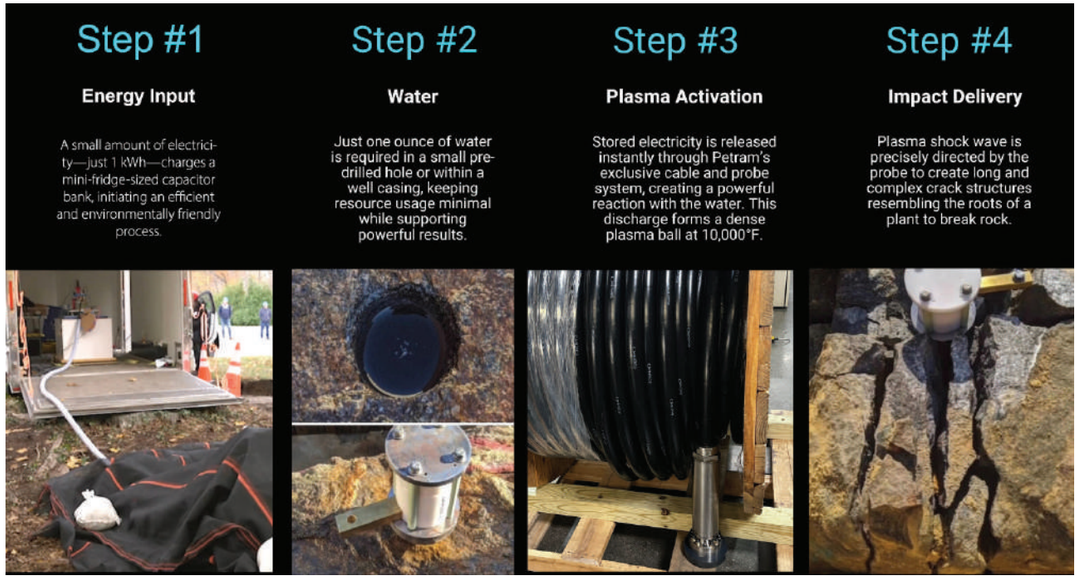
Today, with 10 patents issued and many more on the way, Petram is transforming construction, excavation, and demolition with a focus on energy efficiency, precision, and sustainability.

"Our innovation is making a tangible impact across construction, demolition, and excavation while setting new benchmarks in sustainability and precision," says

ROCK BREAKING TECHNOLOGY OF THE YEAR 2025

"We don't innovate for the sake of innovation—we create solutions that make a real-world impact

Franco Magnotti, CEO



Franco Magnotti, CEO of Petram Technologies. “Urban construction, for example, demands precision to protect existing infrastructure, while excavation requires efficiency to maximize yield with minimal impact. Seeing the parallels, we applied our lunar research to create a solution that now transforms multiple industries.”

The Science Behind the Most Energy-Efficient Rock Breaking on Earth

At the core of Petram Technologies’ breakthrough is its ability to harness and focus energy with unmatched efficiency. Unlike conventional methods that rely on brute force, Petram’s system maximizes energy input to deliver precise, controlled results—making rock breaking faster, cleaner, and more sustainable.

The process begins with charging a high-energy-density capacitor bank, a compact system about the size of a mini refrigerator. Despite its small footprint, this unit delivers immense power and can be mounted on various platforms, from trailers to trucks. Once charged, the system discharges energy into a drilled hole filled with a small amount of water. A proprietary cable and probe system then delivers a high-voltage pulse—up to 30,000 volts and 170,000 amps—instantly bypassing the steam phase and forming a dense plasma ball at approximately 10,000°F.

As the plasma expands, it generates a shockwave of 220,000 PSI—roughly 10-100 times the strength of materials like granite, limestone, shale, and concrete. Unlike traditional fracking, which produces single-directional fractures, Petram’s system creates a complex, multi-directional “dendritic” cracking pattern, similar to plant roots. This ensures a more effective break, making it ideal for both surface and subsurface applications.

Beyond its raw power, the system is remarkably energy-efficient. Using just 0.03 kilowatt-hour per shot—the same energy needed to power a microwave for two minutes or the equivalent calories in one Hershey’s kiss—it generates an astonishing 2.4 gigawatts. To put that in perspective, that’s twice the power required to fuel *Back to the Future’s* DeLorean time machine and comparable to the output of an entire nuclear facility.

However, it’s not just about power—it’s about precision. Petram’s technology directs this energy with pinpoint accuracy, targeting an ounce of water inside the rock. The extreme heat and pressure fracture materials like granite, limestone, concrete, and shale while leaving nearby steel structures completely undisturbed.

This level of precision is a game-changer for urban infrastructure projects. In dense city environments, where underground utilities like gas pipelines, subway systems, and tunnels are tightly packed, traditional rock-breaking methods pose significant risks. Petram’s system eliminates these dangers, making excavation safer and more efficient.

The environmental benefits are just as compelling. Conventional rock-breaking methods generate excessive noise, dust, and vibrations—factors that slow down projects and endanger workers’ health. Petram’s solution operates 20 times faster, reduces noise by 99 percent, and cuts dust and vibration output to just 1 percent of what traditional methods produce. This efficiency isn’t just theoretical—it has real-world impact, with the potential to cut global carbon emissions by one million metric tons annually. It also has tremendous potential in recycling as when used to break concrete with rebar, the cracks form at the interfaces of the concrete and rebar, nicely separating the two materials .

By transforming the way rock is broken, Petram Technologies is setting a new standard—one that prioritizes speed, safety, and sustainability without compromising power.

Revolutionizing Urban Infrastructure and Demolition

One of Petram’s flagship projects with Con Edison in New York City exemplifies the company’s impact. Con Edison set rigorous requirements for a solution that could break rock faster, cleaner, and more cost-effectively than existing methods. The project involved proving that Petram could break gneiss and schist (extremely tough rocks) within feet of existing gas pipelines and other urban infrastructure—a delicate operation requiring both precision and speed.

The results were remarkable. Petram’s system broke rock at 20 times the rate of traditional methods while cutting costs by 50 percent. What truly set Petram apart, however, was its ability to meet environmental and operational demands. The system produces less than 1 percent of the dust and noise compared to conventional methods, making it viable for noise-sensitive urban environments, even at night.

Our innovation is making a tangible impact across construction, demolition, and excavation while setting new benchmarks in sustainability and precision

Petram’s ability to meet such rigorous standards is a testament to the company’s commitment to solving real-world challenges.

The company’s technology not only meets the specific demands of clients like Con Edison but also addresses broader issues such as environmental impact, operational speed, and cost efficiency.

Enhancing Resource Recovery and Subsurface Applications

Beyond surface-level applications, Petram Technologies is transforming subsurface industries, including oil and gas, geothermal energy, and water well drilling.

One of its most groundbreaking features is its ability to enhance rock permeability using a unique dendritic cracking pattern—resembling the root system of a tree. This method dramatically improves fluid flow, allowing for higher yields in water, oil, and gas extraction.

In oil and gas fracking, for example, conventional methods typically recover only 10 percent of available resources. Petram’s technology has the potential to double this efficiency, creating billions of dollars in additional value for energy companies while simultaneously reducing the need for new drilling projects—leading to significant environmental benefits.

Similarly, in geothermal energy production, increasing heat flow efficiency allows geothermal power plants to operate more effectively, further supporting the transition to renewable energy sources.

For water wells, particularly in regions facing water scarcity, Petram’s method allows drillers to extract water more effectively from existing depths rather than drilling deeper—saving costs while preserving natural resources.

The Road Ahead

As Petram Technologies continues to push the boundaries of what’s possible, the company’s roadmap for the future is ambitious and strategically focused.

“The immediate goal is to expand our impact within demolition, excavation, and utility infrastructure,” says Magnotti. “We’re also launching solutions for water wells and heat pumps next year, with deep geothermal and hydrogen applications following within the next three years.”

Developing solutions for deeper, 10,000-foot subsurface applications will require specialized engineering, particularly in designing downhole equipment that can withstand extreme conditions. However, the science is proven—the next step is refining the engineering to make these systems scalable.

In addition to product innovation, geographic expansion is also a priority. While the company’s operations are currently concentrated in the United States, plans are already in motion to expand internationally over the next 18 to 24 months.

Although mining and lithium extraction aren’t on the company’s immediate roadmap, Magnotti acknowledges that these areas present significant future opportunities. Given the versatility of Petram’s technology, applications in these sectors are not a question of “if” but “when.”

A Team Built for Innovation

Behind every breakthrough technology is a team of brilliant minds. Petram Technologies is no exception.

By combining unparalleled energy efficiency, precision, and sustainability, the company is setting a new industry benchmark for excavation and resource extraction. In doing so, Petram is proving that the future of rock breaking doesn’t lie beneath our feet—it’s inspired by the stars. ET

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