Tower Repair & Raising in Remote Locations

An Ampjack® Case Study

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Executive Summary

Remote transmission tower repairs are among the most complex and resource-intensive maintenance operations in the power industry. Tower sites are often located in mountainous terrain or remote regions far from infrastructure, requiring careful planning, specialized crews, and equipment capable of operating in challenging conditions. Historically, the only way to perform major repairs or structural modifications involved shutting down the line, constructing temporary access roads, and transporting heavy equipment into environmentally sensitive areas.

For decades, this legacy approach—ground-based, outage-dependent, and risk-intensive—was considered the industry norm. But with rising pressure to keep lines energized, reduce operational risk, and minimize environmental disturbance, the industry has long been in need of a better alternative[1,2].

This paper explores the successful repair and 10-foot mid-body extension of a lattice tower located in mountainous terrain many miles from the nearest paved road. The project was completed in only 10 working days, without interrupting power, without building access roads, and without bringing in heavy machinery.

Instead of relying on road access or outages, Ampjack's team used human external cargo (HEC) deployment and aerial logistics to install a custom-engineered solution that corrected structural damage, mitigated conductor tension, and completed a full energized lift with minimal environmental footprint.

Could this be the shift the industry has been waiting for?

The Problem

Tower M213-T1, located approximately two hours from the nearest populated area, sat five miles off the nearest paved road on steep, forested terrain. Inaccessible by traditional vehicles due to downed trees and washed-out access trails, the structure presented a significant logistical challenge even before the full extent of its condition was assessed. **(See Fig. 1)** An above-ground condition inspection revealed multiple structural concerns:

- Leg A1 on the southwest corner showed significant outward deflection
- Member A71 on the east face was visibly bent
- Member A105 within the diaphragm of the 14' base extension was deformed
- All three dampeners on the south side of the tower were bent

The tower's corrosion score was rated *Poor*, with pitting and below-ground degradation observed at key stress points—including the tetrapod connection. Average pit depth was measured at 0.88 inches, with high-density corrosion clusters recorded. **(See Fig. 2)**

Compounding the structural issues, the climbing leg above the extension was bowing, creating a safety hazard that needed to be corrected prior to any lift operations. The surrounding terrain was thick with poison oak, uneven footing, and the documented presence of poisonous snakes, which posed a legitimate risk to field crews. These environmental hazards demanded meticulous advance planning and site-specific safety briefings. **(See Fig. 3)**

With no road access and energized lines running through the site, conventional tower repair methods were not feasible without extreme cost and risk. The situation demanded an approach that could address structural concerns, corrosion, and height extension without ever shutting down the line.

Fig. 1: Remote, mountainous tower location

Fig. 2: Corrosion damage

Fig. 3: Bowed leg

The Legacy Approach

Historically, transmission tower repairs of this scale—especially those involving bent or corroded members, tower leg replacement, or height extensions—have relied on methods that require full power line outages, heavy machinery, and extensive ground access[3,4]. Utilities must often:

1. **De-energize the line**, requiring complex scheduling, permitting, revenue loss, and coordination with system operators.
2. **Build temporary access roads** to transport excavators, cranes, or manlifts to the site—sometimes through protected or sensitive environments. **(See Fig. 4)**
3. Stage **heavy suspended loads** to disassemble or rebuild tower sections from the ground.
4. Commit to **long timelines**, often multiple weeks or months, to mobilize crews, coordinate outages, and complete the repair.

In scenarios like the M213-T1 project, these methods become not just inefficient—but unworkable. The site's washed-out access trails and steep mountainous terrain would have required weeks of road building. The presence of poison oak, wildlife, and unstable ground conditions would have increased risks for on-site workers. And most importantly, the need to de-energize the structure would have disrupted service, causing significant operational and economic impact.

Legacy methods simply weren't designed for this level of remote complexity, environmental constraint, or pressure to keep systems online. What was once considered standard practice is now being challenged by safer, more efficient, and more adaptive technologies.

Fig. 4: Traditional tower repair with required outages and heavy equipment

The Ampjack® Approach

Planning & Hazard Assessment

Before a single tool was lifted, Ampjack conducted a thorough site evaluation and risk assessment tailored to the remote terrain and unique structural conditions of Tower M213-T1. Key elements of the pre-construction planning included:

1. **Emergency preparedness:** Identifying the nearest hospital, establishing evacuation protocols, and ensuring clear communication plans in the event of injury. **(See Fig. 5)**
2. **Medical and environmental hazard mitigation:** AED and spill kit locations were confirmed and communicated to the crew. Crew members were briefed on navigating poison oak, working in high temperatures, and remaining alert for poisonous snakes, which were known to hide in equipment and shaded areas.
3. **Site-specific structural assessment:** Damage to members A1, A71, and A105 was catalogued, along with bowing in the climbing leg and corrosion severity at the tetrapod connection.
4. **Access strategy:** Ground access was deemed unsafe and logistically prohibitive. Instead, all tools, equipment, and crew were deployed via helicopter, using human external cargo (HEC) and aerial sling loads to reach the site. **(See Fig. 6, 7, 8)**

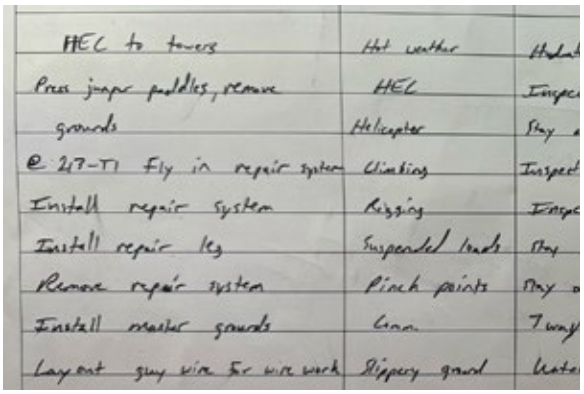

Fig. 5: Detailed jobsite safety and operations plan reviews occur daily

Fig. 6: Ampjack crew preparing for transfer

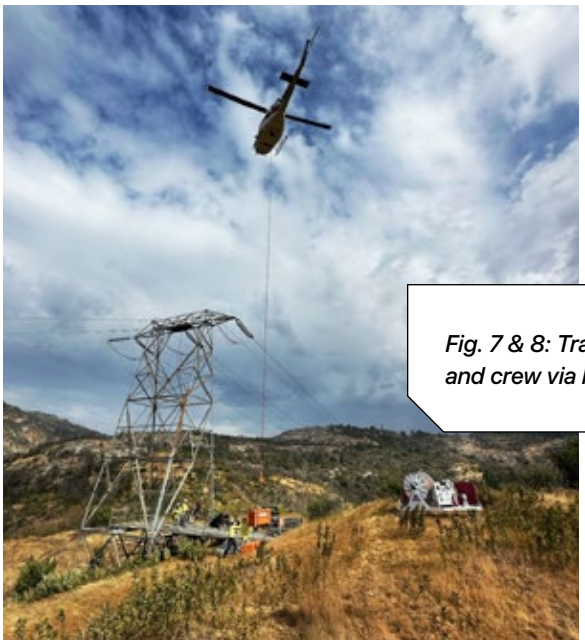

Fig. 7 & 8: Transporting equipment and crew via helicopter

The Ampjack® Approach (continued)

Innovative Structural Repair Without Suspended Loads

In traditional tower repair, especially in remote areas, damaged or corroded sections are often replaced by cutting large members while the tower is supported by cranes or suspended bracing. These suspended loads create serious hazards for crews working below or around the structure—particularly on uneven or unstable terrain.

Ampjack takes a different approach. Using its patented modular support system, the tower is braced in place by a structural beam that bears the tower's weight independently, allowing safe removal and replacement of damaged components while the tower remains fully energized and stable.

This method eliminates the need for suspended loads altogether. The repair beam acts as both a temporary stabilizer and a permanent reinforcement, meaning the repaired tower section is often stronger than it was originally built. **(See Fig. 9)**

Fig. 9: Crew safely performing tower raise using the Ampjack® system

Energized Tower Lift with Hydraulic Precision

Raising a transmission tower typically involves significant equipment: cranes, excavators, and line outages. But on M213-T1, Ampjack used its signature hydraulic lift system, which applies steady upward pressure through a series of synchronized rams and supports. **(See Fig. 10)**

Rather than lifting the tower in a single, high-risk maneuver, the Ampjack system nudges the structure upward in controlled increments. After cutting the tower, the entire structure was lifted five feet at a time, with new steel inserted and secured after each stage. There is no suspension of the tower in mid-air, no reliance on external lifting devices, and no downtime on the line.

Fig. 10: Raising the tower

The Ampjack® Approach (continued)

Fast, Efficient, and Low Impact

All repairs, structural upgrades, and the full tower raise were completed in just 10 working days. By comparison, a legacy approach involving access roads, suspended loads, and outage scheduling could have taken weeks or even months—with far greater safety risk, environmental impact, and operational disruption.

The Ampjack approach isn't just safer—it's faster, leaner, and more future-ready[5]. The tower was left structurally enhanced, the surrounding terrain untouched by machinery, and the client's system remained energized throughout.

Key Outcomes

The M213-T1 project stands as a clear demonstration of what's possible when innovative engineering meets precision planning. Ampjack not only restored the structural integrity of a critical tower in a remote, mountainous region—it did so in record time, without disrupting power, and with no need for heavy machinery or permanent access infrastructure.

Each aspect of the project—from hazard mitigation to tower elevation—was completed with an eye on safety, speed, and long-term resilience. Here are the key results:

1

Structural Integrity Improved

Damaged and corroded tower members were replaced using Ampjack's proprietary bracing system. This approach not only stabilized the tower during repair but left it stronger than the original build, with reinforcement left in place for long-term durability.

2

Safe, Energized 10-Foot Raise

Ampjack lifted the tower using a controlled, hydraulic system—raising it five feet at a time while fully energized. No cranes, no suspended loads, and zero risk to line integrity.

3

Zero Safety Incidents

Despite extreme heat, rough terrain, and threats like poisonous snakes, the project was completed with no injuries or incidents. Thorough planning, airlift logistics, and daily safety briefings ensured a controlled and hazard-free operation.

4

Almost No Environmental Impact

No roads were built. No ground was disturbed[6,7]. All equipment and crews were flown in, leaving the natural environment untouched—a major advantage over traditional, carbon-spewing heavy equipment methods.

5

10 Working Days, Start to Finish

From setup to teardown, the full project took only 10 working days—including structural repair, tension mitigation, and tower elevation. Compared to traditional methods, the time savings are substantial.

Conclusion

The legacy approach wasn't built for today's challenges.

Ampjack is.

This project highlights a turning point for the power transmission industry. For decades, utilities have accepted that repairing and raising towers meant line outages, environmental disruption, complex logistics, and extended timelines. But that's no longer the case.

The Ampjack® solution eliminates the need for outages and heavy machinery, cuts project durations by a factor of two or more, and prioritizes safety without compromise. By using modular hydraulic systems, reinforced repair bracing, and helicopter-only access, Ampjack offers a true field-proven alternative to the legacy model.

This isn't just an improvement. *It's a redefinition of what's possible*.

As grid infrastructure ages and transmission systems expand to support renewable generation, the need for safe, efficient, and energized tower work has never been more urgent. Ampjack is ready—and already delivering—on that need.

References

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USA

Ampjack America Ltd.
3960 Howard Hughes Pkwy, Suite 500
Las Vegas, Nevada 89169
Sales: 973-809-3207

Canada / International

Ampjack Industries Ltd.
90 Bergen Cutoff Rd
Centreport, MB, R4B 0A7
Sales: 204-631-2508

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