CONCEPT OF AUTOMATION OF THE COMPARISON PROCESS OF CODE LEVELS SYSTEM – MODERNIZATION OF DRIVING SYSTEM

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1. CONSTRUCTION AND OPERATION OF THE EXISTING COMPARISON PROCESS

The elements of comparison process in Department of Geodesy and Geodetic Astronomy Faculty of Geodesy and Cartography, Warsaw University of Technology (Fig. 1):

Horizontal track length of 3.57 m, mounted immovable on a five concrete columns 40 cm x 40 cm x 70 cm,
Displacement staff system, consisting of two separate trucks sliding on the track and resisting on the rail with a length of 4.00 m.
vertical part of measuring equipment (not used in the code comparison process),
lighting in the form of twelve lamps glow uniformely distributed within the comparator,
interferometer HP5528A Laser Measurement Hewlett-Packard System,
levelling code system Trimble / Zeiss Dini 12 and Leica NA3003 available with the serial cables to enable data transfer between the leveler and the PC.

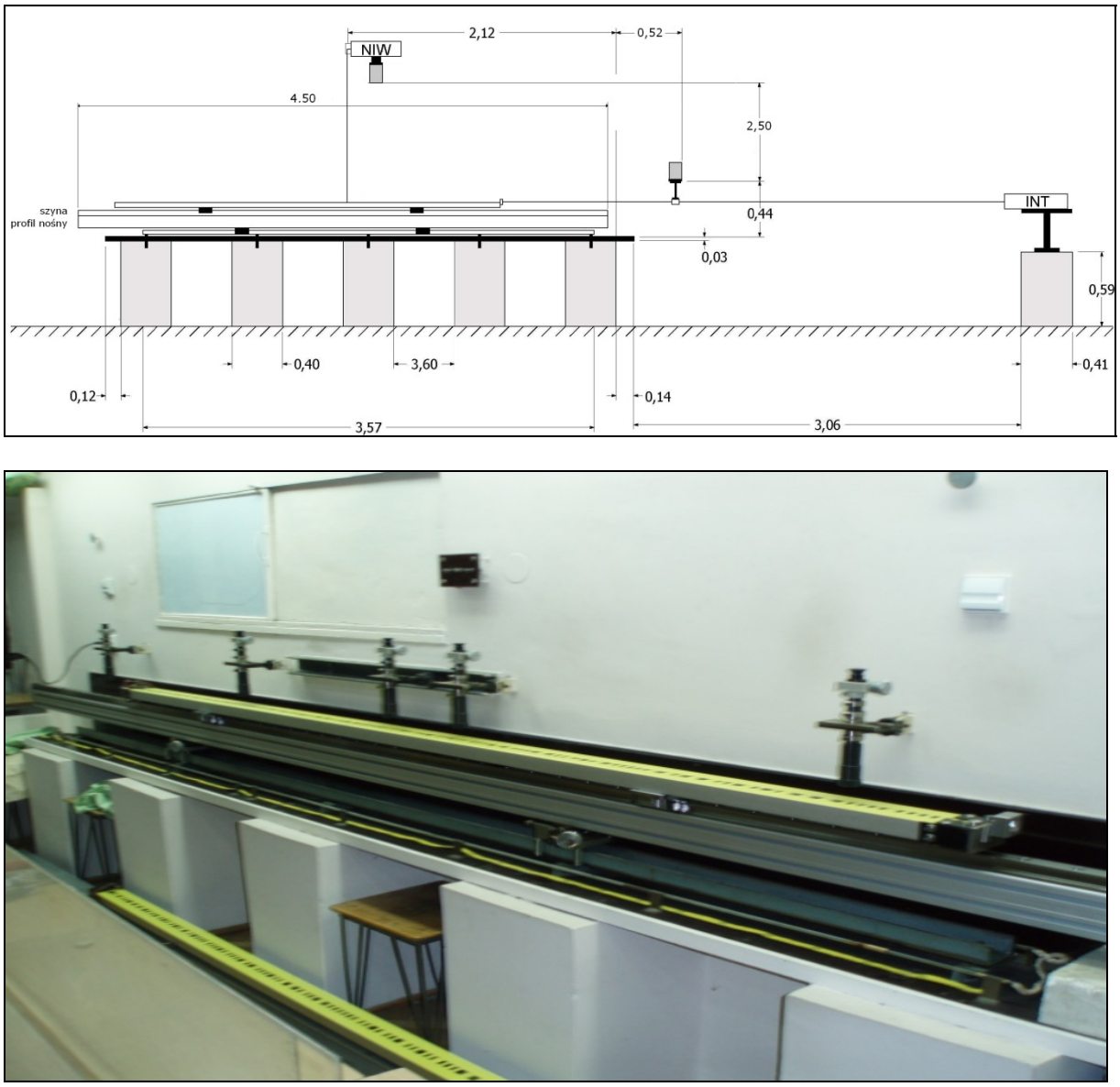

Fig. 1. Comparison System in WUT.

2. STEPS CARRIED OUT ON THE MODERNIZATION OF COMPARISON SYSTEM

As a part of the project, which provides for the modernization of the existing code staff comparison system, the following steps can be noted:

automation of shifting staff

concept of processing the interferometer readings

3. AUTOMATION OF SHIFTING STAFF

This procedure requires a constant presence of at least two observers. After each automated reading, which has pursued leveler, it was necessary to manually move the

staff on a horizontal track, by the length interval and perform the reading of the interferometer.

Automating the design moving staff system was the following:

Precise profile Bosch Rexroth company length 120cm
Precise step engine WObit Witold Ober company (Fig. 2).
The hardware driver SMC64BP, mikroindekser M.I.1.8.and two stabilized power supplies: ZN200-L i ZS8-5-12
The precise step engine mounted on trucks at the Bessel's points.

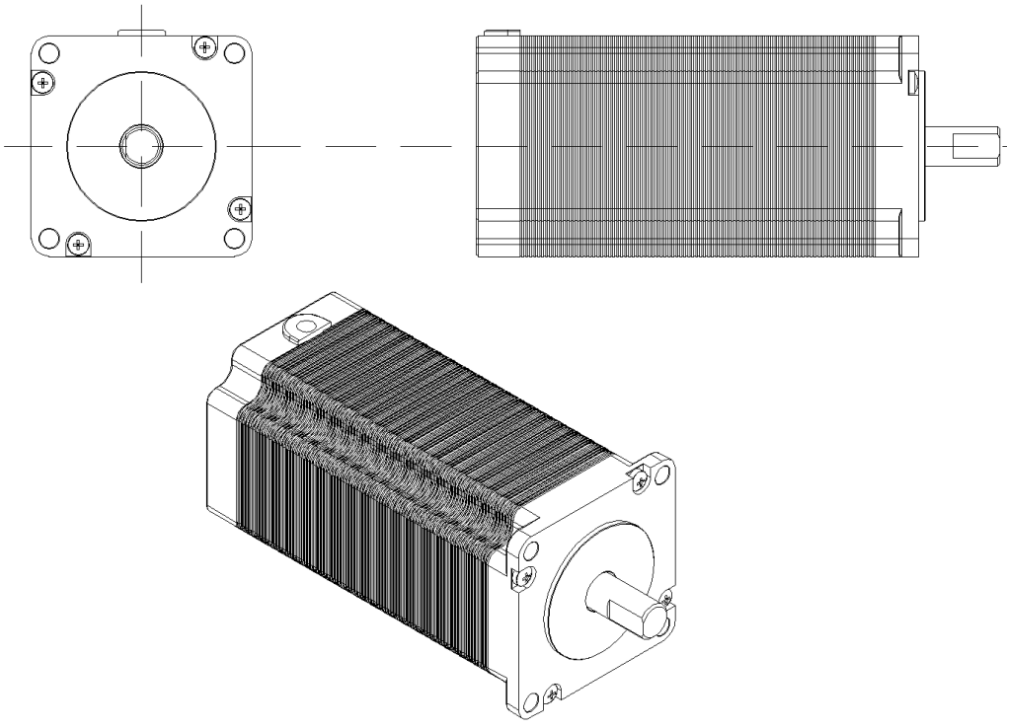

Fig. 2. Precise step engine WObit.

The next step was to connect (Fig. 3) the engine mounted over driver. After connection, truck system is fully supported by computer's remote control commands.

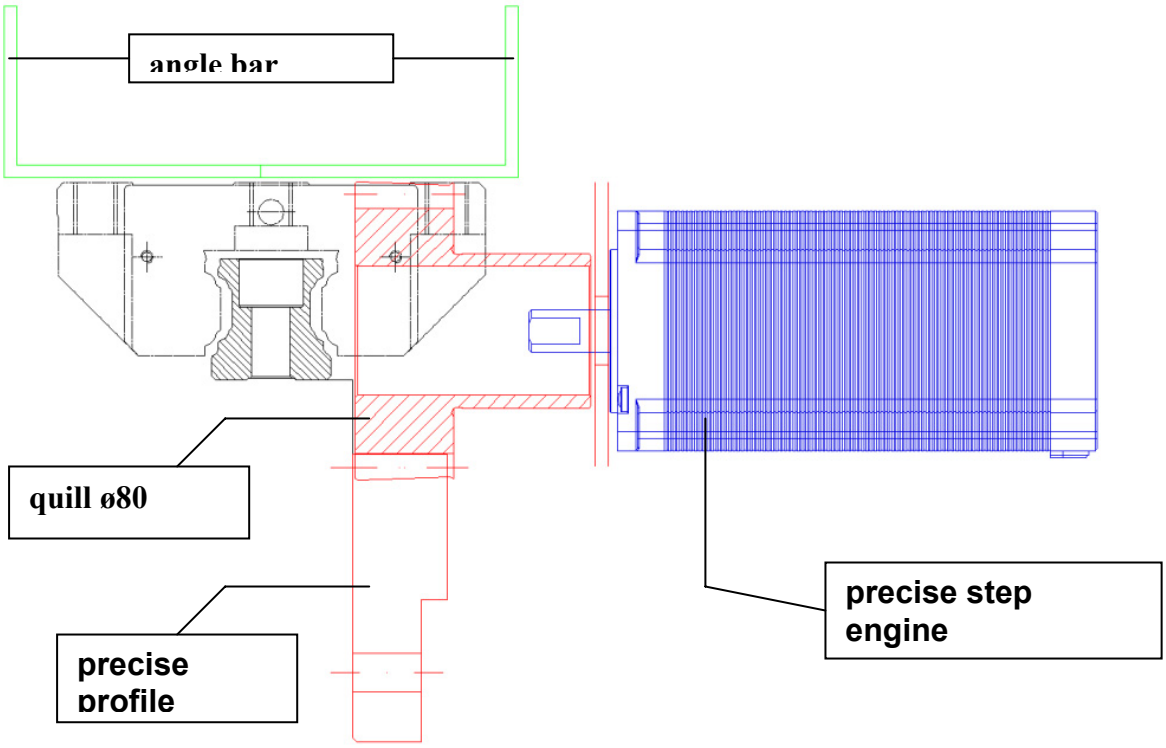

Fig. 3. Connecting of step engine to driver.

WINMI software runs created specifically for the program code to handle the comparison process.

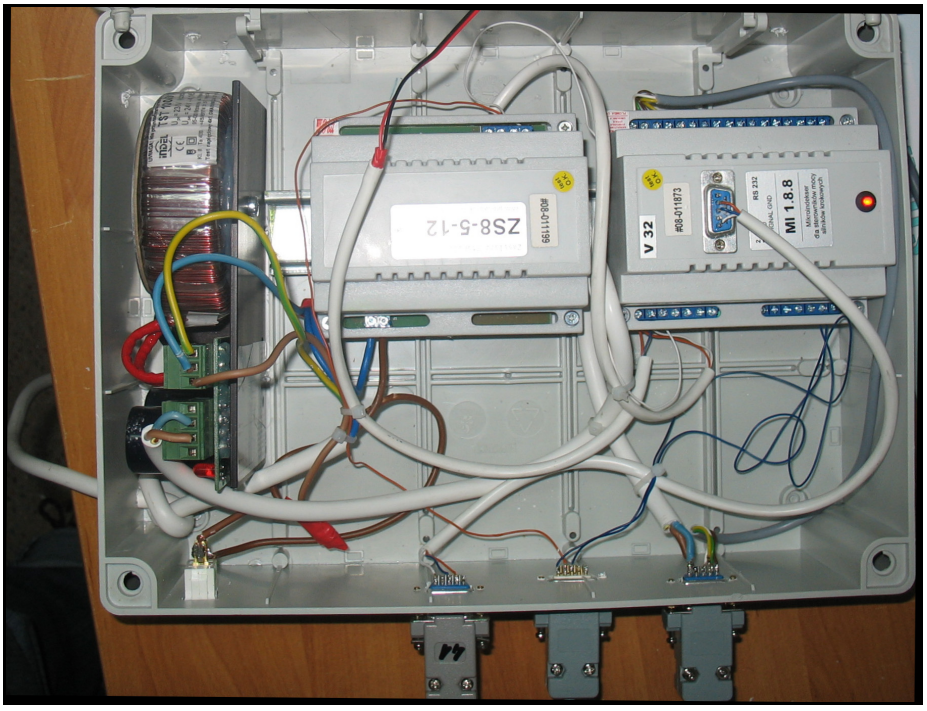

Fig. 4. Controller.

The engine is controlled by the controller (Fig. 4), which can move the staff by the precise step engine.

4. AUTOMATION OF READING SYSTEM FROM THE INTERFEROMETER

Another point of manual comparison process in the original version, was the performance of readings from the interferometer by the observers.
In the course of further analysis of this problem, two solution was proposed based on a interface standard IEEE-4888 GPIB (Fig. 5.) connected to one of the serial ports of your PC, and then:

Solution 1

Append the applet to the existing KOIN software that perform readings from the interferometer and transform the results to the observation program.

Solution 2

Writing a separate program that perform readings from the interferometer, and then save them in a text file, from which KOIN downloads automatically.

Solution 1

During the analysis of the source code of the KOIN program, it was found that there is a problem with the inability to add the applet in the Delphi 7 language, in which it was written KOIN program.

This is due to the fact that the port is the old GPIB type and creators of Delphi code are not suitable for the use of this type of port.

Fig. 5. Interface standard IEEE-4888 (GPIB).

Solution 2

One of the languages, which, after install the appropriate libraries supports GPIB port is Sun's Microsystems Java language.

By using the appropriate functions, it is possible to read values from an interferometer, and save them to a text file.
During this, program loops through the use of KOIN expect to change the flagship of the file.

When separated program change this value, the KOIN automatically reads from that file measure observations of the interferometer, and then having all the data in, KOIN will back to standard calculations.

Unfortunately, at this time, due to the lack of detailed technical information about the reading performance of the proposed interferometer, the above solution is only a conceptual solution.

5. SUMMARY OF CARRIED OUT WORK

The result of the two-step task was to modernize the comparison system,

> **automating of the staff moving process on the horizontal track with a precision step engine and integrate it with the computer controlling the comparision process**
> **solution to the problem of automating the process of reading from interferometer and integrating it with the control comparision process.**

The first phase:

A staff placed on the moving rail moves on a carts, accurate to the precise step engine and control the staff traffic by created project program. The direction of the rail traffic control is built using a controller.

The second phase:

In further stages it is scheduled to write a program to transmission interferometers readings and replacement our controller through RS-232 interface, allowing for multiple fully automatic shifting staff, and injection into the readings of the interferometer. This will ultimately lead to a complete automation system.

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