

Case Study at the 3rd European DOE User Meeting in Lucerne „Optimization of aggregated parameters“

(06.02.2010 – 10:45 to 11:05 by Pavel Nesladek,

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Abstract

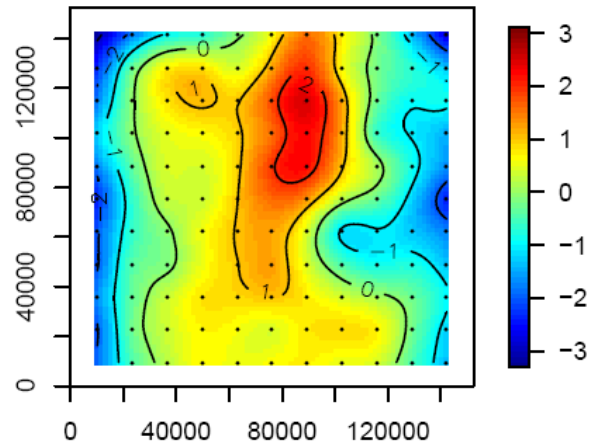
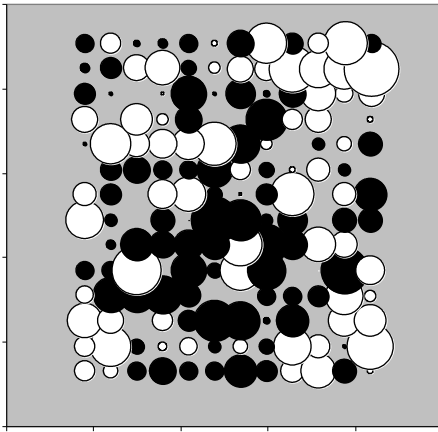
The unit process development or optimization of processes as pattern generation, resist development, etch etc. is in semiconductor technology strongly driven by customer requirements. Customer specifications for final product are frequently literally translated into unit process specifications, or distributed according to available budget model among unit processes known to influence particular parameter. In order to simplify the translation of reached process performance to process qualification criteria, these specifications and parameter are taken directly as responses in the process optimization.

This broadly accepted common approach is over the time getting more and more complicated, as additional parameters are added by customer, frequently requiring sophisticated data evaluation as e.g. pooling of data from different feature types, spline fitting etc. Such parameters can not be optimized directly as responses in DoE experiment. Ignoring this fact, the engineers are led to wrong results, obtaining less optimal process parameters in best case, or getting non significant statistics for all factors used in experiment.

On example of feature size distribution (CDU – critical dimension uniformity) the historical development of customer specification and corresponding evaluation of this parameter in the process development will be shown.

The CDU is aggregated parameter, describing distribution of sizes across the mask. Historically CDU was evaluated as 3 times standard deviation from sample of features of the same target size. Feature size distribution was assumed to be Gaussian; described evaluation was used even if the deviation from Gaussian is obvious.

Spatial distribution of sizes is usually visualized as bubble plot or color map (see below). Due to increasing contribution of metrology noise and need to distinguish the real CDU from noise, fit procedures were applied. Simple fit of linear and radial effects were specified along the 3 σ specification. Recent trend goes to spline fit at which not anymore the 3 σ is specified, but maximum deviation of the fit surface to mean.



Keywords: Optimization , aggregated responses, DoE

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June 1st to June 2nd 2010 in Lucerne / Switzerland

The registration fee is 420,- Euro excl. of VAT

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http://www.statcon.de/dxusermeeting_63_en.html