PMP *MILL* 21 / 31

Comminution -
Model independent descriptions for Mills and Crushers

MILL 21 : DESCRIPTION OF A COMMINUTION STATE

An operating condition is characterised by

two reduction ratios

rr(x(Q low)) and rr(x(Q high))

in the lower and upper particle size range. This description is completed by a particle size related characteristic curve - the

standardised particle concentration curve.

This curve represents the changes of the particle size distribution on unit interval [0,1].

EVALUATING TEST DATA

There are methods available for determining characteristic values and a particle size related characteristic curve from experimental grinding investigations. Therefore, the particle size range [x(Q low), x(Q high)] of the particle size distributions of Feed and Product is represented on unit area [0,1] and the quotient of both transformed distribution densities is formed. The evaluation can be performed for different process conditions.
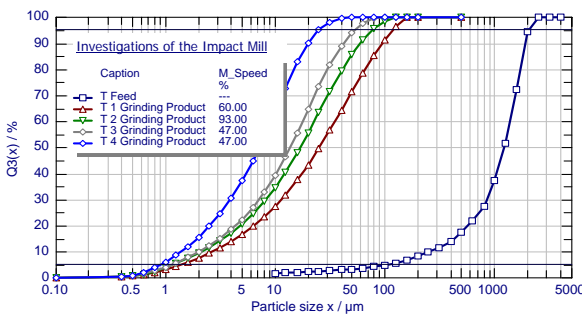

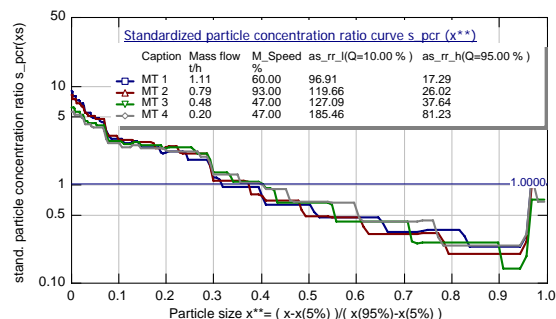Fig. 0: Experimental results of grinding tests at different operating conditions

Fig. 0: Description of comminution in four operating conditions by reduction ratios and the standardised particle concentration curve s_pcr(x**)

MILL 31: EMPIRICAL MODEL

This module supports building up and applying grinding models from the state descriptions of Mill 21.

BUILDING UP MODELS

Comminution proportions and characteristic curves are determined from experimental investigations of different process conditions. The process conditions are characterised by influencing values being machine parameters as well as material values.

The grinding proportions form a characteristic field dependence on investigated influencing values, which is described by a power product approach. When characteristic curves approximately accord at different conditions, a medium characteristic curve is significant.
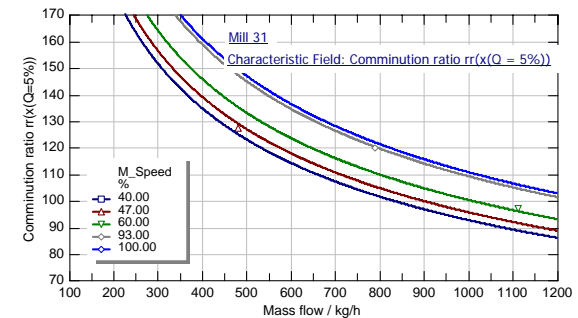
The area of validity will be determined from test conditions or experiences. The exactness of the model is defined by the quality of the characteristic field and the medium characteristic curve.

Methods are easily applicable and the expedience can be verified simply by simulation calculations. Depending on demands, little test data (3 data sets) might be enough for setting up robust models. Further experimental investigations will improve the models stepwise.

APPLYING THE MODEL

The methods can be applied for different grinding machines. A check can be made efficiently on the uniformed PMP - Data Basis.

This model is used in optimisation- and planning calculations, which can be performed in single processes as well as in systems. Even the solution of complex tasks is easier with the PMP-Software.