



Amphibious Bulldozer



One of the first amphibious bulldozers produced

Restoring an Amphibious Bulldozer as Part of Earthquake Reconstruction Support

In March 2011, Japan was struck by the Great East Japan Earthquake, an unprecedented disaster. To support post-disaster reconstruction, in January 2012 a project to restore a D155W amphibious bulldozer manufactured in 1993 commenced at the Osaka Plant. With the support of the plant and nearly 100 partner companies, the restoration was completed in September 2012. Following performance testing, the bulldozer began operating in the disaster area in January 2013.

One of the job sites for the bulldozer was the Yuriage Bridge near the mouth of the Natori River in Natori City, Miyagi Prefecture. When the earthquake hit, the tsunami washed away sediment that served as the foundation for bridge supports. These supports had been left exposed ever since, and an amphibious bulldozer was needed for performing backfilling and bed protection work.

The World's First Commercialization of an Amphibious Bulldozer

Komatsu was the first in the world to commercialize an amphibious bulldozer, the D155W, capable of underwater operations at a maximum depth of 7 m (23 ft) and onshore operations via remote control. The bulldozer's engine is encased in a watertight compartment while the machine is equipped with a high stack for air intake and exhaust. Originally developed and manufactured in 1971, the bulldozer was sold around the world, including in Japan, the Soviet Union (currently Russia), Czechoslovakia (currently the Czech Republic and Slovakia) and Italy. A total of 36 machines were produced, of which 14 machines were sold overseas. Still in operation are the five

Demonstration of Amphibious Bulldozer in Czechoslovakia

In 1976, a demonstration of the D155W amphibious bulldozer was held in the Elbe River, approximately 30 km (18.6 mi) northeast of Prague, Czechoslovakia. The machine fully displayed its capabilities during the demonstration, proving its excellent work performance and Komatsu's advanced technology.



Two amphibious bulldozers working in tandem in the Natori River for the post-disaster reconstruction project

amphibious bulldozers owned by Japan-based Asunaro Aoki Construction Co., Ltd. The restoration project was launched based on a request from Asunaro Aoki to overhaul one of these bulldozers to support reconstruction in the disaster area.

Kickoff of Amphibious Bulldozer Restoration Project

Production of amphibious bulldozers was discontinued 20 years ago. The amphibious bulldozer in question was operated primarily under seawater, which caused severe rusting and corrosion, and the thickness of the main body also underwent significant wear. To carry out disaster reconstruction work, this machine needed to be able to operate for long periods without downtime.

When it was officially decided that Komatsu



Remote controller for the amphibious bulldozer

Divers for guiding underwater work

Loading rocks onto an amphibious bulldozer with a hydraulic excavator

would undertake the overhaul, the project kicked off with veteran and young employees working in unison with the aim of handing down technical skills. The project started with teaching how to read old-style hand drawings and recreating and amending drawings for sheet metal cutting while leveraging the experience of veterans and consulting existing documents.

Components were difficult to obtain since almost all of them were custom-made, which meant a large amount of time was required to procure each component. Because welding and straightening were based on the techniques of a past era, Komatsu had to weld everything by hand and recreate the know-how of those days for the straightening process. The coating for the amphibious bulldozer also differed from coating used for ordinary construction equipment. It consisted of three layers (an undercoat, middle coat and top coat), and each single coat took an entire day to dry. Moreover, since there was a large number of components, Komatsu had to proceed with assembly while applying three coatings to each component. After completion, coating was once again carried out during the shipment disassembly process,

marking the finish of the overhaul.

In September 2012, the amphibious bulldozer was finally restored thanks to the technical skills of many people and the cooperation of numerous companies.

Sophisticated Technologies of Komatsu's Remote-Controlled Machines

Amphibious bulldozers equipped with a radio control system were developed two decades ago. The technologies cultivated through the development and manufacture of amphibious bulldozers have been passed down and incorporated into Komatsu's construction equipment.

The D375 radio-controlled bulldozer, which was equipped with the world's first automatic blade control system, played a crucial role in disaster recovery efforts after Mt. Fugen erupted in Nagasaki, Japan, in 1998. The D85MS remote-controlled anti-personnel demining machine provides humanitarian support in Afghanistan, Cambodia and Angola.



The restored amphibious bulldozer looks as good as new.

Restoration of Amphibious Bulldozer

<The Original Condition>



The amphibious bulldozer sent back to the Osaka Plant sustained extensive damage from rust and corrosion.

Processes Required for Restoration

- Number of redesigns: Approx. 250
- Number of parts ordered: 3,458
- Number of reconstructed and revised drawings for sheet metal cutting: 247
- Since many of the parts no longer existed, it was challenging to procure all the parts.
- Damage to the suspension and the main frame was so severe that Komatsu had to reconstruct the sheet metal and the casting parts. The molds for the parts were long gone and needed to be made from scratch.
- Each part was applied with three layers of protective coating.



<Reassembly after Restoration>



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