The Curve Solver Program

Graphs Almen saturation curve and provides value of intensity

by Jack Champaigne

The introduction of the 10% rule in 1984 by the SAE was the first mathematical approach to determine intensity from the saturation curve. As I discussed in my article in the winter Shot Peener, the 10% rule helped undo the confusion created by earlier SAE documenation regarding saturation, coverage and intensity. However, plotting a saturation curve to meet the 10% rule is laborious and prone to inaccuracies. Thankfully, computer-based curve-fitting procedures are now almost universally available. They offer several advantages over manual procedures including speed and objectivity.

Electronics Inc. is pleased to be representing the Curve Solver program designed by Dr. David Kirk. This Curve Solver has several advantages over other products of its kind: It was developed by Dr. Kirk, one of the greatest researchers in the shot peening industry, it's available in 12 versions, it is very easy-to-use and comes with a comprehensive reference manual sent directly to users via email, and it is FREE!

The program is easy-to-use since it is based on the popular spreadsheet program "Excel" from Microsoft. A built-in feature, called "solver" is used to fit a smooth curve to the arc height data and then compute a value for intensity. The lower and upper peening tolerances can also be displayed in the graph as shown on page 36. Shown below are the available versions.

We didn't need proof that no one likes to plot saturation curves, but here is a telling statistic: We have received 603 requests for Dr. Kirk's Curve Solver. To get your free copy, go to www.shotpeener.com/learning/solver.htm.

SATURATION CURVE SOLVER PROGRAM SUITE

Program Type	Equation	Program No.	File Name
Standard	EXP2P	1	SCS1 S EXP2P vers.06.xlt
	2PF	2	SCS2 S 2PF vers.06.xlt
	EXP3P	3	SCS3 S EXP3P vers.06.xlt
Comparator	EXP2P	4	SCS4 C EXP2P vers.06.xlt
	2PF	5	SCS5 C 2PF vers.06.xlt
	EXP3P	6	SCS6 C EXP3P vers.06.xlt
Flapper - 3M	EXP2P	7	SCS7 FL3M EXP2P vers.06.xlt
	2PF	8	SCS8 FL3M 2PF vers.06.xlt
	EXP3P	9	SCS9 FL3M EXP3P vers.06.xlt
Flapper - BG	EXP2P	10	SCS10 FLBG EXP2P vers.06.xlt
	2PF	11	SCS11 FLBG 2PF vers.06.xlt
	EXP3P	12	SCS12 FLBG EXP3P vers.06.xlt

NOTES:

Program Type
- "Comparator" programs have the added feature of being able to superimpose another curve on a chart for comparison purposes.
- "Flapper" programs allow for automatic correction of measurements according to either the "3M" or "Boeing" recommended procedures

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Equation
- "EXP2P" is a two-parameter exponential equation,
- "2PF" is the French Specification two-parameter equation
- "EXP3P" is a three-parameter exponential equation.

File Name
- "SCS" is for Saturation Curve Solver, followed by the program number, program type and equation. "vers.06" identifies a specific version of a given program. This will change as new versions are produced (e.g. to "vers.07" in 2007).
- "xlt" is the 'file extension' which identifies the program as an Excel 'template'. When a template is used and then closed a template asks if you wish to "save". The usual procedure is to then save work as a "worksheet" with an 'xls' extension thus preserving the template unaltered for future use.

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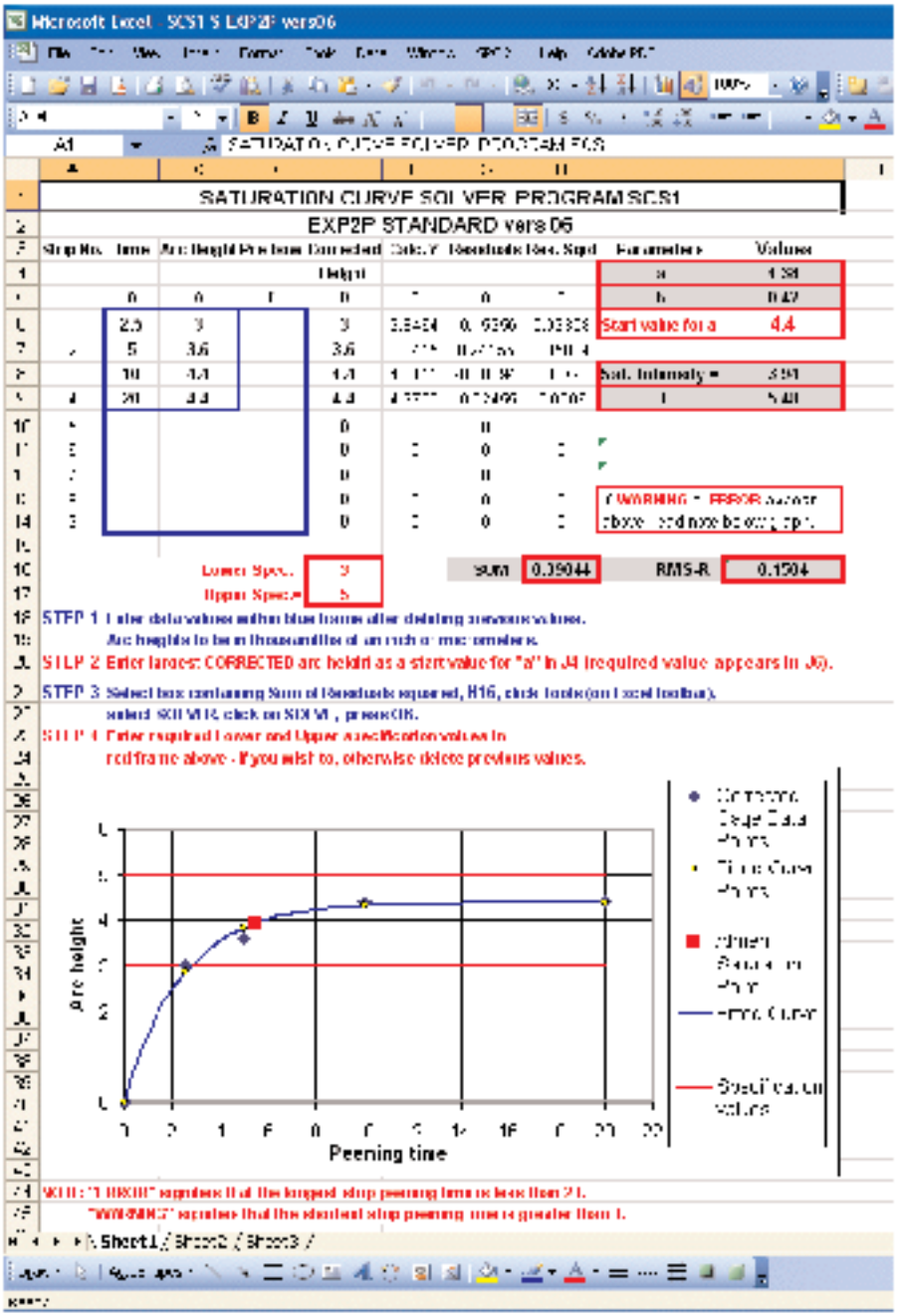

Dr. David Kirk joined Coventry University as a Senior Lecturer in Metallurgy in 1960 and rose to become Chairman of the School of Materials. Interest in residual stresses led to research into shot peening and his development of the Shot Peening Research Laboratory at Coventry University. He was Chairman of the Fifth International Conference on Shot Peening held at Oxford University in 1993, where he was elected as Chairman of the International Scientific Committee on Shot Peening. In 1996 he received their "Lifetime Achievement Award". Since his retirement, Dr. Kirk has been an Honorary Research Fellow at Coventry University and is a member of their Faculty of Engineering and Computing. He is a featured contributor to *The Shot Peener* and designer of the Curve Solver.

Jack Champaigne is Editor of *The Shot Peener* and President of Electronics Inc. (EI) Mr. Champaigne is an instructor for the EI shot peening workshops and on-site training programs. He also developed and oversees the online forums for the www.shotpeener.com web site.