SPC (Statistical Process Control) Overview

(*http://Elsmar.com/Forums/showthread.php?t=12353*)

Steve Prevette

16th June 2005 07:32 PM

SPC (Statistical Process Control) Overview

1 Attachment(s)
This presentation gives a little more detail on the nuts and bolts of SPC. This was made for my monthly performance indicators session here at Hanford. I alternate months with a classroom topic one month, and a hands-on computer topic the next.

This presentation is provided for peer review and comment.

Wes Bucey

16th June 2005 11:28 PM

Quote:

> *In Reply to Parent Post by **Steve Prevette***
> *This presentation gives a little more detail on the nuts and bolts of SPC. This was made for my monthly performance indicators session here at Hanford. I alternate months with a classroom topic one month, and a hands-on computer topic the next.*
>
> *This presentation is provided for peer review and comment.*

Excellent non-technical presentation. Even the statistically-challenged can see the process is not "smoke and mirrors" - that it is a simple and straightforward process that returns more than its cost as value to the organization.

Thanks for sharing.

wmarhel

17th June 2005 07:04 AM

Thanks for sharing Steve, very nicely done.

Wayne

Jennifer Kirley

19th June 2005 02:37 AM

This is an excellent overview of a tool that befuddles or intimidates many into careless neglect of the procedure. I especially enjoyed likening it to a smoke detector (feel safer?) and the visuals/examples were excellent. Nice work Steve, thank you!

Jennifer (non-statician) Kirley

Govind

19th June 2005 10:15 AM

Steve,
I find the presentation very useful. A good refresher as well.
I am very interested in the slides 19 to 21.
"The existing average and control limits should NOT be changed unless a significant trend is detected."
I would appreciate if you can explain with an additional bullet point as to how you propose to detect the significant change in average?
Thanks,
Govind.

Jim Wynne

19th June 2005 01:30 PM

Quote:

> *In Reply to Parent Post by* ***Govind***
> *Steve,*
> *I find the presentation very useful. A good refresher as well.*
> *I am very interested in the slides 19 to 21.*
> *"The existing average and control limits should NOT be changed unless a significant trend is detected."*
> *I would appreciate if you can explain with an additional bullet point as to how you propose to detect the significant change in average?*
> *Thanks,*
> *Govind.*

Not answering for Steve, of course, but changes in the process mean are always the result of a significant change in the process; this would show up in a histogram as a bimodal distribution. The problem is that if you wait for this kind of thing to show up on a chart, it's too late. The type of change I'm talking about is often deliberate--a tooling change is a good example. In such cases, it's advisable to allow the process to stabilize and then recalculate control limits. Steve's point about not changing the average is perhaps misworded; the average changes when it changes.

Steve Prevette

20th June 2005 09:55 AM

On the issue of changing the baseline average and control limits - Davis Ballestracci gave me a great quote once - the baseline is innocent until proven guilty. You do not adjust the baseline until there is a significant change or trend in the data. And the signal for a significant change or trend is tripping one of the SPC trend rules, such as 7 points above average. Now, sometimes the data return to the previous baseline after corrective actions are taken, and in that case the baseline would remain the same. But if the data steady out at a new baseline average (or standard deviation), then the baseline would be

changed.

Have I posted "The Life Cycle of a Trend" here? I wrote that up with an illustrative example a few years back.

qualityboi

21st June 2005 03:04 PM

I liked the presentation, it gives a good overview of SPC without going into the how the UCL and LCL are derived which is a sleeper for non quality folks. In your discussion you may want to mention the whole idea of decision making is making those decisions by fact, not by feel. Good job!

qualityboi

21st June 2005 03:25 PM

I understand that the center line average is recalculated from the process data, however, how would you know if your process was out of control if you keep on readjusting the center line? We had an SPC specialist that had set up a control chart for our out of box quality defects. The center line and control limits kept changing with the data, the chart was useless to me. Maybe I missed something? Is it here that was posted that the center line is innocent until proven guilty?

Steve Prevette

21st June 2005 05:32 PM

I am going to attach here "The Life Cycle of a Trend". That will help explain what is happening.

The idea is the EITHER a circle, or a shift in the baseline is indication of a shift in the process.

If the center line is proven guilty, your prediction of the future based upon that center line and control limits is no longer useful. You must revise the center line and control limits so that your prediction of the future is more accurate.

The Life Cycle of a Trend

qualityboi

22nd June 2005 11:28 AM

Quote:

> *In Reply to Parent Post by* ***Steve Prevette***
> *I am going to attach here "The Life Cycle of a Trend". That will help explain what is happening.*
>
> *The idea is the EITHER a circle, or a shift in the baseline is indication of a shift in the process.*
>
> *If the center line is proven guilty, your prediction of the future based upon that center line and control limits is no longer useful. You must revise the center line and control limits so that your prediction of the future is more accurate.*

I see, we are using our charts for in line quality measures, real time, less for prediction going forward. Excellent paper I will use it as a reference the next time we do an SPC audit. The trouble with being an auditor is trying to maintain some level of proficiency in subjects we might only audit once a year. This

is an excellent reference, thanks! :thanx:

qualitygoddess - 2010

22nd June 2005 01:48 PM

No Link.....

Last edited by Craig H. : 1 Hour Ago at 10:58 AM. Reason: Add link to the moved article

Craig H.:

I cannot get the link to work. Suggestions?

Craig H.

22nd June 2005 01:58 PM

Quote:

> *In Reply to Parent Post by **qualitygoddess***
> *Last edited by Craig H. : 1 Hour Ago at 10:58 AM. Reason: Add link to the moved article*
>
> *Craig H.:*
>
> *I cannot get the link to work. Suggestions?*

Yeah, wait a few minutes 'til Marc has a chance to fix it. He just PMed me that he got the message I sent him when I realized that my handiwork was not quite working as planned. Sorry for the confusion.

Don't worry, I am not going to quit my day job....

ADDED LATER: Marc has fixed the link. It is worth a look. Thanks, Marc, and thanks, Steve!!!

Bill Pflanz

22nd June 2005 02:06 PM

Quote:

> *In Reply to Parent Post by **qualityboi***
> *I understand that the center line average is recalculated from the process data, however, how would you know if your process was out of control if you keep on readjusting the center line? We had an SPC specialist that had set up a control chart for our out of box quality defects. The center line and control limits kept changing with the data, the chart was useless to me. Maybe I missed something? Is it here that was posted that the center line is innocent until proven guilty?*

Steve's description of trend's life cycles is excellent (I couldn't get the link to work but I saved a version of it the last time). The only problem is that the SPC specialist may be recalculating the control limits every time new data is added. If the process is stable, there is no reason to do that unless there is a cause as described by Steve in his paper. Many software packages allow the control limits to be recalculated each time unless you fix the control limits. Some allow data to be removed from the

calculation even though it still appears on the chart as an outlier.

It probably doesn't change the limits that much in the short term but I can see why it would confuse an auditor who is not sufficiently trained in SPC. A good question for the auditor to ask is what is the purpose for changing the control limits each time and what review or corrective action is being taken for the out of control points.

Bill Pflanz

hobbyxin

3rd August 2005 01:38 AM

Good things you do! thanks for sharing!

sbickley

3rd August 2005 11:24 AM

Quote:

> *In Reply to Parent Post by* ***Steve Prevette***
> *I am going to attach here "The Life Cycle of a Trend". That will help explain what is happening.*
>
> *The idea is the EITHER a circle, or a shift in the baseline is indication of a shift in the process.*
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> *If the center line is proven guilty, your prediction of the future based upon that center line and control limits is no longer useful. You must revise the center line and control limits so that your prediction of the future is more accurate.*
>
> *The Life Cycle of a Trend*

Steve,

In your previous .ppt presentation (which is great btw), why were the center lines repeatedly re-calculated in your Hanford examples? Was there a trend in each case? I could not discern that from the slides and it was a bit confusing. If you have a minute, would you mind explaining that piece for me?

Thanks,
Scott

Steve Prevette

3rd August 2005 11:55 AM

Quote:

> *In Reply to Parent Post by* ***sbickley***
> *Steve,*
>
> *In your previous .ppt presentation (which is great btw), why were the center lines repeatedly re-calculated in your Hanford examples? Was there a trend in each case? I could not discern that from the slides and it was a bit confusing. If you have a minute, would you mind explaining that piece for me?*

Thanks,
Scott

In those cases, if you look back at the baseline and UCL/LCL in effect prior to the shift, you should be able to see the significant pattern (usually 7 in a row below average was most common) at the beginning of the new baseline time interval.

There is a bit of a problem that can occur in injury trending - sometimes an injury that starts out as non-reportable later becomes reportable due to the symptoms worsen. Carpal Tunnel is a good example. It may be several years from onset of initial symptoms until surgery is needed. But, the injury is charted on the first date of reporting. So sometimes past data may change aand may remove the decreasing trend. If data are affected withing the baseline time interval, I do recalculate the baseline. On very rare occasions, I have had to remove the baseline shift and go back to the old baseline.

Qaware

12th August 2005 02:51 PM

Origin of recalculating baseline and control limits?

Hello

I think it sounds correct to keep the same baseline until a significant change has been detected. We are currently looking at reprogramming our SPC software, and I would like to propose that we do not recalculate control limits/baseline periodically. I know, however that there are people in the company who disagree with me on this, I don't know why though.

I would like to know why literature (at least the books I have read) on this subject recommends recalculation. What is the origin of this approach? :confused:

Jim Wynne

12th August 2005 04:22 PM

Quote:

In Reply to Parent Post by ***Qaware***
Hello

I think it sounds correct to keep the same baseline until a significant change has been detected. We are currently looking at reprogramming our SPC software, and I would like to propose that we do not recalculate control limits/baseline periodically. I know, however that there are people in the company who disagree with me on this, I don't know why though.

I would like to know why literature (at least the books I have read) on this subject recommends recalculation. What is the origin of this approach? :confused:

If you recalculate the control limits despite nothing significant having changed, the control limits won't change significantly. In other words, it's mostly a waste of time but otherwise does no harm. I know that's not a justification for doing it, but it might be a justification for just letting them do it and not worrying about it.

Steve Prevette

12th August 2005 07:56 PM

Rebaselining Pros and Cons

But first - Do not calculate new average and control limits unless the existing one has been proven guilty by the data! Make sure your baseline has not become some sort of moving average - it needs to stay fixed in time, even if that was three years ago.

Con - People can get over anxious to rebaseline. And, in the timeframe just following a trend, you don't have much data to make a new baseline from. This may also be a production line where you want to take corrective action to get the data back to the old baseline. Dr. Wheeler tends to default to don't change the baseline unless you have both a data shift, and you know why the data shift occurred.

Pro - "The job of management is prediction" (Deming). The baseline average and control limits provide prediction. If the current baseline has been proven no good, it is no longer a good prediction. We want to detect when the data stabilize out again, and set up new predictions.

In either case, SPC is a remarkable self-healing, self-correcting process. If you shift the baseline too early, on a false alarm, the new baseline will be proven guilty and you will be back on the old baseline.

Jim Wynne

12th August 2005 08:07 PM

Quote:

> *In Reply to Parent Post by* ***Steve Prevette***
> *But first - Do not calculate new average and control limits unless the existing one has been proven guilty by the data! Make sure your baseline has not become some sort of moving average - it needs to stay fixed in time, even if that was three years ago.*
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>
> *In either case, SPC is a remarkable self-healing, self-correcting process. If you shift the baseline too early, on a false alarm, the new baseline will be proven guilty and you will be back on the old baseline.*

I don't think we disagree on this. And permit me to reemphasize the thing about *prediction.* If you're doing inferential statistics and you can't make good predictions, something is wrong.

tristan

17th November 2005 11:03 PM

i think there is an interpretation cut short here in terms of using control charts. re-calculating baselines must also be linked to final product performace, reliability, and customer specifications. any process

change leading to baseline change must be checked against these. by doing these, the changing baselines and control limits do tell us 2 things: feedback to current process & confidence in how the process will perform in the future.

Nehal 11th November 2006 04:59 AM

Re: SPC (Statistical Process Control) Overview

good info.
want more information regarding **SPC**.

Jim Wynne 11th November 2006 09:51 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by **Nehal*** (Post 172230)
> *good info.*
> *want more information regarding **SPC**.*

Welcome to the Cove, Nehal :D

This place is loaded with information on SPC. Do a search of the Cove and you'll find lots of stuff, and if you have a specific question, someone here will be glad to help.

Steve Prevette 11th November 2006 12:25 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by **Nehal*** (Post 172230)
> *good info.*
> *want more information regarding **SPC**.*

There is the Hanford Trending Primer at http://www.hanford.gov/safety/vpp/trend.htm which includes more information, and information on the Hanford Performance Indicator Forum.

artichoke 1st December 2006 11:52 AM

Re: SPC (Statistical Process Control) Overview

Steve,

Wonderful to see that you are one of the very few people who seem to be aware of the 99.7% control chart myth. This myth appears to have been propagated by popular authors such as Montgomery and

has led to much misunderstanding.

Steve Prevette

11th January 2007 01:02 PM

Re: SPC (Statistical Process Control) Overview

NEW!

Based upon a request originally by Bechtel, but also supported by my employer Fluor, and other Department of Energy contractors here at Hanford, I've accumulated a lot of my papers into a two-day statistical training session. This covers SPC, and also choosing indictors, Dr. Deming's Red Bead Experiment and System of Profound Knowledge, some hands-on exercises, and some computer exercises. Fluor has given me permission to make the materials available on the internet, and the URL is

http://www.hanford.gov/rl/?page=1156&parent=1144

Since the materials were generated under US Government contract, there is not a copyright protection. You are welcome to make use of the materials if you find them useful. I would, of course, appreciate a mention as the source of the materials if you use them.

{Semi-Advert} Of course, if you'd like me to come make the training for your group, that could be arranged.

DsqrdDGD909

11th January 2007 03:45 PM

Re: SPC (Statistical Process Control) Overview

Whhoooowweeeee - I've hit the Mother Lode.

Thanks a bunch!

shank

14th December 2007 07:59 PM

Re: SPC (Statistical Process Control) Overview

I am getting confused between stability and capabitlity. Can someone list out the attributes to capability and stability separately?

Jim Wynne

14th December 2007 08:27 PM

Re: SPC (Statistical Process Control) Overview

Quote:

*In Reply to Parent Post by **shank*** (Post 227550)
I am getting confused between stability and capabitlity. Can someone list out the attributes to capability and stability separately?

Welcome to the Cove, shank :D

It's pretty simple. "Stability" refers to a state of statistical control, meaning that the process is subject only to inherent random variation. "Capability," on the other hand, has to do with how likely the process is to produce output meeting the specification limits. A process may be stable without being capable.

Stijloor

15th December 2007 04:36 AM

Re: SPC (Statistical Process Control) Overview

Quote:

*In Reply to Parent Post by **shank*** (Post 227550)
I am getting confused between stability and capabitlity. Can someone list out the attributes to capability and stability separately?

Hello shank,

Jim provided an excellent explanation of stability and capability.

You may also look at **this forum** to learn more about these topics.

Welcome to The Cove Forums and come back often! :agree1:

Stijloor.

Steve Prevette

17th December 2007 10:51 AM

Re: SPC (Statistical Process Control) Overview

Quote:

*In Reply to Parent Post by **shank*** (Post 227550)
I am getting confused between stability and capabitlity. Can someone list out the attributes to capability and stability separately?

As a practical example, let us say that I am working on a construction project that is killing one worker per month on the average, and that is stable on a control chart.

The rate of deaths of workers is STABLE and PREDICTABLE. I can project forward and say how many deaths will occurr. This may sound morbid, but in the early 20th century there were rules of thumb of

how many deaths to expect per million dollars of project cost.

I hope everyone will agree here that a stable non-zero rate of killing workers in not ACCEPTABLE. The stable rate is thus NOT CAPABLE.

Note: to make predictions of my capability to meet specifications, I must be stable first in order to the prediction to be accurate.

Jim Wynne

17th December 2007 11:06 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***Steve Prevette*** (Post 227777)
> *As a practical example, let us say that I am working on a construction project that is killing one worker per month on the average, and that is stable on a control chart.*
>
> *The rate of deaths of workers is STABLE and PREDICTABLE. I can project forward and say how many deaths will occurr. This may sound morbid, but in the early 20th century there were rules of thumb of how many deaths to expect per million dollars of project cost.*
>
> *I hope everyone will agree here that a stable non-zero rate of killing workers in not ACCEPTABLE. The stable rate is thus NOT CAPABLE.*

Stability and capability are concepts that apply to processes, not to the means of counting them. It makes no sense to say that a count of accidental deaths isn't capable--it's the process that causes the deaths that's not capable, assuming zero deaths is the criterion. Whether or not deaths (or any other undesirable outcomes) is "acceptable" is a red herring. The is math concerned only with what is, and not what should be. We can predict that there will be *x* airline crash fatalities per *y* miles traveled, but the prediction (and its statistical foundation) have nothing to do with whether or not any number of deaths is considered acceptable.

sekaran

30th January 2008 07:51 AM

Re: SPC (Statistical Process Control) Overview

how do create spc Specification Limits?

Steve Prevette

30th January 2008 09:59 AM

Re: SPC (Statistical Process Control) Overview

I assume you are asking how to create SPC Control Limits (not specification limits). The specification limits, if any, come from the customer requirement (cut a board to a 2 foot plus or minus 1/8 inch length).

I have a writeup on the internet on how to conduct SPC, including generation of the control limits from the data at http://www.hanford.gov/rl/?page=1148&parent=1144. There are also plenty of other

writeups in stats textbooks, and other postings here on the Cove.

artichoke 30th January 2008 05:48 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by **sekaran*** (Post 233998)
> *how do create spc Specification Limits?*

Your question is a little unclear but this may help: "How to Establish Manufacturing Specifications"

http://www.spcpress.com/pdf/Manufact...cification.pdf

bobdoering 7th April 2009 09:26 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by **Steve Prevette*** (Post 234025)
> *I assume you are asking how to create SPC Control Limits (not specification limits). The specification limits, if any, come from the customer requirement (cut a board to a 2 foot plus or minus 1/8 inch length).*
>
> *I have a writeup on the internet on how to conduct SPC, including generation of the control limits from the data at http://www.hanford.gov/rl/?page=1148&parent=1144. There are also plenty of other writeups in stats textbooks, and other postings here on the Cove.*

If you are doing precision machining - and you are using correct process control, the calculations for control limits are straight forward: 75% of the specification. To see why, and for more information you can read: Statistical Process Control for Precision Machining

artichoke 7th April 2009 05:11 PM

Re: SPC (Statistical Process Control) Overview

bobdoering,

I'm curious as to why you have a logo "Stop X-bar/R Madness" ?

Machining, where constant tool wear effects results (Machine shops, SIC 3599, one of over 400 industry codes) is obviously a special case outside the general discussion. Amongst the hundreds of industries there may also be other special cases, such as those involving PID control, which fall outside the general discussion of control charts.

bobdoering 7th April 2009 06:39 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***artichoke*** (Post 307316)
> *bobdoering,*
>
> *I'm curious as to why you have a logo "Stop X-bar/R Madness" ?*
>
> *Machining, where constant tool wear effects results (Machine shops, SIC 3599, one of over 400 industry codes) is* ***obviously a special case*** *outside the general discussion.*

I always find it amusing that precision machining is considered such an insignificant "special case".

Even if so, so what?

It exists, and its practitioners *need* to understand that they have been sold a bill of goods with traditional charting systems. The madness is specifically for those that have been driven to use that chart when it does not apply - specifically precision machining. It *has* driven people in precision machining mad - with ridiculously compressed control limits and over and under reported capabilities. Most have no idea what to do or where to go, and it has been my goal to correct that problem.

I do not doubt that there are truly naturally occurring normal processes, that meet the requirement of *being set to a nominal value (mean), and stay at that value (some values a little lower, some values a little higher) without any interaction by an operator.* There may be a bunch of them in the other SIC codes - good for them. They can use the myriad of textbooks to get the information they need. They were written *just for them*. I have even stronger belief that there are other exceptions - but that others affected by them have, too, been drilled into the normal fallacy, and the associated charting methods.

My point (and the point of my avatar) is to rid the madness in precision machining. I find it a very important cause, no matter how minute as a ratio of industry codes (as if they are equally distributed, and as if 200 or 300 more SIC codes might not have captured machining in their industry) or by any other "measure". This excuse of "being an exception" has been used by the SPC software suppliers, which do not provide the correct tool for precision machining to use - leaving them to fend for themselves with paper charts or Excel spreadsheets - or worst, the wrong control because they paid for garbage software sold by people who have no idea about how to control machining.

Others may have the opportunity to correct the rest of the world's statistical problems - at least for now.

Often when marketing a solution to a problem, you have to catch someone's attention to the fact that they have a problem. Apparently, your attention was caught - so there is clearly a level of success.

Besides, I was told I couldn't use my old avatar any longer.

artichoke 7th April 2009 07:11 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***bobdoering*** (Post 307338)
> *I always find it amusing that precision machining is considered such an insignificant "special case".*

Please read my post. I did not say that machining is "insignificant". I stated that machining is one of more than 400 industry codes.

Mis-using any chart may "drive people mad" as you suggest.

Quote:

> ... but that others affected by them have, too, been drilled into the normal fallacy, and the associated charting methods.

The belief in the normality fallacy widespead. Processes do **not** need to be normal for the use of Shewhart control charts. I strongly recommend Don Wheeler's excellent book on the topic: ***"Normality and the Process Behaviour Chart".***

bobdoering

7th April 2009 09:20 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***artichoke*** (Post 307352)
> *Please read my post. I did not say that machining is "insignificant". I stated that machining is one of more than 400 industry codes.*

Well, if significance was not the point of the 1 out of 400 statistic you mentioned, then your actual point remains clouded. Especially when that statistic has nothing to do with the amount of machining in the overall scope of all manufacturing industries, due to a vast number of captured shops not identified by their claimed SIC code.

Quote:

> *In Reply to Parent Post by* ***artichoke*** (Post 307352)
> *The belief in the normality fallacy widespead. Processes do* ***not*** *need to be normal for the use of Shewhart control charts. I strongly recommend Don Wheeler's excellent book on the topic:* ***"Normality and the Process Behaviour Chart".***

I have read Dr. Wheeler's books, as he has read mine. It is *true* he has identified that processes do **not need** to be normal for the use of Shewhart control charts. However, that is no more of a 'law" than the *need* for the charts to be normal. **Not *all* non-normal charts can successfully use the Shewhart control charts.** Fact is, if you look at one of the points for the claim that processes do *not* need to be normal to use Shewhart charts, you will find the review of Burr's 27 non-normal distributions. One of

the distributions *not covered* by Burrs 27 non-normal distributions is the continuous uniform distribution. Too bad, it clearly shows that it does not play by the traditional Shewhart control chart rules. But, the X hi-lo/R Chart for that distribution does support Shewhart's premises for economic control, as illustrated throughout many postings in this forum, suitable for searching.

By the way, Dr. Wheeler's response to my book was "I have to admit that I have not directly addressed in my books the complex processes you have addressed."

artichoke

7th April 2009 09:57 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***bobdoering*** (Post 307373)
> *Fact is, if you look at one of the points for the claim that processes do not need to be normal to use Shewhart charts, you will find the review of Burr's 27 non-normal distributions. One of the distributions not covered by Burrs 27 non-normal distributions is the continuous uniform distribution. Too bad, ...*

Don Wheeler's book "Normality and The Process Behaviour Chart", examines 1143 distributions (not 27), with many other than Burr. He gives an excellent validation to Shewharts's work.

Don Wheeler also examines uniform distributions on page 117, "Advanced Topics in SPC".

bobdoering

7th April 2009 10:43 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***artichoke*** (Post 307378)
> *Don Wheeler also examines uniform distributions on page 117, "Advanced Topics in SPC".*

It is a nice, generic justification for control limits, in general. I agree in the use of control limits, in general. But, it does not specifically support usage of the X-bar R chart (the original conversation) for a continuous uniform distribution. It may work for a discrete uniform distribution - if you find such a process to control, such as rolling a die. But, that does not relate to my point.

To use Dr. Wheeler's logic (page 116, "Advanced Topics in SPC"): the strongest justification that X hi/lo-R charts are ideal for precision machining is it works well in practice, and it provides effective action limits when applied to real world data.

What's more - it makes sense, and it make sense to the operator. It also provides *far more useful data* to the practitioner than the X-bar R chart. It can tell you when to make an adjustment, when to change a tool, and the tool wear rate. The X-bar R chart can not do that - and at best it generates overcontrol. It is easy to show how that can happen. I am sure if you have had an opportunity to properly *implement this technique* yourself, its benefits would be clear.

Again, these are issues that have already been discussed throughout the forum. Feel free to further search out the specifics.

artichoke

8th April 2009 12:35 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***bobdoering*** (Post 307379)
> *It also provides far more useful data to the practitioner than the X-bar R chart. It can tell you when to make an adjustment, when to change a tool, and the tool wear rate. The X-bar R chart can not do that - and at best it generates overcontrol.*

The X-bar R chart is not intended to tell you when to change a tool nor to measure tool wear rates. It is however an excellent tool for the majority of process applications, regardless of data distribution.

Don Wheeler also makes an excellent point on page 36 "Normality and The Process Behaviour Chart". Regarding the majority of processes, it takes 3,200 data points to test for lack of fit to a distribution out to +/-2.95 sigma (or 1,480,000 observations to check for normality out to +/-4.5 sigma) ... and by the time such data is collected, the process will have changed.

bobdoering

8th April 2009 06:17 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***artichoke*** (Post 307388)
> *The X-bar R chart is not intended to tell you when to change a tool nor to measure tool wear rates. It is however an excellent tool for the majority of process applications, regardless of data distribution.*

The fact that X-bar R chart is not intended to tell you when to change a tool nor to measure tool wear rates shows its dramatic limitation in value in precision machining. It does have its purpose in other cases, and I am not denying that fact.

Quote:

> *In Reply to Parent Post by* ***artichoke*** (Post 307388)
> *Don Wheeler also makes an excellent point on page 36 "Normality and The Process Behaviour Chart". Regarding the majority of processes, it takes 3,200 data points to test for lack of fit to a distribution out to +/-2.95 sigma (or 1,480,000 observations to check for normality out to +/-4.5 sigma) ... and by the time such data is collected, the process will have changed.*

Academically, and in many cases, that is true. But, the number of points *correctly* collected in precision machining required to establish the distribution depends on the tool wear. It might only take 10 points -

it could take a week of points. The better the tool wear, the more points it takes. It is the significant *sampling error* in the X bar-R charting methodology that creates its *misinformation* in precision machining. *As I have mentioned, all of its problems have been clearly illustrated elsewhere in the forum for those that care to study the problem, and do not need to be repeated here.*

It is good to read Dr. Wheeler's books, but it is not a good idea to stop there. Every author has a limit to their experiences, and he is no exception. His work is academically rigorous, but the empirical evidence shows the need for another approach in precision machining. One that has been shown to be very effective. It is the fear of the practitioners imposed by those who are compelled to think that the X-bar R will control their process (it will not) by blindly citing such references that is the crux of the problem in the field. You have provided adequate evidence of that. And to your *original question*, that is the point of the avatar - my goal to put a stop to that madness. Its point is not to say X-bar R is *never* good, or that the rules for control are *always* wrong. There is no madness, no worries, no cares for those cases. But the fact that they work for them can not be extrapolated -or "rubber stamped" as is typically the case - to the case of precision machining - or perhaps other "exceptions" you cited earlier.

artichoke

8th April 2009 07:56 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***bobdoering*** (Post 307410)
> *But the fact that they work for them can not be extrapolated -or "rubber stamped" as is typically the case - to the case of precision machining - or perhaps other "exceptions" you cited earlier.*

If you take the time to read Dr Wheeler's books thoroughly, you will find many practical examples and very detailed analyses, with no signs of "rubber stamping" as you suggest.

bobdoering

8th April 2009 08:39 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***artichoke*** (Post 307424)
> *If you take the time to read Dr Wheeler's books thoroughly, you will find many practical examples and very detailed analyses, with no signs of "rubber stamping" as you suggest.*

I own his books, and have read them. They were a very good foundation and starting place to progress from. And, we have progressed beyond the trend line charting analysis he has proposed for tool wear. Its limitations have been established (some of which you mentioned), easy to prove, and resolved with newer methodology. The beauty of the newer methodology is that it is so clear, logical and practical that it does not require very detailed analysis. Its elegance is in its simplicity and effectiveness.

The "rubber stamping" does not refer to his work, but the incorrect application of the statistical process control concepts in the field.

snowman6705 4th June 2009 04:25 AM

Re: SPC (Statistical Process Control) Overview

1 Attachment(s)
Hello everybody,
I have a pre study material, where some charts and questionys are offen for me.
Could somebody help me with MSA, SPC, FMEA questions in the zip file?
It would be very helpful for me to take the TS evaluation!:thanx::thanks:

Stijloor 4th June 2009 05:34 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***snowman6705*** (Post 317242)
> *Hello everybody,*
> *I have a pre study material, where some charts and questionys are offen for me.*

Offen?

Stijloor.

snowman6705 4th June 2009 06:25 AM

Re: SPC (Statistical Process Control) Overview

O excuse me for my not real excellent english.
I mean I can not answer the questions in the application excercises.

Stijloor 4th June 2009 07:28 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***snowman6705*** (Post 317251)
> *O excuse me for my not real excellent english.*
> *I mean I can not answer the questions in the application excercises.*

Do you have (access to) the AIAG Core Tools manuals?

Stijloor.

snowman6705 4th June 2009 07:54 AM

Re: SPC (Statistical Process Control) Overview

Actually no, because I got the evaluation date too late and I had no time to purchase the AIAG docs, therefore I seek answers to those questions.

Jim Wynne 4th June 2009 12:32 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***snowman6705*** (Post 317270)
> *Actually no, because I got the evaluation date too late and I had no time to purchase the AIAG docs, therefore I seek answers to those questions.*

Let's be realistic. You uploaded a zip file that contains nine folders, and a total of about 30 files. There are dozens of questions involved. You can't expect anyone here to take the time to go through all of that and do your work for you. You've come to a place where there's lots of information on all of the topics involved, and there are a lot of people who are willing to help you learn, but no one here is going to turn you into an expert overnight. Search the Cove and ask specific questions and you'll get plenty of help.

snowman6705 4th June 2009 03:11 PM

Re: SPC (Statistical Process Control) Overview

I can not answer the questions in the application excercises.
In the zip file there is SPC with some charts and questions , which are at the end of the doc file
I would appreciate if anybody could help me only with these questions.:thanx:

CarolX 4th June 2009 03:22 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***snowman6705*** (Post 317355)
> *I can not answer the questions in the application excercises.*
> *In the zip file there is SPC with some charts and questions , which are at the end of the doc file*
> *I would appreciate if anybody could help me only with these questions.:thanx:*

snowman6705 - why don't you post the exact question you are having trouble with along with any related data and perhaps we can help. A lot of people here are willing to help - but we can't do the work for you.

snowman6705 4th June 2009 03:43 PM

Re: SPC (Statistical Process Control) Overview

5 Attachment(s)
OK then,
here are the questions and the charts.

CarolX 4th June 2009 03:50 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***snowman6705*** (Post 317367)
> *OK then,*
> *here are the questions and the charts.*

snowman6705 - I do not mean to be harsh - but we can not answer all the questions for you -

I downloaded your zip file and opened the word document under the SPC section. The first line states

"The following pages give examples of the level of knowledge required. If you cannot answer all of these sample questions below, it is recommended you do further pre-study prior to the training course."

Your above posts contain all the questions listed in the word document.

We would be remiss in giving you the answers. You will learn nothing. And you won't find many folks here that would do this.

If you are struggling with a specific question, please ask - we can help - but we won't "give" you the answers.

prakash_varpe 15th July 2009 11:22 PM

Re: SPC (Statistical Process Control) Overview

;)

Quote:

> *In Reply to Parent Post by* ***Steve Prevette*** (Post 112438)
> *This presentation gives a little more detail on the nuts and bolts of SPC. This was made for my monthly performance indicators session here at Hanford. I alternate months with a classroom topic one month, and a hands-on computer topic the next.*
>
> *This presentation is provided for peer review and comment.*

hi thanking you,

i have lot data with me & i want to make control chart for that but i dont have software like minitab for this can you help me

prakash_varpe 15th July 2009 11:24 PM

Re: SPC (Statistical Process Control) Overview

for making control chart i required a software, can you help

bobdoering 16th July 2009 05:45 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by **prakash_varpe*** (Post 324735)
> *i have lot data with me & i want to make control chart for that but i dont have software like minitab for this can you help me*

It is hard to answer a question like this correctly so generically. It would be good to know what characteristics and processes are you studying. Also, it would be good to know if you did a capability study, and if so, how did you collect the data.

Bev D 16th July 2009 02:55 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by **prakash_varpe*** (Post 324736)
> *for making control chart i required a software, can you help*

Excel will work you just have to type in the formulas and create the chart

chvrajus 13th January 2010 08:55 AM

Re: SPC (Statistical Process Control) Overview

Hi All -

First of all, thanks for the information about SPC.

I am new to this forum and this is my first post and I am not sure if I am posting under right thread.

I am working for a manufacturing company and my manager told me to study about SPC. Especially for low volume SPC

Can any one have idea about low volume SPC.

- What kind of charts will be used for SPC (Histogram, Bell curve chart, etc……)

- How to calculate the limits
- I want to monitor the live data and offline data. What tool or SW is available in the market for SPC charts and reports
- Any examples?

Thanks in Advance
Ven

Steve Prevette

13th January 2010 09:18 AM

Re: SPC (Statistical Process Control) Overview

Take a look at http://www.hanford.gov/rl/?page=1144&parent=169. If you are in the USA, you should have no problem accessing. I have heard reports of folks in some foreign countries not being able to access it.

It does provide a way to do SPC and several examples.

samsung

13th January 2010 09:38 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***Steve Prevette*** (Post 356098)
> *Take a look at http://www.hanford.gov/rl/?page=1144&parent=169. If you are in the USA, you should have no problem accessing. I have heard reports of folks in some* ***foreign countries not being able to access it.***
>
> *It does provide a way to do SPC and several examples.*

I often visit this site and never had an issue accessing it from India.

Just for a Feedback.

Thanks.

bobdoering

13th January 2010 09:40 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***chvrajus*** (Post 356095)
> *I am working for a manufacturing company and my manager told me to study about SPC. Especially for low volume SPC*

What kind of processes and characteristics are you trying to control? That is important to know to aim you in the right direction.

mjfqd 12th February 2010 06:31 PM

Re: SPC (Statistical Process Control) Overview

Where can I find a comparison of SPC programs? We machine parts for aerospace.

artichoke 12th February 2010 06:49 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***chvrajus*** (Post 356095)
> *Can any one have idea about low volume SPC.*

Ven,
I strongly recommend buying Don Wheeler's SPC "bible" - "Advanced Topics in SPC" and perhaps some of his other books.
page 267, Ch 11.9 "Control Charts for Rare Events" may answer your question.

Stijloor 12th February 2010 07:00 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***mjfqd*** (Post 361707)
> *Where can I find a comparison of SPC software programs?*

There's a ton of stuff out there. I've seen **buyers guides**, but these are all very biased, actually more advertisements. I suggest that you make a listing of your actual SPC software needs/applications; that will help you to narrow the search. Then start contacting possible suppliers, you may even get their stuff on a trial basis. You can always ask for comments/feedback here at The Cove Forums.

I hope other (SPC Expert) Covers will chime in.

Stijloor.

mjfqd 12th February 2010 07:10 PM

Re: SPC (Statistical Process Control) Overview

Quote:

In Reply to Parent Post by ***chvrajus*** (Post 356095)
Hi All -

First of all, thanks for the information about SPC.

I am new to this forum and this is my first post and I am not sure if I am posting under right thread.

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Can any one have idea about low volume SPC.

- What kind of charts will be used for SPC (Histogram, Bell curve chart, etc……)
- How to calculate the limits
- I want to monitor the live data and offline data. What tool or SW is available in the market for SPC charts and reports
- Any examples?

Thanks in Advance
Ven

IX/MR charts (individual X/Moving Range) charts use the results from each part to establish control limits. However, you still need about 100 measurements to get meaningful results.

Target charts are another way to go. You combine the charts from similar runs by normalizing the data. For instance, you use the measurements from different parts that have similar features such as drilled holes. By charting the deviation from the mean of the tolerance for the holes, you can watch the overall process. The trick is to limit the variables (machines, operators, material, tools, etc).

Stijloor

12th February 2010 07:13 PM

Re: SPC (Statistical Process Control) Overview

Quote:

In Reply to Parent Post by ***mjfqd*** (Post 361713)
IX/MR charts (individual X/Moving Range) charts use the results from each part to establish control limits. However, you still need about 100 measurements to get meaningful results.

Target charts are another way to go. You combine the charts from similar runs by normalizing the data. For instance, you use the measurements from different parts that have similar features such as drilled holes. By charting the deviation from the mean of the tolerance for the holes, you can watch the overall process. The trick is to limit the variables (machines, operators, material, tools, etc).

Sorry, I am confused...:confused: What post are you responding to?

Stijloor.

mjfqd 12th February 2010 07:17 PM

Re: SPC (Statistical Process Control) Overview

Multi-tasking will always get me in trouble.
I responded to our friend in Australia, but I appreciate your help on the SPC program. I started my own comparison table, but I was hoping to find someone else's that I could validate on my own. Your link to the buying guide is very helpful.

Stijloor 12th February 2010 07:23 PM

Re: SPC (Statistical Process Control) Overview

Quote:

*In Reply to Parent Post by **mjfqd*** (Post 361716)
Multi-tasking will always get me in trouble.
I responded to our friend in Australia <snip>

No problem, give me the post number and I can fix it.

Stijloor.

mjfqd 12th February 2010 07:28 PM

Re: SPC (Statistical Process Control) Overview

Now that I look at it, I was replying to a reply (#67). I'll get the hang of this eventually.

Stijloor 12th February 2010 07:34 PM

Re: SPC (Statistical Process Control) Overview

Quote:

*In Reply to Parent Post by **mjfqd*** (Post 361718)
Now that I look at it, I was replying to a reply (#67). I'll get the hang of this eventually.

Check it out. I hope I fixed it correctly.

Stijloor.

mjfqd 12th February 2010 07:57 PM

Re: SPC (Statistical Process Control) Overview

Thanks again! You made me look like I know what I'm doing.

Intesar 22nd November 2010 10:26 AM

Re: SPC (Statistical Process Control) Overview

thank you for sharing valuable info

amal83 9th March 2011 12:59 AM

Re: SPC (Statistical Process Control) Overview

Thank you for this. I'm trying to teach my employees abut SPC and why it is important. This is very useful.

Steve Prevette 9th March 2011 06:59 AM

Re: SPC (Statistical Process Control) Overview

The complete set of materials from the Hanford website are now completely uploaded at the Energy Facility Contractors Group at http://www.efcog.org/wg/esh_es/Stati...trol/index.htm. I will continue to add new materials as I generate them

Also, the EFCOG recently published an internet book on leading indicators at http://www.efcog.org/wg/ca/docs/arch...t%202-1-11.pdf

vnn1985 6th May 2011 01:49 AM

Re: SPC (Statistical Process Control) Overview

Hi every one!
At the moment, I am working for machanical precision company.
in production line, there are not quality control staff taking sample to check. all product already checked by final inspection (100% some product, less than 100 %(30-40%)for other products). As new comer, I really dont know what SPC tools for control production-process and product control. What tools (control chart, histogram, pareto, ...) I should using and how to using?
Thanks

bobdoering 4th July 2011 03:05 PM

Re: SPC (Statistical Process Control) Overview

Quote:

In Reply to Parent Post by ***vnn1985*** (Post 432577)
At the moment, I am working for mechanical precision company. in production line, there are

not quality control staff taking sample to check. all product already checked by final inspection (100% some product, less than 100 %(30-40%)for other products). As new comer, I really dint know what SPC tools for control production-process and product control. What tools (control chart, histogram, pareto, ...) I should using and how to using?

Specifically, what kinds of processes are you using, and what characteristics are you trying to use to control the process? Have you started by looking at this?

reynald

4th July 2011 09:05 PM

Re: SPC (Statistical Process Control) Overview

Quote:

*In Reply to Parent Post by **Steve Prevette*** (Post 422324)
Also, the EFCOG recently published an internet book on leading indicators at http://www.efcog.org/wg/ca/docs/arch...t%202-1-11.pdf

Steve,
I find this awesome!
Thanks a lot for sharing.

artichoke

4th July 2011 09:33 PM

Re: SPC (Statistical Process Control) Overview

Quote:

*In Reply to Parent Post by **vnn1985*** (Post 432577)
Hi every one!
As new comer, I really dont know what SPC tools for control production-process and product control. What tools (control chart, histogram, pareto, ...) I should using and how to using?
Thanks

Before jumping in with solutions, the first step should be to gain an in depth understanding of SPC. My recommendation is to buy or borrow:

Understanding SPC - Wheeler (this is the SPC "bible")
Advanced Topics in SPC - Wheeler
Out of the Crisis - Deming

Hami812

5th July 2011 01:15 PM

Re: SPC (Statistical Process Control) Overview

Excellent stuff. I just realized I have less of a clue than I thought. But now I have a clue and know

where I can start focusing.

artichoke 5th July 2011 05:11 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***Hami812*** (Post 441016)
> *Excellent stuff. I just realized I have less of a clue than I thought. But now I have a clue and know where I can start focusing.*

Take care with your selection of reading material. The EFCOG document makes the very common mistake these days, of failing to distinguish between what Deming calls enumerative and analytical studies. This is what Deming described as "poor teaching of statistical methods in industry" (page 131, "Out of the Crisis"). This failure has taken much of industry backwards. Demings lessons have been poorly learned. Perhaps Deming's book should be your first read, before getting into the deeper stuff with Wheeler.

pearsonow 10th August 2011 06:07 AM

Re: SPC (Statistical Process Control) Overview

Artichoke - I cannot agree more, i am re-reading Out Of The Crisis at the moment, as we are introducing SPC to some of our suppliers, and i want to ensure i teach it t them in a way that has meaning - not just gathering data for it's own sake.

I will have to look into Wheeler's work also. Has anyone got any suggestions for suitable reference material for short run based data?

I have read most of the Injection moulding related stuff in the SPC forum (guess where I've been told to look first). I am spending 2 day next week, before returning home, with one of our moulders - the longest time period of my visit - and am now wondering if what we orgininally set out to do is the correct method.

I will post in more detail shortly but will probably start a new thread as this will be a long and ongoing discussion I feel. I also intend to get some time off over the weekend, 15.5 hrs flying time, I am going to do some sightseeing!

artichoke 10th August 2011 06:58 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***pearsonow*** (Post 445820)
> *Artichoke - I cannot agree more...*
> *I will have to look into Wheeler's work also. Has anyone got any suggestions for suitable reference material for short run based data?*

...

I don't know what your particular problem is but you might find Ch 6.2, Wheeler "Advanced Topics in SPC", on Rational Subgrouping, with an example of injection mouldings with 5 consecutive press cycles, to be of interest anyway.

bobdoering 10th August 2011 07:00 AM

Re: SPC (Statistical Process Control) Overview

Quote:

*In Reply to Parent Post by **pearsonow*** (Post 445820)
Artichoke - I cannot agree more, i am re-reading Out Of The Crisis at the moment, as we are introducing SPC to some of our suppliers, and i want to ensure i teach it t them in a way that has meaning - not just gathering data for it's own sake.

I also recommend looking at this link.

artichoke 10th August 2011 05:19 PM

Re: SPC (Statistical Process Control) Overview

Quote:

*In Reply to Parent Post by **bobdoering*** (Post 445827)
I also recommend looking at this link.

Bob,
I checked your link and came to this "... run the data through a distribution fit analysis, and find the best fit ..."

If you read Dr Wheeler's book "Normality and the Process Behaviour Chart", Wheeler describes very elegantly and in great detail, how this statement is utter nonsense. It is just one small part of the Six Sigma scam.

Wheeler also published an article in the Quality Digest recently on the subject.

The above statement is the sort of nonsense that has sent quality backwards to the days before Shewhart. It seems that in almost a century, little has been learned.

I'm happy to discuss if you need but I'm sure that reading Wheeler's material will bring you to an understanding more quickly.

bobdoering 10th August 2011 11:51 PM

Re: SPC (Statistical Process Control) Overview

Quote:

In Reply to Parent Post by ***artichoke*** (Post 445941)
Bob,
I checked your link and came to this "... run the data through a distribution fit analysis, and find the best fit ..."

If you read Dr Wheeler's book "Normality and the Process Behaviour Chart", Wheeler describes very elegantly and in great detail, how this statement is utter nonsense. It is just one small part of the Six Sigma scam.

Wheeler also published an article in the Quality Digest recently on the subject.

The above statement is the sort of nonsense that has sent quality backwards to the days before Shewhart. It seems that in almost a century, little has been learned.

I'm happy to discuss if you need but I'm sure that reading Wheeler's material will bring you to an understanding more quickly.

Please, I *posted* that article on the forum. I own most Dr. Wheeler's work, including the one you cited. Most of it is very good and handy. But his statement - if read closely, mentions that you do not need to know the distribution "to make SPC work", but by no means does that suggest you do not need to know the distribution to understand capability or if any of the Western Electric rules are applicable to a particular process output among many other valuable pieces of information it provides. His point is as long as you chart you will find the signals of variation you need.

The notion of understanding the process distribution has nothing to do with six sigma - since that area is befuddled with normal-centric thinking. They rarely care about finding the *correct* model for their data.

You statement of "nonsense" is really unsubstantiated, but that is understandable. SPC takes more than regurgitating text, it takes thinking. Keep reading...it may sharpen your thinking. You have a good start, but have a ways to go.

artichoke 11th August 2011 12:19 AM

Re: SPC (Statistical Process Control) Overview

Quote:

In Reply to Parent Post by ***bobdoering*** (Post 445960)
..., but by no means does that suggest you do not need to know the distribution to understand capability or if any of the Western Electric rules are applicable to a particular process output ...

The notion of understanding the process distribution has nothing to do with six sigma - since that area is befuddled with normal-centric thinking. They rarely care about finding the correct model for their data.

You statement of "nonsense" is really unsubstantiated,

Wheeler explains on page 34 "Normality and the Process Behaviour Chart" that it takes at least 3200 points to test a distribution to 2.95 sigma ... and by the time you do, the process and its distribution will most likely have changed. For that reason, trying to determine the distribution of data for a process is a waste of time, that is, "nonsense".

Six Sigma adherents are concerned about "normalising" the data so that control charts may be used. This is also "nonsense". The "correct" distibution is not necessary for Shewhart charts. Wheeler proves this with an analysis of 1143 different distributions and shows, as Shewhart stated, that a knowledge of the distribution is not needed.

KCIPOH

1st September 2011 12:46 AM

Re: SPC (Statistical Process Control) Overview

Hello Steve,

Can you explain by the meaning of "the baseline is innocent until proven guilty"?

how to say its proven guilty?

confuse and appreciate your explanation:confused:

Thank You

Regards
Daniel

Steve Prevette

1st September 2011 08:46 AM

Re: SPC (Statistical Process Control) Overview

Ah yes. The quote comes from a course I took from Davis Ballestracci.

"A baseline is innocent until proven guilty"

One of the most confusing topics to newcomers to SPC is - when should I shift the baseline average and its associated UCL and LCL to follow a change in the data?

Some people say - never! I haven't given permission for the process to change, I don't accept the change! However, if the job of SPC is to predict future performance, and if the data have shifted such that it no longer predicts future performance, one needs to eventually follow the indication.

Some people say - I just implemented a change! I should rebaseline now! Well - what if the change was ineffective? You may end up "tampering" (see the Funnel Experiment) with the chart, and it will not be effective at prediction either.

Davis made the point - ONLY consider rebaselining a chart if FIRST you have at least one "trend signal" / "out of control condition". Then you may consider going to a new baseline. But generally one should also know WHY the process data shifted, and have some indication that it is a permanent shift.

On the web site, the presentation on Life Cycle of a Trend (and the paper is posted here on the Cove someplace) goes through this in more detail, with examples.

bobdoering 1st September 2011 09:39 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***Steve Prevette*** (Post 448562)
> *But generally one should also know WHY the process data shifted, and have some indication that it is a permanent shift.*

I agree, and that is why I always recommend preparing a *total variance equation* ahead of time, so that the sources of variation have been considered. When a shift or trend or other change (that is unexpected) occurs, rather than running around like a chicken with your head cut off, you look through your total variance equation or CNX chart or fishbone diagram - whichever you prefer - and look for the possible causes. Consider this advanced variation list development similar to PFMEA - where you take the time to *think* about your process *ahead of time* rather than just diving into it.

If you determine the cause, and understand the cause and it fits within the concept of your process, you may then accept a chart shift or recalculation of limits. You initial data may not have included long term variation, such as raw material lot variation, etc. It will only be seen - and dealt with - in time.

Jim Wynne 1st September 2011 09:47 AM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***bobdoering*** (Post 448578)
> *I agree, and that is why I always recommend preparing a total variance equation ahead of time, so that the sources of variation have been considered. When a shift or trend or other change (that is unexpected) occurs, rather than running around like a chicken with your head cut off, you look through your total variance equation or CNX chart or fishbone diagram - whichever you prefer - and look for the possible causes. Consider this advanced variation list development similar to PFMEA - where you take the time to think about your process ahead of time rather than just diving into it.*
>
> *If you determine the cause, and understand the cause and it fits within the concept of your process, you may then accept a chart shift or recalculation of limits. You initial data may not have included long term variation, such as raw material lot variation, etc. It will only be seen - and dealt with - in time.*

This is the essence of it--sometimes the mean changes, but if you just recalculate control limits without understanding *why* it changed, the proverbial baby is thrown out with the bath water. This is also the fundamental folly of the Six Sigma 1.5-sigma shift. We are led to believe that the process mean can drift a significant amount over time without anyone noticing that something has happened.

artichoke 1st September 2011 06:12 PM

Re: SPC (Statistical Process Control) Overview

Quote:

> *In Reply to Parent Post by* ***Jim Wynne*** (Post 448580)
> *This is also the fundamental folly of the Six Sigma 1.5-sigma shift. We are led to believe that the process mean can drift a significant amount over time without anyone noticing that something has happened.*

The folly of six sigma is really much worse. It's interesting how these things are like a game of "Chinese whispers". The original claim was a "proof" by Mikel Harry that **all** process drift by 1.5 sigma in 24 hours. Harry based his original "proof" on errors in the height of stacks of discs, which of course bears no relation whatsoever to processes. He later said that it was "empirical" and not needed. In 2003 Harry pulled a new "proof" out of the ether on a completely different basis and this time called it a "correction". My papers show it was just as much nonsense as the original. Harry's off sider Reigle Stewart changed the "proof" again to be a "dynamic mean off-set". All of these "proofs" are easily shown to be invalid.

Despite the ridiculous basis for 6 sigma, almost no one has bother to check the facts behind the scam, although one has to do considerable digging to find the original papers. As a result, billions of dollars have been wasted on a methodogy built on rubbish.

Steve Prevette 1st September 2011 09:51 PM

Re: SPC (Statistical Process Control) Overview

I happened to think that perhaps the question truly was about "innocent until proven guilty". That is an American phrase to my knowledge. It just says we assume an accused criminal is innocent, until proven guilty (instead of guilty until proven innocent).

In this SPC parlance - if we have a baseline/UCL/LCL that we have established, we assume it is good - until it is proven guilty by receiving an "out of control" signal.

On 1.5 sigma - it's long been my theory that the real "problem" being seen was that the observed failure rate at 6 sigma from the average was not the failure rate predicted by the normal distribution. An alternate theory rather than the 1.5 sigma shift, would have been to acknowledge that the data likely weren't normally distributed and the observed tail was a bit "thicker" than the normal curve. As has been stated uncountable times here on the Cove, SPC does not depend upon normality. If only Mikel Harry et al had heard of the Tchebychev Inequality.

artichoke 1st September 2011 10:20 PM

Re: SPC (Statistical Process Control) Overview

Quote:

In Reply to Parent Post by ***Steve Prevette*** (Post 448678)
An alternate theory rather than the 1.5 sigma shift, would have been to acknowledge that the data likely weren't normally distributed and the observed tail was a bit "thicker" than the normal curve. As has been stated uncountable times here on the Cove, SPC does not depend upon normality. If only Mikel Harry et al had heard of the Tchebychev Inequality.

Yes, one never knows what the data distibution is and one does not need to. Thicker tails however are not always the case, for example time based distributions (time to answer phone in a call centre for example). This has one fat tail and the other is truncated. Shewhart charts still work well, none the less.

Wheeler's "Normality and the Process Behaviour Chart" is a great read. See p88 and his comments on Chebychev vs actual distributions.

pmg-20130220 18th February 2013 01:44 AM

Re: SPC (Statistical Process Control) Overview

SPC (Statistical Process Control) is a method of monitoring a process during its operation in order to control the quality of the products while they are being produced, rather than relying on inspection to find problems after the fact. It involves gathering information about the product, or the process itself, on a near real-time basis so that the operator can take action on the process. This is done in order to identify special causes of variation and other non-normal processing conditions, thus bringing the process under statistical control and reducing variation.

learner sun 19th April 2013 05:03 AM

Re: SPC (Statistical Process Control) Overview

I am new for this forum.
I have a question do we need to fix control limits after 25 groups of data? or we always let SPC software to automatically caculate the control limits?

Note: I am using SPC software for process control/monitoring.

Bev D 19th April 2013 08:38 AM

Re: SPC (Statistical Process Control) Overview

Welcome :bigwave:

You shuold NOT continually recalculate control limits. This defeats the entire purpose of control charts. Resetting can create limits that accomadate trends and small shifts.

You should set the limits on a stable baseline period and only recalculate when a known improvemetn has been implemented and the improvement is evident in the chart.

The time now is 04:19 AM. All times are GMT -4.
Your time zone can be changed in your UserCP --> Options.

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Discovering Change | Process Capability - Cp vs. Cpk | Histogram Animation | Process Loop Animation | Taguchi Loss Function
Fishbone / Cause and Effects Animation

Site courtesy of:
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If you are having problems Registering, Activating your Registration, or other problems, you can phone me in the US. I'm not here 24/7/365, but if I'm here I'll try to help.