Министерство образования и науки Российской Федерации
НОВОСИБИРСКИЙ ГОСУДАРСТВЕННЫЙ ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ



# SCIENCE. RESEARCH. PRACTICE

# СБОРНИК ТРУДОВ ГОРОДСКОЙ НАУЧНО-ПРАКТИЧЕСКОЙ КОНФЕРЕНЦИИ АСПИРАНТОВ И МАГИСТРАНТОВ

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means of high-temperature brazing with specialized solder. The composition of the solder is 28% titanium and 72% copper. This composition will provide a reliable connection that will avoid the flow of the soldered seam.

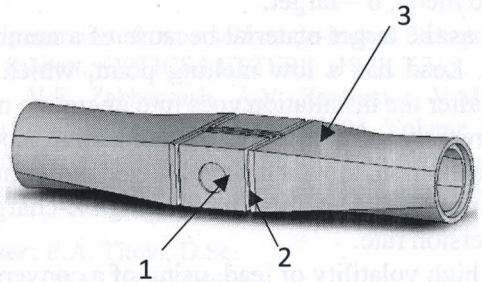


Fig. 2. Construction of conversion target

**Reference**

1. V.A. Ponomarev, Solder for brazing electronic equipment, patent of the Russian Federation No. 2058872

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## BEAM PARAMETERS MONITORING SYSTEM IN AN ELECTRON-OPTICAL LINE USING LUMINOPHORE PROBES

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***Abstract**: The following paper is devoted to designing the system of monitoring and control of charge particle beam in an electron-optical transfer line using luminescent screens. Designing and testing of the described system is taking place at the accelerator complex VEPP-4M in Budker Institute of Nuclear Physics (BINP) in Novosibirsk.*

***Key words:** CCD, luminescent screen, MAD-X, transfer line, lattice.*

The process of charge particle beam injection in the accelerator through transfer line requires additional system, which will allow monitoring of beam



parameters in key places of the line. Required system is being created at the accelerator complex VEPP-4M in BINP.

Beam parameters monitoring system consists of charge coupled device (CCD – cameras) that collect and send visual data, luminescent screens which are inserted in transfer line when a beam passes by, screen control units responsible for luminescent screens insertion using contactors and illumination of screens. Entire system is linked in one Ethernet network and can be managed from one of the computers in control room of the complex. Any chosen camera must start collecting data with a synchronization signal. Synchronization signals are being obtained from other systems.

CCD-cameras and screen control units are developed in BINP. CCD-cameras are based on CCD-matrixes SONY ICX084AL with total number of pixels 692 x 504 and diagonal 6 mm. [1]

Designed system will allow beam distribution monitoring in fifteen key places of the transfer line. All received data will be analyzed and stored. Beam parameters received by the system will be verified with values calculated using lattice function of the transfer line in MAD-X program. MAD-X allows for evaluating beam parameters such as beta functions, dispersion functions, coordinates, sizes, transverse emittances etc.

Software is required to manage the system. The ROOT-based program has following features:

- Image acquisition from any camera linked to network;
- Luminescent screen insertion;
- Illumination level management;
- Transverse distribution monitoring;
- Evaluation of beam coordinates and sizes.

Designed system may be used for calibration of other systems such as current detectors or other similar sensors.

At present the program providing system management is in the testing stage. CCD-cameras and screen control units are being assembled. Laboratory has power supply sources, some cameras and screen control units. That is enough for method testing on transfer line.

System testing undergoes in several stages. First, testing of visual data collection from CCD-cameras is done. Second, testing of luminescent screen insertion process is done. Third, tuning of the optimal illumination level of

the screen is done. And the final stage is testing of synchronization. At present, first stage is complete, next two are in progress.

**Reference**

1. Data Sheet, Sony Corporation / ICX084AL

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**Language Adviser**: N.P. Medvedeva, Can. Sc. (Econ.)

## STUDY OF HEAT TRANSFER AND CRITICAL HEAT FLUXES DURING EVAPORATION AND BOILING OF THE LIQUID IN A THIN HORIZONTAL LAYER UNDER REDUCED PRESSURE

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***Abstract:*** *The paper tells about structures, heat transfer and critical heat fluxes during evaporation and boiling of the liquid in a thin horizontal layer under reduced pressure.*
***Key words:*** *heat transfer, boiling, reduced pressure, a thin layer of liquid*

The aim of the work was to obtain experimental data on heat transfer and critical heat fluxes in intensive evaporation of liquid horizontal layers at reduced pressure in a wide range of changes of the height of the layer and pressure. N–dodecane was used as the test liquid in experiments.

The structures of the four types: the "funnels", "craters", dry spots and bubbles are formed in the liquid layers depending on the layer height and pressure [1]. Structures in the form of "funnels" and "craters" were formed under the influence of the reactive force of phase transition. "Funnels" are the pit with a hemispherical bottom in a thin layer of liquid. "Craters", in contrast to the "funnels", are in the center of the deepening of a long, flat residual layer of liquid of finite dimensions. "Craters" were formed in place of the array "funnels". The maps of the hydrodynamic modes of heat transfer are given in this work. Dry spots were formed in layers of a height less than the capillary constant at given pressures less than 0.001. In the layers above the capillary constant (Figure 1), when the reduced pressure is less than 0.001