

Exporting – Becker Quality Solutions

Prolink's strategic partnership with Becker Quality Solutions, Inc. takes quality to the next level. Becker Quality Solutions' new Process Toolbox combines measurement data from QC-CALC with engineering knowledge to produce very specific operator instructions that are easily executed. For additional information on the Process Toolbox, please contact Larry Becker at Becker Quality Solutions at www.beckerqualitysolutions.com.

How It Works

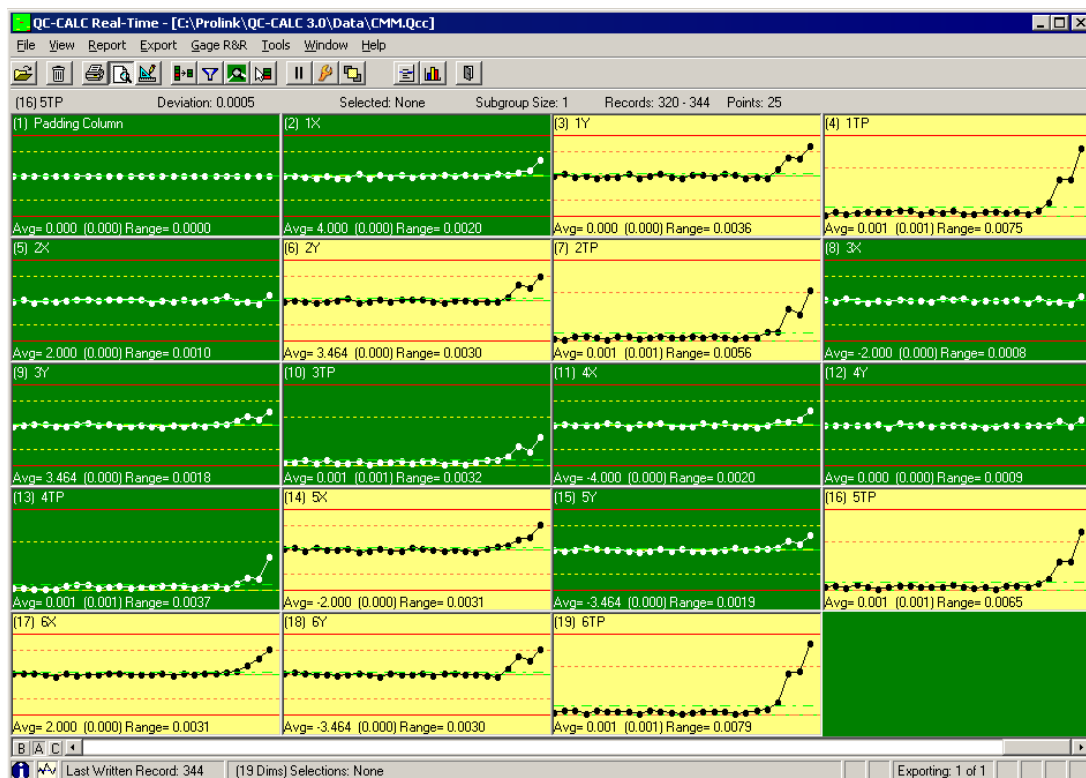
The process engineer enters all the typical problems that can cause a failure in his specific process into the Process Toolbox Editor. With each issue that is entered, the engineer builds in the solution to the issue using a combination of messages and calculations. The Process Toolbox Viewer then runs in the background collecting output data from QC-CALC and watching for patterns within the data. When a problem is detected, the operator is immediately notified allowing him to fix a potential issue before it leads to scrap. It's literally like having your best process engineer present 24 hours a day!

An Example

The following sequence of events happens automatically without operator intervention. Here is a typical sequence:

1. The part is inspected on a CMM
2. The data is read and displayed by QC-CALC
3. QC-CALC transmits data to Becker Process Toolbox (Viewer)
4. The viewer runs mathematical equations and instructions using the QC-CALC data
5. A report is displayed to the machine operator on his local PC.

The example screen below is a set of QC-CALC live plots showing the results of inspecting 25 parts containing a bolt hole pattern. The last few parts are showing a shift in the process but it is difficult to determine what process adjustments are needed to correct the problem. Bolt hole patterns have a complex relationship between the holes and the overall centering of the pattern.



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The Process is Good

This sample report is the Process Toolbox Viewer and was triggered automatically on the machine operator's monitor. This type of report is displayed during the first half of the QC-CALC screen where the process numbers are in control. This report updates after each part to ensure the operator knows his setup is accurate.

Process Toolbox Viewer - A-CMM-Plan.pmd

CNC Machine Adjustments

Last part run on: 3/29/2007 3:34:17 PM

This report is the result of careful analysis after the inspection of the latest transmission case for the Chrysler A77 OP10. Please read the summary below and be prepared to make machine offset adjustments to keep the process running smoothly. All adjustments shown below involve 3-large blue knobs labeled X-Axis, Y-Axis, and Theta (Rotation). Please make adjustments according to the instructions below keeping in mind most of the time you will not need any changes.

Run Machine!

All Features Good - NO Adjustment Needed!

Bolt Hole Pattern Features:

CNC Memory Location: G54.1, X Offset

Deviation From Nominal -0.00059

Turn X-Axis knob by -----

Instructions:

No Adjustment Required!

Bolt Hole Pattern Features:

CNC Memory Location: G54.1, Y Offset

Deviation From Nominal: 0.00027

Turn Y-Axis knob by -----

Instructions:

No Adjustment Required!

Bolt Hole Pattern Features:

CNC Memory Location: G68.1, R (Angular) Offset

Deviation From Nominal: -0.00022

Turn R-Axis knob by -----

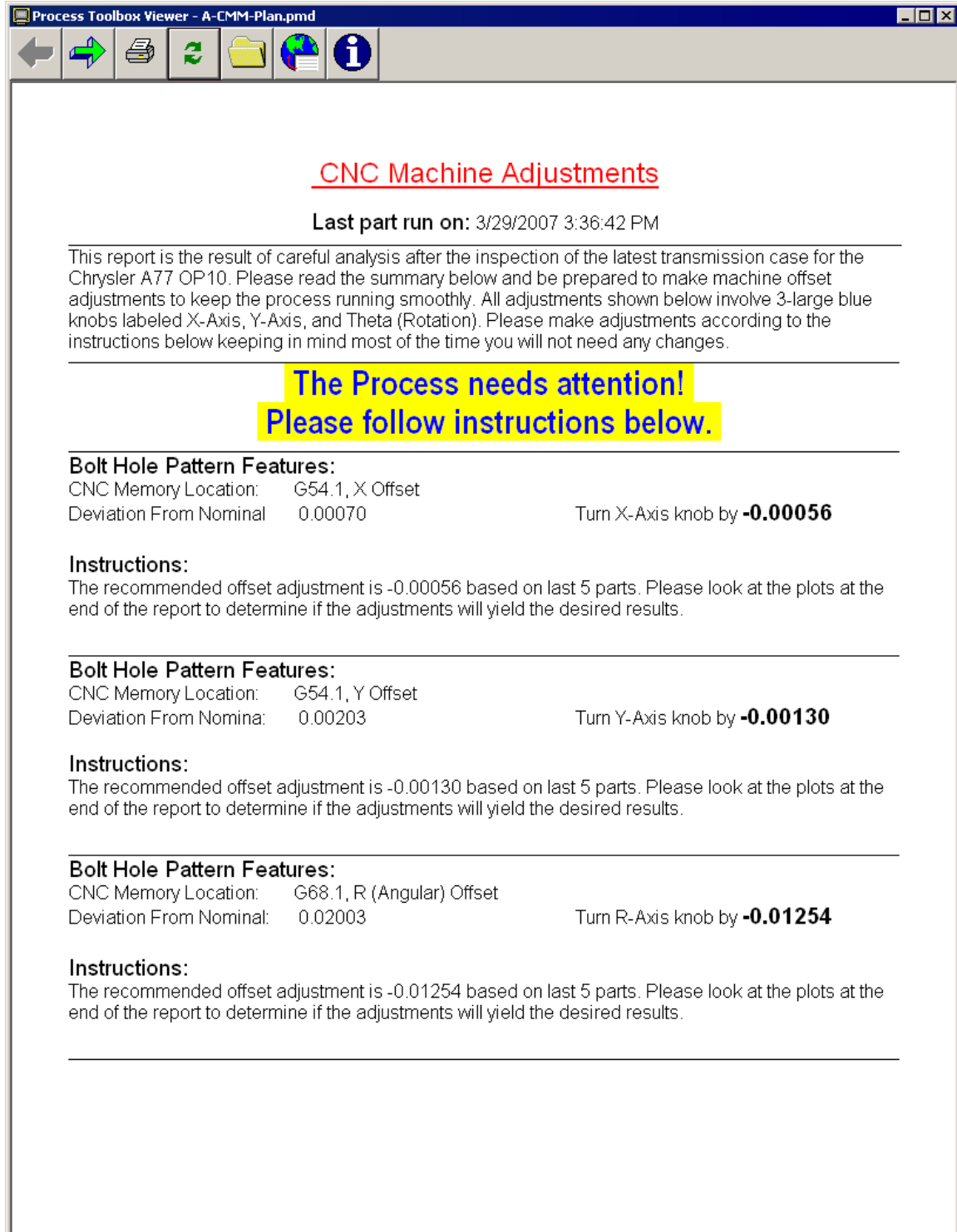
Instructions:

No Adjustment Required!

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The Process is Beginning to Go Bad

As time passes and the process begins to shift, the Process Toolbox Viewer continues triggering automatic reports on the machine operator's monitor. Here we see the process is in need of adjustment and by how much. The process engineer has entered enough knowledge into the document to help the operator fine tune his machine.



The screenshot shows the 'Process Toolbox Viewer - A-CMM-Plan.pmd' window. The interface includes a toolbar with icons for navigation and information. The main content area displays a report titled 'CNC Machine Adjustments' with a timestamp 'Last part run on: 3/29/2007 3:36:42 PM'. The report text explains that adjustments are needed for the Chrysler A77 OP10 transmission case. A yellow highlighted box contains the text 'The Process needs attention! Please follow instructions below.' The report is divided into three sections, each detailing a 'Bolt Hole Pattern Feature' with its CNC Memory Location, Deviation From Nominal, and the required adjustment for the X, Y, or R axis knob.

CNC Machine Adjustments

Last part run on: 3/29/2007 3:36:42 PM

This report is the result of careful analysis after the inspection of the latest transmission case for the Chrysler A77 OP10. Please read the summary below and be prepared to make machine offset adjustments to keep the process running smoothly. All adjustments shown below involve 3-large blue knobs labeled X-Axis, Y-Axis, and Theta (Rotation). Please make adjustments according to the instructions below keeping in mind most of the time you will not need any changes.

**The Process needs attention!
Please follow instructions below.**

Bolt Hole Pattern Features:
CNC Memory Location: G54.1, X Offset
Deviation From Nominal: 0.00070
Turn X-Axis knob by **-0.00056**

Instructions:
The recommended offset adjustment is -0.00056 based on last 5 parts. Please look at the plots at the end of the report to determine if the adjustments will yield the desired results.

Bolt Hole Pattern Features:
CNC Memory Location: G54.1, Y Offset
Deviation From Nominal: 0.00203
Turn Y-Axis knob by **-0.00130**

Instructions:
The recommended offset adjustment is -0.00130 based on last 5 parts. Please look at the plots at the end of the report to determine if the adjustments will yield the desired results.

Bolt Hole Pattern Features:
CNC Memory Location: G68.1, R (Angular) Offset
Deviation From Nominal: 0.02003
Turn R-Axis knob by **-0.01254**

Instructions:
The recommended offset adjustment is -0.01254 based on last 5 parts. Please look at the plots at the end of the report to determine if the adjustments will yield the desired results.

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The Process is Bad – Page 1

As time passes and the process gets worse the Process Toolbox Viewer continues triggering automatic reports on the machine operator's monitor. This time we've reach a critical point where the machine must be stopped. If the operator makes the recommended adjustments, he can click the green arrow button the see graphically what the Viewer is trying to tell him. The next page shows the bad part with the out-of-spec bolt hole pattern.

The screenshot shows a software window titled "Process Toolbox Viewer - A-CMM-Plan.pmd". The interface includes a toolbar with icons for navigation and information. The main content area displays a report titled "CNC Machine Adjustments" with a timestamp "Last part run on: 3/29/2007 4:58:32 PM". A warning message in a red box states: "Stop Machine! The Process Needs Immediate Attention! Please follow instructions below." The report details three adjustment areas: X-Axis, Y-Axis, and R (Angular) Axis, each with CNC Memory Location, Deviation From Nominal, and a recommended adjustment value.

CNC Machine Adjustments

Last part run on: 3/29/2007 4:58:32 PM

This report is the result of careful analysis after the inspection of the latest transmission case for the Chrysler A77 OP10. Please read the summary below and be prepared to make machine offset adjustments to keep the process running smoothly. All adjustments shown below involve 3-large blue knobs labeled X-Axis, Y-Axis, and Theta (Rotation). Please make adjustments according to the instructions below keeping in mind most of the time you will not need any changes.

Stop Machine!
The Process Needs Immediate Attention!
Please follow instructions below.

Bolt Hole Pattern Features:
CNC Memory Location: G54.1, X Offset
Deviation From Nominal: 0.00146
Turn X-Axis knob by **-0.00140**

Instructions:
The recommended offset adjustment is -0.00140 based on last 5 parts. Please look at the plots at the end of the report to determine if the adjustments will yield the desired results.

Bolt Hole Pattern Features:
CNC Memory Location: G54.1, Y Offset
Deviation From Nominal: 0.00279
Turn Y-Axis knob by **-0.00187**

Instructions:
The recommended offset adjustment is -0.00187 based on last 5 parts. Please look at the plots at the end of the report to determine if the adjustments will yield the desired results.

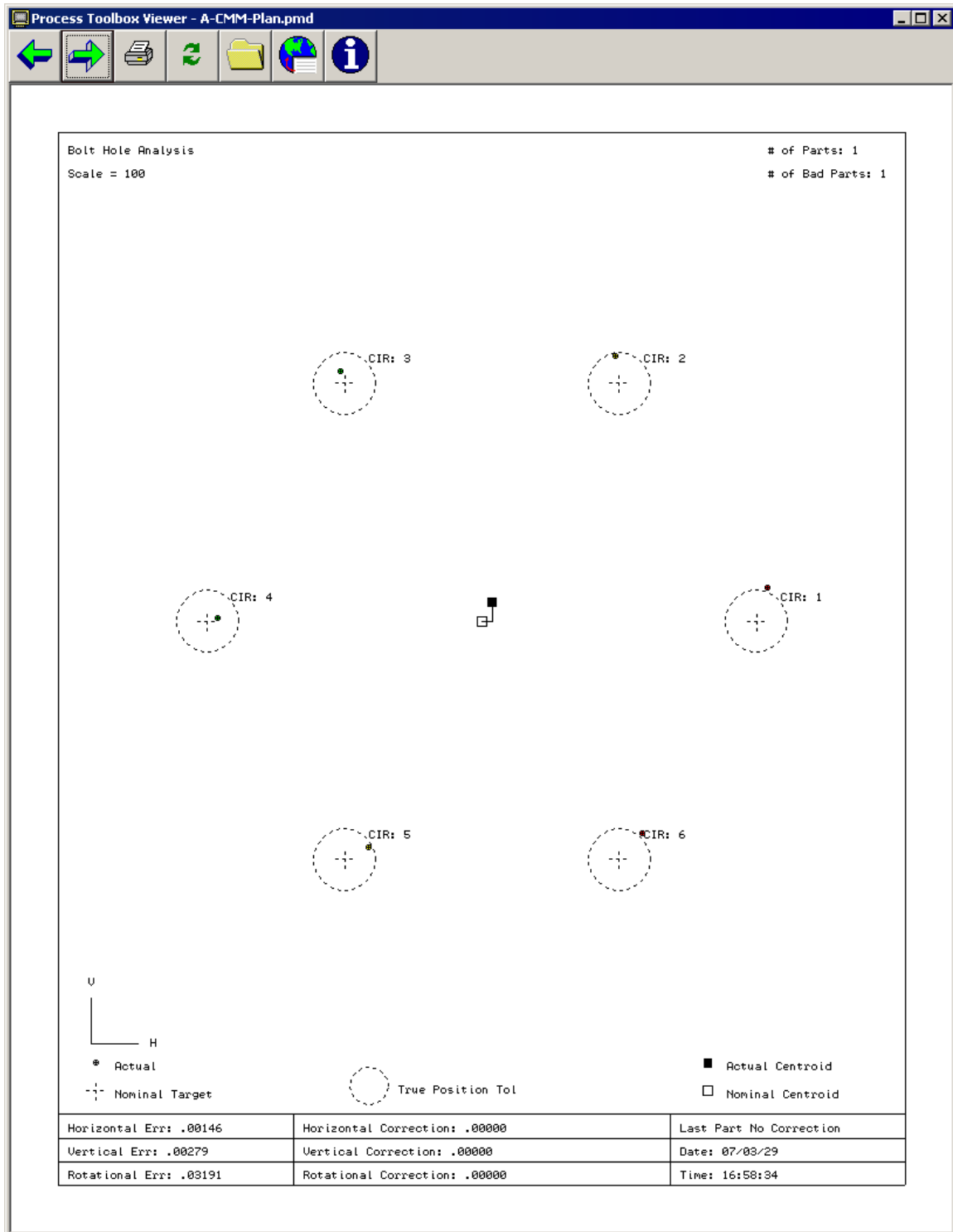
Bolt Hole Pattern Features:
CNC Memory Location: G68.1, R (Angular) Offset
Deviation From Nominal: 0.03191
Turn R-Axis knob by **-0.02257**

Instructions:
The recommended offset adjustment is -0.02257 based on Last 5 parts. Please look at the plots at the end of the report to determine if the adjustments will yield the desired results.

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The Process is Bad – Page 2

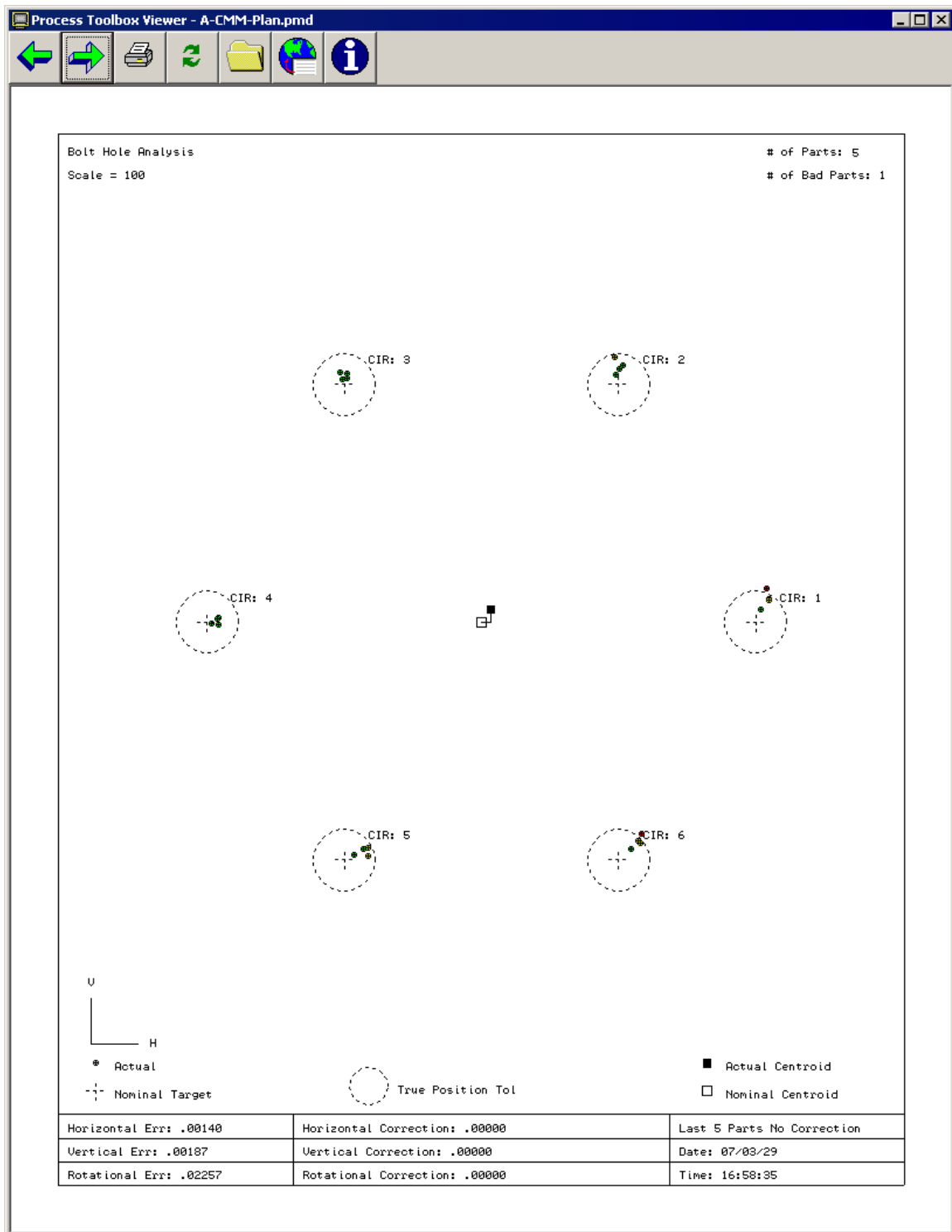
Here we see the bad part's pattern and clearly Cir 1, and Cir 6 centers are outside of the true position tolerance ring. Also note the centroid of the bolt hole pattern is not centered. This is depicted by the black & white squares in the middle of the diagram.



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The Process is Bad – Page 3

Clicking the right green arrow brings us to the next screen showing the centering of the last 5 parts before the adjustments are made.



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The Process is Bad – Page 4

Finally, clicking the right green arrow one more time brings us to the last screen showing the position of the last 5 parts if the recommended adjustments are made. Notice how the centroid of the pattern is corrected to nominal position and the clustering of the individual holes are as close to nominal as possible. This on-screen report gives the operator the confidence that his adjustments will center the process correctly.

