Coldness and Heat Resistant Camera and Novel Heat Distribution Monitor

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Abstract

The unique patented technology, heat resistant camera, which is monitoring directly in 1500°C environment, is in the possession of our company. In this report, the unique model of coldness and heat resistant camera, and the image processing system with novel heat distribution monitor are illustrated. This is only the camera which can monitor in both cold environment and hot environment in the world.

Keywords: Coldness and heat resistant camera, heat distribution monitor.

1. Introduction

Recently, as the functions of industrial products are being consolidated, the request of quality control in Japan is getting higher. To ensure quality control, the method can be applied in any condition is expected. In another word, no matter in hot desert area or cold polar region, it is request to pursuit, to verify and to ensure the same quality of products.

Fig. 1. Coldness and heat resistant camera FHRD100.

Fig. 2. Novel heat distribution monitor A-NB10.

For example, in the fields of manufacture in automobile companies, construction companies, and airplane companies, the devices which realize environment variation as polar region are applied to detect whether there is quality change or how large is the quality change in products. In those applications, the temperature variation of environment is usually set in the range from -60°C to 200°C. However, current situation is that the devices which realize the environment is still on the way to be available to all. Meanwhile, the products for detecting various kinds of internal information are still under development. In the development, the most significant issue is to observe, record, and analyze according to image. Since systems for ordinary temperature environment (for camera, generally, the range is 0°C~55°C) cannot be applied, coldness and heat resistant camera, which is able to be applied in internal of devices, is expected.

The unique patented technology, heat resistant camera, which is applied directly in 1500°C environment, is in the possession of our company. In this report, the unique model of coldness and heat resistant camera, FHRD100 (Fig. 1)

Fig. 3. Connection of bulb stand cable.

Fig. 4. Experimental system.

and the image processing system with novel heat distribution monitor – A-NB10 (Fig. 2) are illustrated.

2. Coldness and Heat Resistant Camera

Since there are achievements of coldness and heat resistant cameras in our company, we just merge the functions together in jacket. However, to achieve that, there are several obstacles to overcome. The key point is the utilities for environment variation are constructed as following.

- ① Body of coldness and heat resistant camera (CCD with 400k pixels and LED with high brightness set in the cooling jacket)

- ② Choose the cable (coldness and heat resistant) the ones made by Teflon are good choice
- ③ Protection of cable (coldness and heat resistant protection)
- ④ Connection of bulb stand cable for the control of utility cable (Fig. 3)

1. Air IN
2. Air OUT
3. Water IN
4. Water OUT and dry air OUT

The control function owing to temperature variation of bulb stand camera is developed by Prof. Seiichi Serikawa from Kyushu Institute of Technology. The experimental system for $-60^{\circ}\text{C} \sim +200^{\circ}\text{C}$ temperature environment is designed as shown in Fig. 4.

3. Novel Heat Distribution Monitor

Then, whether there is response and how large is the response of the products in $-60^{\circ}\text{C}\sim+200^{\circ}\text{C}$ environment is designed to be detected by images fetched by CCD camera. In order to master the information, the application of image processing is quite important.

Especially, the novel heat monitor – A-NB10 is good at mastering the temperature difference at surface of target objects. The proposed monitor performance excellent at heat resistant camera and it is supposed to be designed for coldness and heat resistant camera.

4. Summary

In next phase, the field tests are supposed to be implemented with the cooperation from companies or research groups. Then the real products are planned to be manufactured.

Meanwhile, new version of heat distribution monitor for coldness and heat resistant camera is planned to be released.