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The Design and Implementation of Precious Test and Quality Control System Based on Delphi

Ruoping Wang & Liguo Lai

Changchun Institute of Equipment and Technics

Changchun 130012, China

Tel: 86-431-8550-3161 E-mail: cc.ruoping@163.com

Abstract

In this article, utilizing Delphi 7.0 as the development platform, we design the system to collect or record measurement data through electronic digital caliper and digital table, compute control parameters of quality control chart, draw the process control chart of controlled objectives and read, analyze and manage the measurement data.

Keywords: Delphi 7.0, Electronic digital caliper, Precious test, Quality control

1. Introduction

The electric digital caliper is a sort of apparatus to measure the distance of relative removal between two measured faces, and it is one product of mechanical and electrical integration. It can transfer the collected and tested accessory data to the computer through the communication interface. Because the electric digital caliper has many advantages such as clear reading, clear display, convenient use and high effectiveness, it is broad applied in the domain of manufacturing in China.

2. Objective of system

The objective of the system is to utilize the electric digital caliper and digital table to collect or manually record measurement data, compute the control parameters of quality control chart, draw the process control chart of controlled objective, effectively analyze and judge the stability of working procedure quality in the production process, find the abnormities occurred in the production process in time, exactly the trend of quality, and through translating the analysis control chart into the production control chart, prevent and reduce the occurrence of over-tolerance products, make the making process in the technical stable state, and make the quality of working procedure divinable, and quickly measure the influence degree of system error and adopt corresponding measures to control the quality, and follow, transfer and manage measurement data to offer quality guarantee for the successive productions.

3. System composing and operation environment

3.1 Composing of system

The precious test and quality control analysis system mainly includes seven function modules such as system management, test database, test repository, quality control, basic information query and print, and system service. The basic design concept and flow of the system is shown in Figure 1.

3.2 Operation environment

3.2.1 Hardware

The lowest collocation of hardware that the software operates includes Pentium 3 CPU (500M and over 500M main frequency), EMS memory of 128M or over 128M and hard disk of 6G or over 6G.

3.2.2 Development environment

This system is designed, developed and transferred under Microsoft Windows XP, and the front-end client program uses the Delphi 7.0 as the software development program, and the background database uses the Microsoft Access, and the documents in the program are made through Microsoft Office FrontPage 2003.

3.2.3 Operation environment

The operating system can use Windows NT, Windows 98, Windows 2000 or Windows XP.

4. System functions and software structure design

4.1 System functions

(1) Realizing the supervision of machining quality for the structured components connected with the electric digital caliper.

(2) Data read. Reading the quality control curve or histogram drew through comparing the test data on the electric digital caliper with the drawing size.

(3) Realizing historical data query and displaying historical data curve or histogram.

(4) Realizing exports of report forms and data.

4.2 Structure design of software

The implementation of precious test and quality control includes three parts. The first part realizes the record of basic data. The second part realizes the transfer, reading, display, treatment, memory and curve (histogram) drawing of data through the measurement of electric digital caliper. The third part realizes the historical data query, and curve (histogram) query, printing of report forms. The works of various parts include following aspects.

4.2.1 Data transfer

The data is transmitted by ASCII code (and text formatting), and every measurement data is ended by the enter symbol and is transmitted continually. The data has no frame head, and the ASCII code of measurement has 10 bytes, i.e. the front is the positive sign or minus, then 7 figures and one decimal, and the transmitted byte is fixed.

4.2.2 Data reading and graph protracting

(1) The core codes of data readin.

```
try case Msg of
Apw_triggerdata:{got 'login', send response} ;
Apw_triggeravail: {extract and display/process the data};
begin
S:='';
for W:= 1 to Data do
begin
C := ComPort1.Char;
if CB_hexGet.Checked then
begin
S:=S+inttohex(byte(C),2)+' ';
end else
S:=S+C;
inc(I1);
end;
```

(2) Drawing the curve. Use the function in Delphi 7.0 to draw the curve which is seen in Figure 2.

```
Canvas.MoveTo(0, 0);
Canvas.LineTo(X, Y);
```

4.2.3 Data memory and history data query

(1) The core codes in the data memory process.

```
table.FieldByName('drawing size').AsString:=bsskinedit9.Text;
table.FieldByName('actual measurement result').AsString:=bsskinedit10.Text;
……
table.Post;
```

(2) Historical data query (seen in Figure 3). According to the query condition inputted, we can confirm the query result. The core codes:

```
query.SQL.Add('select * from testing records');
```

```
stemp:='select * from testing records ';
query.Open;
begin
stemp:='select * from testing report where number=
' + "" + trim(edit5.text)+ "";
end;
```

5. Conclusions

Through the process control chart of controlled objective, the precious test and quality control system designed in this article can effectively analyze and judge the stability of working procedure quality in the production process, find the abnormities occurred in the production process in time, exactly the trend of quality, and through translating the analysis control chart into the production control chart, prevent and reduce the occurrence of over-tolerance products, make the making process in the technical stable state, and make the quality of working procedure divinable, and quickly measure the influence degree of system error and adopt corresponding measures to control the quality, and follow, transfer and manage measurement data to offer quality guarantee for the successive productions. This system makes the software interface more beautiful and the data read more convenient and better fulfills users' demands through the exertion of the third party's controls such as Businesskinform and Spcomm.

References

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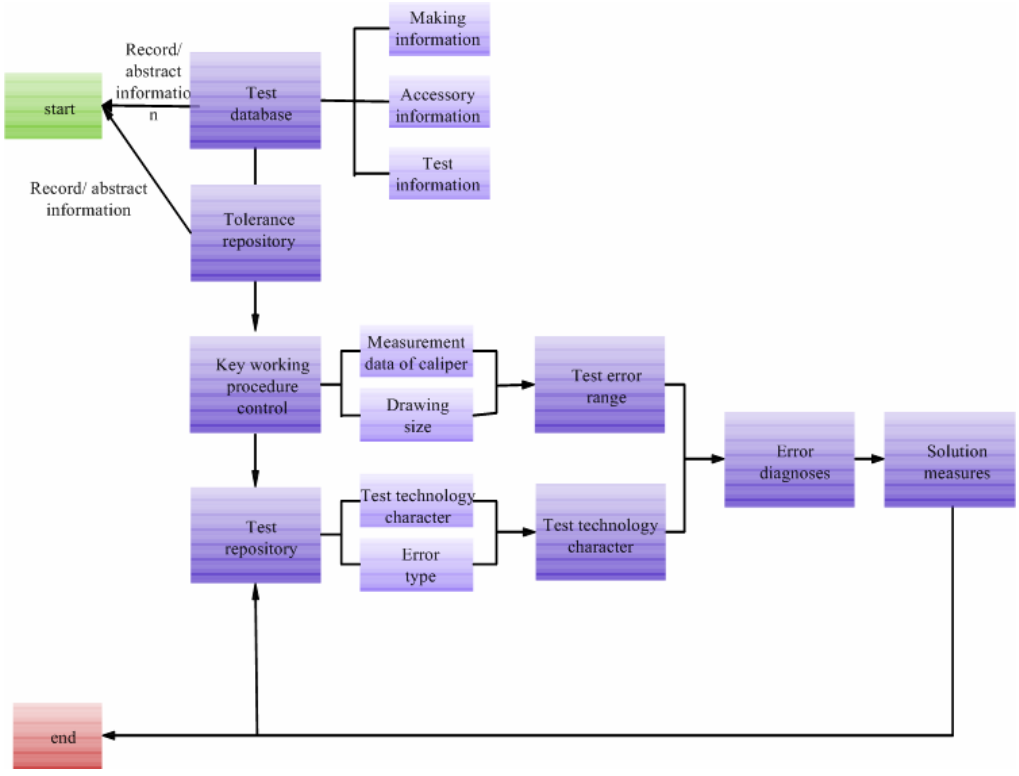

Figure 1. Main Function Design Flow of the Precious Test and Quality Control System

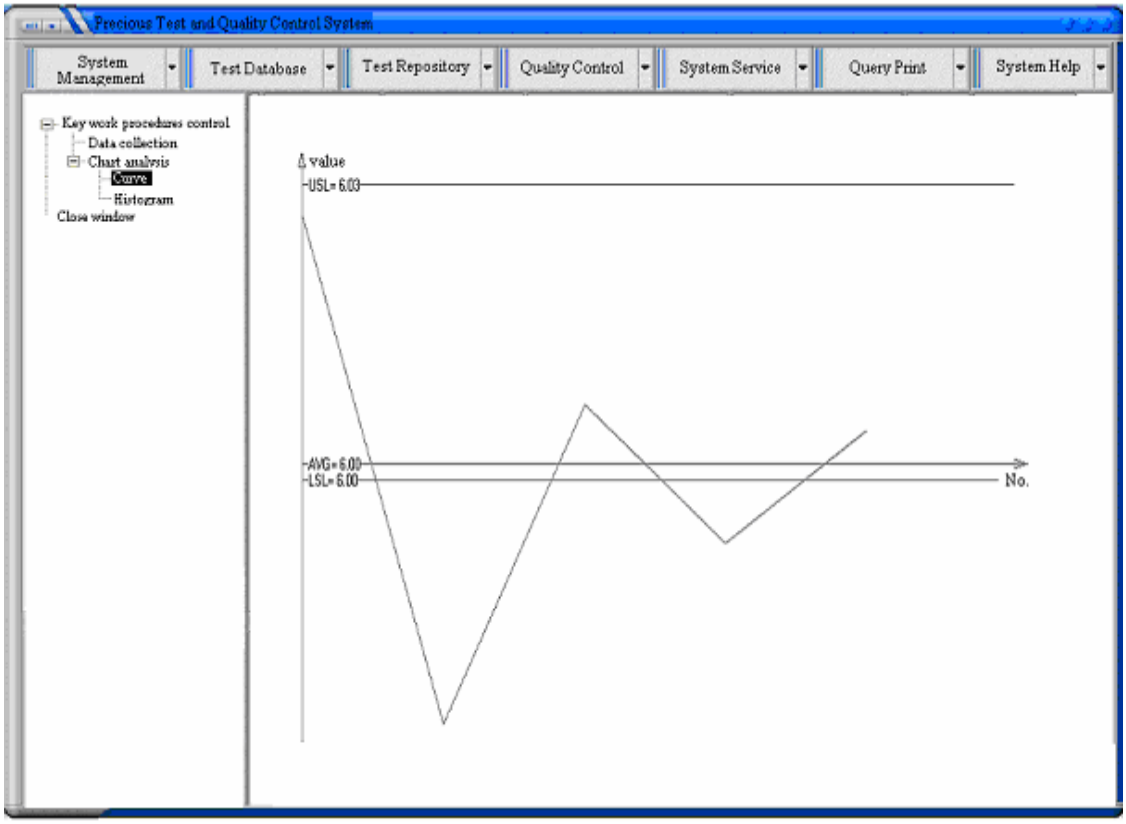

Figure 2. Quality Control Curve

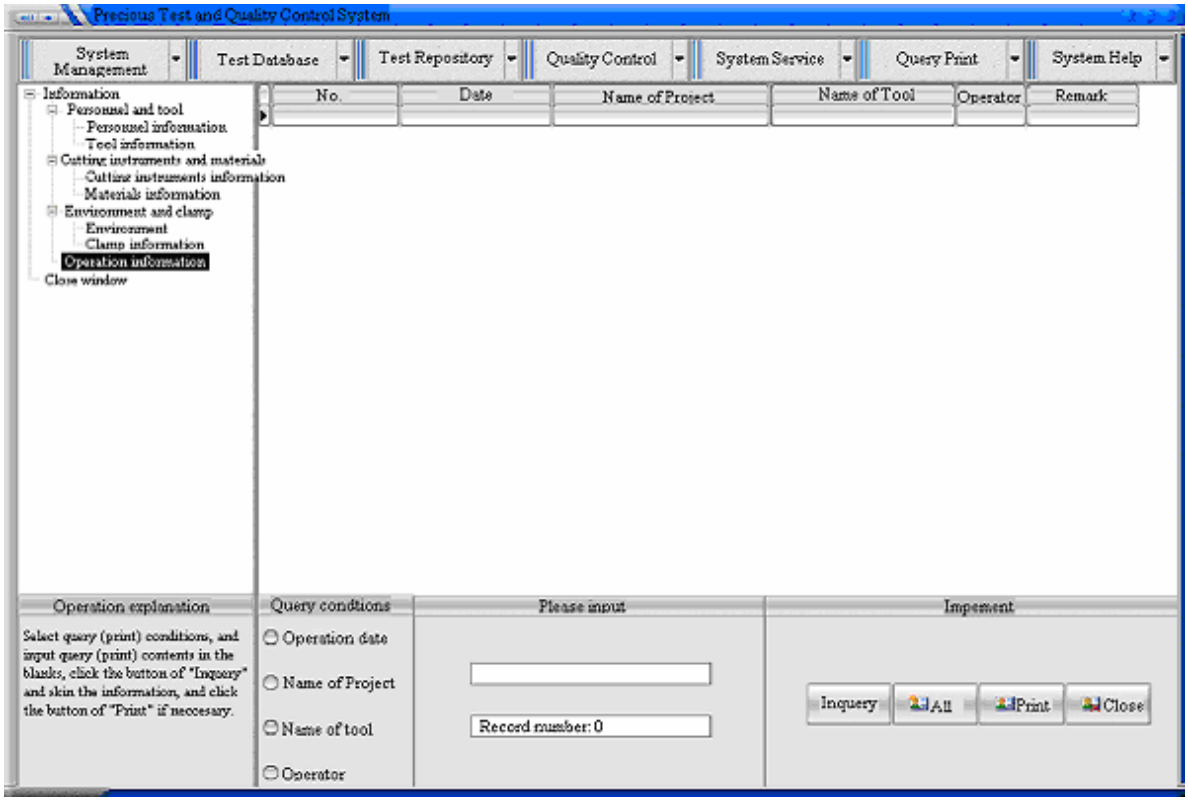

Figure 3. Historical Data Query