Simple Statistical Process Control (SPC)

By Jeff Spira

Many small businesses have been asked to begin performing statistical process control on a part they've been manufacturing or are considering manufacturing, as a requirement of ISO-9000 or other new quality system requirements. Confronting the highly technical presentation of information published on the topic sends most small manufacturers into an information overload. There is a simple way to approach this and start using this extremely useful SPC technique without facing the prospect of learning advances statistical mathematics.

The most useful statistical process technique for small manufacturers is what is known as the average and range control chart, or more informally the X Bar R chart. This simple way of looking at the control of a process may be used for literally any process, from machining precision metal parts to making pizzas, using this control method, you are able to greatly increase consistency in making anything.

An average and range control chart is generated for each characteristic of the process you wish to control. For instance in a lathe turned pin, you might choose to have an X Bar R chart for the outside diameter and another for the length. In the case of pizza manufacture you may decide to have one for the quantity of cheese added and another for the crust dough thickness. In any case, you only use a control chart for those characteristics that are critical to the quality of your product. These are usually referred to as Key Product Characteristics (KPC) and usually are determined by important fit of function parameters.

The average and range control chart tells you when you need to adjust a process to keep it under control. Likewise it tells you when to keep your hands off. Because over-controlling a process introduces even more variability into it. For instance of you adjust a machine every time it makes a part that is not exactly nominal, your variations will

increase rather than decrease, because there is always some inherent variability in any process. Allow that inherent variability to take place and the process will stay centered.

An example of this was in a second operation machining operation being performed by a plastics manufacturer. Once an hour, the supervisor took a part from the production, measured it and adjusted the machine so that the next part would come out on the nominal. After introducing the X Bar R control chart to the process and teaching the supervisor to not make any adjustments to the process until the process actually strayed outside the control limits, it was found that no machine adjustments were needed for at least a week, and the precision of the process increased greatly.

The introduction of the average and range control chart, and the performance of the SPC tasks actually saved money because it made the process more efficient. The operator was making parts on a continual basis instead of waiting for the supervisor to make the machine adjustments every hour.

Using average and range control charts does not require expensive software. Simple Microsoft Excel spreadsheet templates are available to do the functions. It doesn't require an extensive mathematics background, only simple training in how to put data into the spreadsheet an dhow to interpret the results. Using one will increase the quality and efficiency of any manufacturing process.

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