

Method for Road Construction on Active Volcanic Lava Fields



TYPE OF R&D RESULT

New technology
New product
New service
New knowledge or skill



DEGREE OF COMMERCIAL MATURITY

Concept model or idea
Proof of concept (design)
Validated in a controlled environment
Validated in a real environment
Successfully implemented in a real environment



PROTECTION

Not applicable
Patent
Software
Know how
Utility model

Title of the patent: Procedimiento de construcción de una infraestructura viaria sobre un campo de lava caliente.

Application number: 202331050.

Date of application: 18/12/2023

State of grant: Pending.

Where granted: Spain.

Description of the solution. Problem solved

Constructing road infrastructure in volcanic regions poses significant challenges, as conventional methods and materials are unable to withstand the extreme conditions associated with recently formed lava flows. Temperatures exceeding 100°C cause rapid degradation and erosion of traditional construction materials, while exposure to temperatures beyond 300°C typically triggers the emission of harmful gases. At temperatures above 500°C, combustion processes further compromise the integrity of materials, making conventional approaches impractical in these environments.

These limitations leave volcanic regions isolated and hinder the development of safe, sustainable infrastructure.

To address these challenges, researchers from the Department of Architectural Construction have developed a novel road construction method specifically designed for recently formed volcanic environments.

This innovative technique utilizes recycled materials from recently formed lava flows, combining them in a specialized construction process that ensures high durability, thermal resistance, and compliance with safety standards.



Figure 1. The La Laguna-Las Norias road on La Palma, a 3.5-kilometer stretch built over volcanic lava flows from the 2021 eruption.

This technology enables the rapid construction of safe and durable roads in recently formed volcanic environments, providing essential connectivity for affected communities.

Its reliance on local materials not only minimizes costs but also promotes sustainability by reducing the need for external resources. The method's scalability and adaptability make it applicable to volcanic areas worldwide, specially for the development of road infrastructure in volcanic terrains with high temperatures, paving the way for innovative solutions in road infrastructure recovery after disasters and urban planning.

The method was tested on the road connecting the towns of La Laguna and Las Norias, in the Aridane Valley, on the



island of La Palma. This 3.5-kilometer stretch was built over hot lava fields from the 2021 Tajogaite volcano eruption and served as a pilot project to implement and validate the procedure.

Fields of commercial application

The innovative method for road construction on hot lava fields has a wide range of commercial applications:

- **Infrastructure development in recently formed volcanic regions.**
- **Emergency response and disaster recovery**, providing rapid connectivity to isolated communities after eruptions.
- **Urban planning** in recently formed volcanic zones.
- Development of **tourism infrastructure** in geothermal or volcanic national parks.
- It has potential use in **military and strategic installations** in geologically active regions, as well as for building **scientific research bases** to study volcanic activity.

Competitive advantage

The technology offers a series of benefits compared to other road construction methods used in volcanic areas:

- Unique capability to operate in high-temperature environments.

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- Elimination of potable water dependence, enabling road construction in conditions where water-based techniques fail.
- Unlike traditional methods, this approach uniquely utilizes recently formed lava flows as the primary construction material, eliminating the need for cooling.
- Broader applicability to other volcanic regions.



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