

Application note number 5

## Choosing a yield model with “11 Select a yield model or default”

This applications note applies to both the basic and the benchmark cost model editions.

In the revision 1 and 2 versions of the cost model, the only die yield model supported by the cost model was the Murphy model. Starting with revision 3, the Murphy model is the default model, but the Exponential, Poisson and Seeds model are also available.

Choosing a yield model is an experiential process. IC producers compare data from a specific process for yield versus die size to results from the various models and select the best fit. For an outsider to a company this process may not be possible unless the outsider is buying wafers with a variety for different die sizes.

In spite of the potential difficulties in determining the appropriate yield model to use, it is still useful to be able to evaluate different yield models and see the effect of the models on cost.

The following is the mathematical formulations of the supported models.

Exponential model

$$Y = \frac{1}{1 + AD}$$

Murphy model (default)

$$Y = \left[ \frac{1 - e^{-AD}}{AD} \right]^2$$

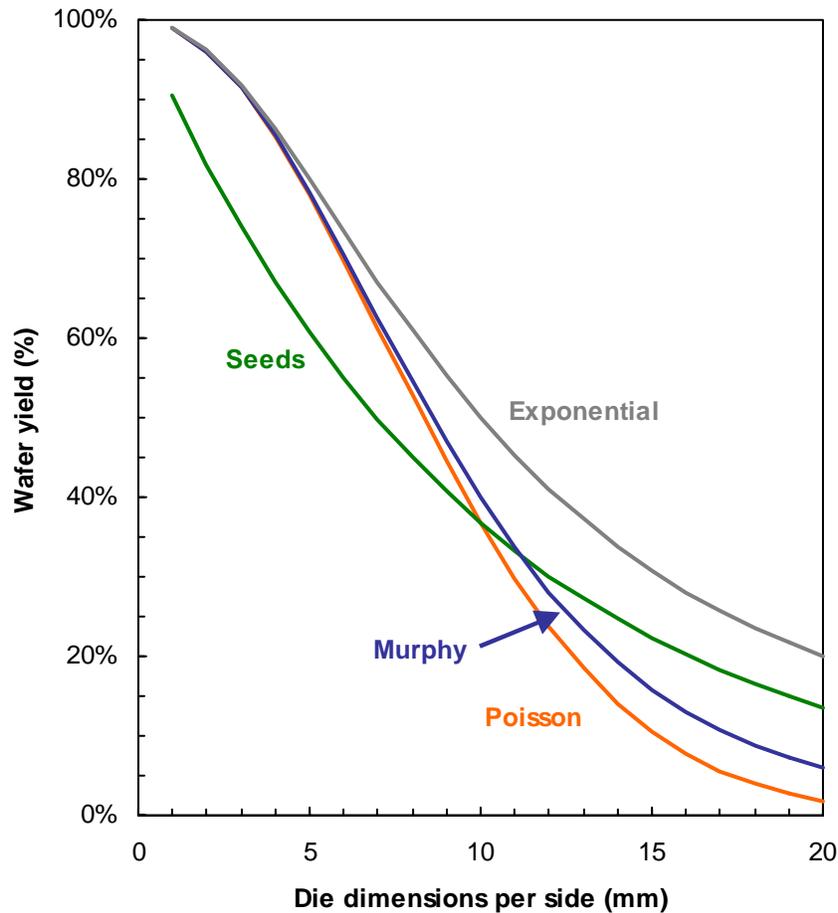
Poisson model

$$Y = e^{-AD}$$

Seeds model

$$Y = e^{-\sqrt{AD}}$$

A resulting yield for the models versus die size is illustrated in figure 1 ( $D = 1.0$  for all models illustrated).



**Figure 1. Yield model comparison.**

From figure 1 it can be seen that the exponential model results in the highest yield at all die sizes, Seeds the lowest yield at die smaller than 10mm per side and Poisson results in lowest yield for die larger than 10mm per sides. By selecting appropriate models for a given die size, varying the model used allows best and worst case yields for a given die to be modeled. This “yield bracketing” gives the user a sensitivity analysis to the yield model.

Questions or comments? Please e-mail us at [info@icknowledge.com](mailto:info@icknowledge.com)

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