

# Unmanned Construction



Mt. Fugen first erupted in 1990, and has since become increasingly active. Pyroclastic flows have caused significant damage to the surrounding Mizunashi River Basin area and now extend more than 4.5 km from the summit of the mountain.

## INTRODUCTION

Nature is unpredictable and disaster can strike at any time. Often the devastation left behind is vast, and in many cases it remains too dangerous to send construction crews in to repair the damage for weeks (or even months) after the event. In such circumstances, remotely-controlled unmanned construction equipment could play a valuable role, making the site safe for human operators and performing initial construction work.



*After-effects of eruptions*

## FUJITA AT MT. FUGEN

For more than five years, Fujita has been developing and refining our unmanned construction system on the slopes of Mt. Fugen, an active volcano on the southern tip of the Japanese island of Kyushu.

Fujita first arrived on site in 1994 and, following successful trials of our unmanned construction techniques, began construction of a series of check-dams on the mountainside.

As of April 2000, the first check-dam was completed, and work well underway on check-dam No. 2.



*Check-dam No.2 (impression)*



*Location of Mt. Fugen*



*Fujita's unmanned site*

## OTHER NATURAL DISASTER WORK

In addition to our work at Mt. Fugen, Fujita's unmanned construction method has been successfully used at sites of several other natural disasters in Japan. These have included:

- Landslip: Kumamoto 1997
- Landslip: Nagano 1997
- Landslip: Akita 1998

We are now looking to introduce our innovative technology worldwide.

Other new technologies

Civil Marker  
Earth Air Purifiers

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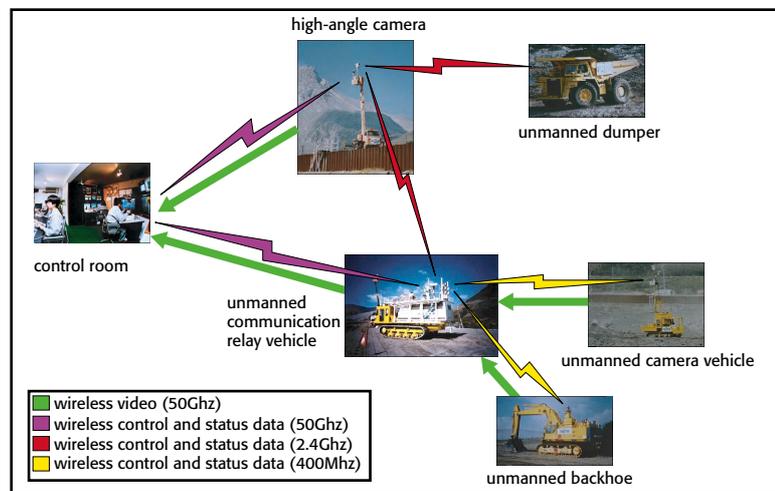
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## TECHNICAL INFORMATION

Fujita's unmanned construction system at Mt. Fugen is controlled by human operators located more than 2 km away from the site. Operators receive real-time video imaging via a 50GHz wireless system. These images can be from the remotely-operated machine itself, from independent remotely-operated cameras, or from a high-angle camera with an overview of the whole construction site.

Instructions from the operators are transmitted over high bandwidth 50GHz wireless links to a communications relay vehicle which then transmits the information (at a lower frequency) to each individual machine.

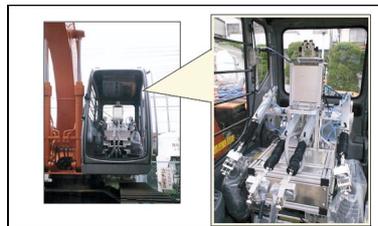
By connecting the local control room to the internet, we have recently proved it is possible to control our construction equipment from hundreds of kilometers away.



*Schematic of Fujita's unmanned construction site.*

## TELE-OPERATED ROBOT

Building on our experience with unmanned construction, Fujita has now developed the portable tele-operated robot system. The system comprises a set of components which can quickly be installed into most conventional backhoes to allow unmanned operation.



The low weight (ca. 100 kg) and limited installation requirements (2-3 trained persons can install the system in about an hour) make this system easily transportable to locations the world over.

## BUSINESS MODELS

The capabilities of our unmanned construction technique have been soundly demonstrated over the past five years and we are now looking to promote the technology worldwide. Specifically we are keen to:

- Consult with local companies about using unmanned technologies in hazardous terrain and provide advice on how to develop workable systems.
- Create partnerships to expand worldwide use of our portable tele-operated robot. We can supply equipment and training where required.

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