VIDEO INSPECTION SYSTEM BASED ON MOBILE VIDEO CAMERA POSITIONING ON THREE AXES

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Abstract: The video inspection system presents a modern method of analysis for the dam's surface using a mobile video camera. The solution for the positioning of the video camera must provide a high level of: flexibility, stability, positioning accuracy, maneuverability and accessibility. Four variants for the video camera positioning system were considered: placing the video camera in a hanging position using a mechanical system connected to the dam; placing the video camera in a hanging position on a boat situated at the water level; placing the video camera on a pole, and positioning of the camera lens in the dam direction; placing the video camera on a transfer table, travelling on the dam's surface. For all variants, the video camera will have at least three freedom degrees. The system architecture is structured on two hierarchical levels (management level and local level), and has been designed as an open system. The video inspection system was developed in the framework of SISCAV3 Project, financed by MENER Romanian National Research & Development Program.

Key words: video inspection, dam, mobile video camera, mechanical positioning system

1. INTRODUCTION

The system architecture is structured on two hierarchical levels, and has been designed as an open system composed of: *Local Level* At this level all the commands for camera positioning system and for reducer controlling are generated. *A Management Level*: is a mobile computer.

2.BASIC TECHNICAL SOLUTIONS

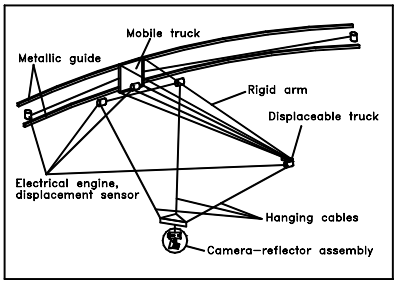

fig 1

Variant I: Placing the video camera in a hanging position, by means of a stainless steel cable, on an X direction oriented arm. It can be moved in the Y direction, and video camera will be placed under the arm. The mechanic system for the positioning of the video camera will be composed of a fixed arm oriented in an X direction. On this arm the mobile support for the video camera is hanging. The fixed arm is backed by the body of the dam, based on a rail system, fixed on the concrete.

Variant II: Locating the video camera and the mechanical system on a unit, «rolling bridge» type, on a boat (double raft).

Two traction cables, made of stainless steel, are suspended in parallel and anchored on the banks. Four cables, equipped with whips at one extremity, for the raft anchor by two of the hanging cables. Beam system fixed at one extremity by the great raft, while the other extremity is fixed to the small raft.. This sensor is mounted on the video camera unit. The video camera unit is placed on a submersible case with lighting source. The video – reflector unit will be placed on the shot axis, in an upstream-downstream direction.

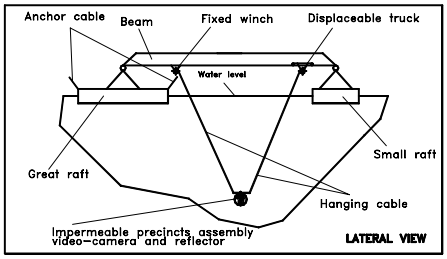

fig. 2

Variant III : Locating the video camera on a metallic pole, with its lens oriented towards the dam. The pole will be placed in an area which can be seen from anywhere around the dam and can be easily reached to.

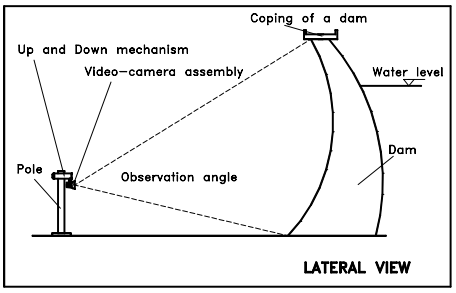

fig.3

The module frame ensures the cohesion of all secondary units; its structure is simple and compact; The operating mechanism with moto-reducer lifts and lowers the module. The support and guiding mechanism ensures a constant displacement of the module in the vertical direction. The blocking mechanism achieves gathering of the operating mechanism with support and guiding. The closing is performed round the pole. The video mechanism ensures sustaining and rotation of the pole.

Variant IV: Placing the video camera on a «truck» and lowering the unit along the wall from upstream of the dam.

The truck transports the video camera in the target zone of the dam wall. The permanent connection between the video camera and the operator drives the truck to the target zone of the dam. The winch operates the traction cable, which is firmly connected to the truck, and ensures the lifting and lowering of the truck. According to the captured images, the control unit will actuate the winch and the direction system as well.

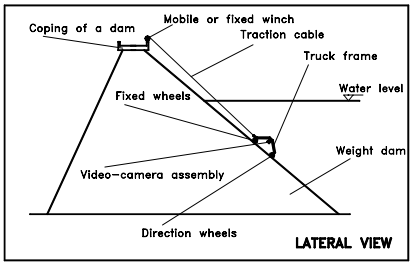

fig.4

4. CONCLUSIONS

The system described above is based on modern techniques for dam concrete surface analysis. However, the selected variant images are stored in the databases forms; captured images can be processed and compared. The inspection system is developed within the framework of SISCAV3 Project, financed by MENER Romanian National Research & Development Program.

REFERENCES

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