

AN AUTOMATION SYSTEM BASED ON LABVIEW TO CONTROL THE TEST OF MECHANICAL FLOW METERS

Mechanism to characterize flow measurers

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Abstract: A mechanical flow meter is a device used mainly to measure and calculates velocity of water's flow on rivers and open channels. These devices, as the time of use pass trough, suffer mechanical imperfections, that are why it is important to calibrate them twice a year, depending of its time of use. At the Mexican Institute of Water Technology (IMTA in Spanish) was designed and developed a circular water tank for propose of test of these meters. The present paper shows the automation systems designed to control the tests to calibrate these mechanical meters. The system is based on LabVIEW. LabVIEW is a general purpose programming tool with extensive libraries for data acquisition instrument control, data analysis, and data presentation. With this tool and a special hardware interface, it was possible to automate the process to test these meters. The system is called SCM (System of characterization of mechanical meters). SCM control the test of two mechanical meters simultaneously, and has some user's control features that permit the Operator a easy to use human machine interface.

1 INTRODUCTION

Before that disappear the installation where himself towards the Calibration of the mechanical meter flow the Mexican institute Technology water builds a circular water tank for purpose apart the test calibration those meters.

This circular water tank have 12m of diameter, 80cm. Cross section and 1.40m of depth with a motor is of 15 kV. for move the arm of 12m the mechanical flow meter are device use for Measurement the speed in river and open channel, the which testing needs depending on your use.

This measurements it are carry with the help of a headphone and a battery, himself submerge the device in the water flow and himself count the turn that get your cops a the open or close a circuit each revolution in a period of time give and with this date and know the area is possible calculate the expense.

In the channel in the beginning himself producer the characterizations in form manual:

before the apocopated demand, himself use the tool the computation for produces the characterizations of the measurement of flow.

2 PERIPHERY AT CONSIDERS.

For carry at handle the development of software was necessary take in count the information that drive each a of the mechanics, list the parts that will be in the system and in consequence define the software.

CONCEPT

- a) The measurement flow are system mechanics of measurement of flow of water, consist of a system of six cones or cup, the as are impulse for the flow of water.

In of mechanism have platinum that himself close for each tour complete that gives the disc o cups.

Given himself mechanics character, each flow meter has himself proper characterization of answer.

control for means of brush location in the axis central.

In the fig.1 himself see the complete system.

b) The signal of the flow meter is transmitter since the arms towards the smallhouse of

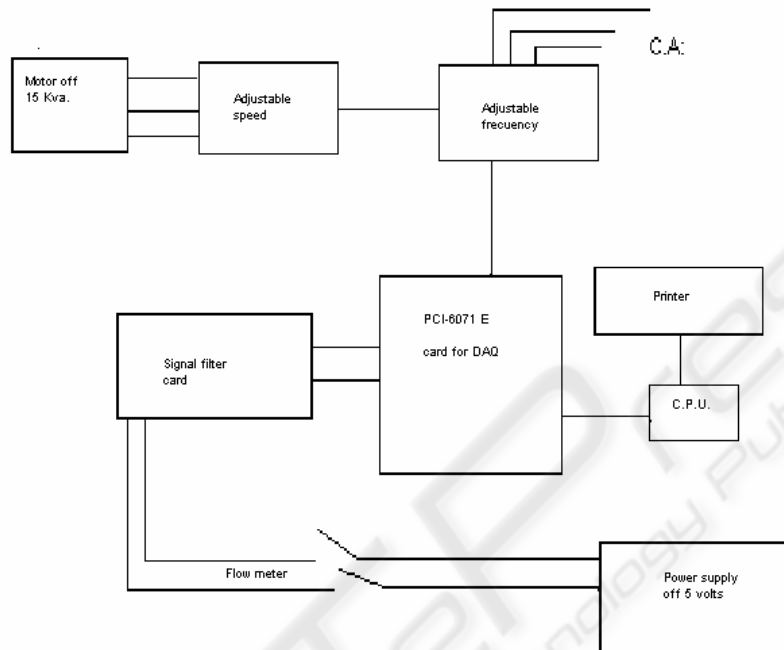


Figure 1: Draw of complot of circular water tank system

COMPONENT IN THE SYSTEM

1. PCI-6071 E card for DAQ
2. - Adjustable frequency ABB
3. -Pentium II 400mhz computer
4. -Signal filter card
5. -Power supply
6. -Flow meter
7. -Engine of 15 kV.
8. -Adjustable speed
- 9.-Software LabView

Himself make a description for each component.

1. - PCI-6071 E card for DAQ

This is E Series multifunction DAQ I/O, it can solve DAQ and control system applications, automatization, programmable input ranges and gains where determinism in your software is critical.

The E series not only do you have the flexibility to easily port your applications between different computer platforms and operating systems.

This is install in of the PC and it is possible configure for software and the connection of jumper according this conditions that the person want.

This hardware has libraries for facilitate the communications with the instrument that are necessary for measurement the signals.

2. - Adjustable frequency ABB.

The controlador of C.A. of 1 to 75 HP count with a display and at keys for control the panel, also with a menu where is optional the drive, in form manual and automatic.

A bridge of diodes converts line power almost entirely to active power. The displacement power factor approaches unity (>0.98) regardless of speed or load of the connected motors.

A Motor control Card controls the Inverter the Stage and monitors the operation of the ACS 501.

A Control Interface Card is the link between the operator and the ACS 501. It features a Control Panel with an alphanumeric display and keypad. A terminal block for external control connections is also located on the Control Interface Card.

The Control Interface Card is optically isolated from the line potential. The Control Interface Card common is connected to the chassis ground through 10-megohm resistor.

2.3. - Pentium IV 400mhz computer.

2.4. - Signal filter card.

The signal of the flow meter is very noise how you look in the fig. 2. For this problem was necessary place a filter card and a protection at the circuit by means of an optoisolator circuit.

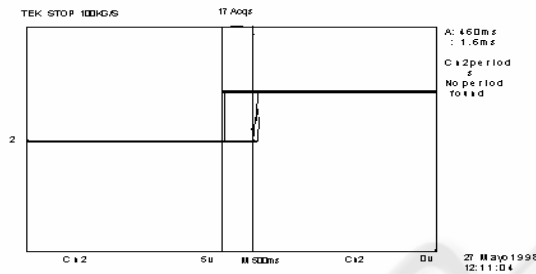


Figure 2: Noise signal of the flow meter

2.5. -Power supplies of 5 volts to 0.5 amperes for supply the signal to the flow meter.

2.6. -Adjustable speed is manufacture by means of gears that receive the move of motor of 15 kW.

3 REQUEST OF THE PROGRAM

- 3.1 Ask identification.
- 3.2 Menu with options
 - Characterizations
 - Consulting base of dates
 - Get of low or high dates
 - Recorder each characterizations

- 3.3 Made the process of characterizations and filter signal
- 3.4 Made the calculate necessary.
- 3.5 Proportion the equation of characterizations.
- 3.6 Result
 - Date of the user
 - Graphic of the result
 - Table for calculates for in form normal and with cable

The program himself fulfill in the software LabView consist in approximately 64 routine, he model the draw of the program in the fig.3.

A of the screen that us present is the following:



Figure 3: Menu Principal

MENU PRINCIPAL

1. - Process Characterizations.
2. - Consulting base of dates.
3. - Configuration of the system.
4. - Exit of the system.

1. - Process Characterizations in where himself the assign clef and register number.

- a). - Himself into to base of dates, where himself can select the file of a flow meter with

Characterizations or himself can give of high or down.

- b). - Himself write the dates of the new flow meter and dates of maintenance date ingress.
- c). The system give a screen for actuality the dates of the equation of adjustment whit the 12 ranges of speed number of test and how many time last the process.
- d). The system question if have other flow meter if is "no" following to the screen where sample the information.
- e). The process begins actuality of dates of number of pulse in the ranges of speed in m/sec. That is 0.148, 0.402, 0.530, 0.657, 0.912, 1.167, 1.422, 1,676, 1.931, 2.186, 2.441 and 2.996.

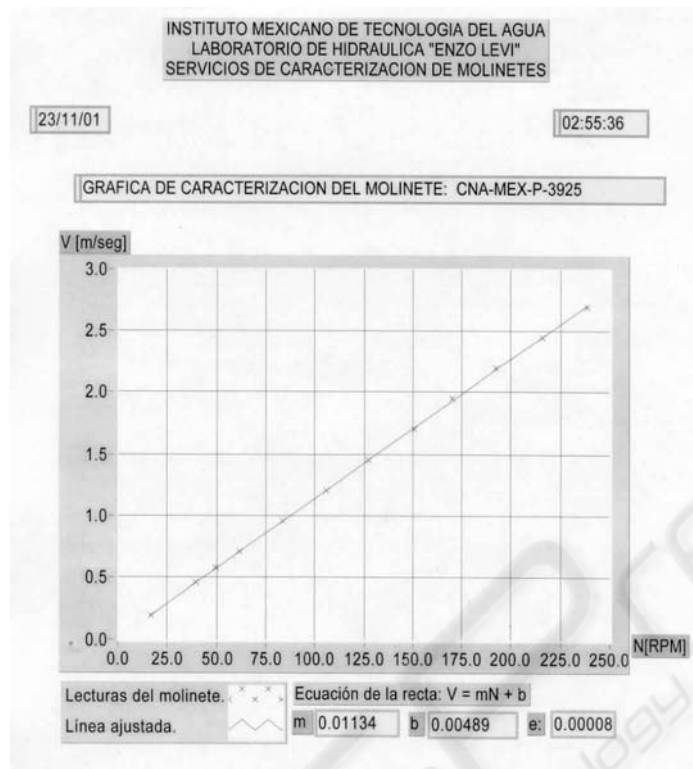


Figure 4: Graphic of characterization of the meter flow

f). When the process finishes himself the can printer the result in four pages.

- 1ª. Dates of the user, maintenance and responsible name.
- 2ª. Dates of the parameter of equation (m) and (b) and the graphic that is simple in fig. 4.
- 3ª Table for gauging in forms normal.
- 4ª, Table for gauging with cable

2. - Consulting base of dates.

Himself can possible see dates of the flow meter characterization and edit or print the information.

3. - Configuration of the system.

Himself can change dates of operation for example ranges speed, time of advice of error (*).

4. - Exit of the system is when finish all the process.

* When the flow meter have a problem the system give signal say "The flow meter doesn't ask"

4 CONCLUSION

The development of this software is an innovation of the technology for characterizes flow meter in short time and with exact and certain.

With this him comply the objet of achievement characterizations meter in short time and with exact and certain.

This mean for fulfill the characterizations for mean of the characterizations

For mean of the circular water isn't common, without embargo the result

Himself compared with characterizations of a laboratory certify internationally who

Himself is the Laboratory of Canada Center for Inland Waters obtaining similar results.

By him that can say that this software is working in of the conditions acceptable.

For him that himself handled of achieve the certify of all the system.

The operation and maintenance of the software is easy and rapids.

With the base of dates is possible make analysis and statistical and with this,

Obtain conclusions for make better the constructions of the flow meter.

