Acceptance sampling for variables

Menu:	QC.Expert	Acceptance sampling	Variables

       The module helps to decide whether a quantitative characteristics of a material (e.g. size, purity, strength, mass, humidity) satisfies given requirements. Acceptance sampling for variables is useful even for materials, for which no individual pieces can be distinguished (e.g. fluid or gaseous materials). In such cases, a sample of appropriate size from the whole batch is taken. The sample is subsequently analyzed (measured). Size of an individual sample is related to the measurement method and its properties. Sampling has to be done in a random way, keeping in mind that each part of a sampled batch has to have the same probability of becoming a part of a sample.

Data and parameters

       The values of producer risk *Alpha* and consumer risk *Beta*, together with corresponding acceptable probability of unacceptable quality *AQL* and unacceptable probability of unacceptable quality *RQL* are entered in the Acceptance sampling for variables dialog panel. Meaning of these four parameters is analogous to the meaning of parameters of the attributes acceptance sampling. QL stands for the minimum value allowed for the measured variable (i.e. lower limit), similarly QU stands for the maximum value allowed. When only one of these two is given (e.g. minimum metal content in an ore, maximum heavy metals content in milk), the other field is left blank. Common values for *Alpha*, *Beta, AQL, RQL* are set by the *Initialize* button. After the parameter values have been entered, the required sample size N and coefficient K are computed upon pressing "?". These two values specify **acceptance sampling plan**. Upon pressing the *Select columns* button, the user is prompted to select data columns. The *Compute* button runs computations necessary to analyze the data. Each column should contain N data points corresponding to one batch. When computations are finished, the program produces a plot and gives a conclusion in words. Producer risk *Alpha* is the probability (risk) of rejecting a good batch (i.e. batch of acceptable quality), while consumer risk Beta is the probability (risk) of accepting a batch of unacceptably poor quality.

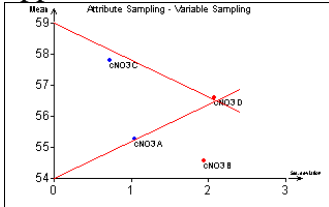**Fig. 1 Acceptance sampling for variables dialog panel**

Protocol

	Values entered in the Acceptance sampling for variables dialog panel, Figure 21.
	Minimum acceptable level.
QL	Maximum acceptable level.
QU	Acceptable probability of unacceptable quality.
AQL	Unacceptable probability of unacceptable quality. Producer risk.
RQL	Consumer risk.

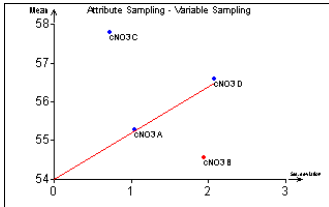|	
Alpha	
Beta	
Mean	Column average.
Sigma	Column standard deviation.
Conclusion	Conclusion in words (acceptable/unacceptable).

Graphs

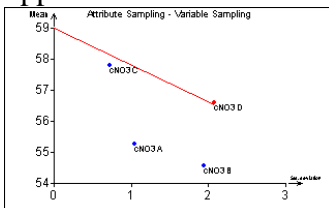|	
Acceptance sampling with upper and lower limits	When both limits are specified, a batch is accepted if the corresponding point is within the limits given by the red lines. When a point falls above or below the triangle, the corresponding batch is not accepted because the measured values are too high or too small. When a point falls right from the triangle, no conclusion can be drawn because the variance of the measurements is too large. Measured values should then be checked in the Basic data analysis module for outliers. One might need to take more precise measurements.
Acceptance sampling with lower limit	When only the lower limit is specified, a batch is accepted if the corresponding point falls above the line. It is clear that acceptance is influenced both by more desirable mean and by smaller variance. Unacceptable batches are marked red.
Acceptance sampling with upper limit	When only the upper limit is specified, a batch is accepted if the corresponding point falls below the line. It is clear that acceptance is influenced both by more desirable mean and by smaller variance. Unacceptable batches are marked red.