

Electric Machine Design using *SPEED*

Prof. T.J.E. Miller, F.I.E.E.E.
SPEED / CD-adapco

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Training in the latest versions for SPEED users

Introduction to SPEED for new users





Prof. Miller is the originator of the *SPEED* software and founder of the *SPEED Laboratory* at the University of Glasgow.

His career spans more than 40 years in electrical power engineering, with periods at GE in Schenectady N.Y. and a number of U.K. companies, starting with an apprenticeship at Tube Investments Ltd. in Birmingham.

Prof. Miller has written or co-authored 9 books, 10 patents, and more than 200 learned-society papers, but his main effort has been the *SPEED* software and its documentation and training.

SPEED is used by about 1500 engineers worldwide for designing electric machines. In 2011 the *SPEED* software was purchased by CD-adapco (N.Y. , London and Nürnberg), a leading supplier of CFD and engineering CAD software. Prof. Miller is now a consultant with CD-adapco.



The Workshop has two parts

a.m.
2h

- Theory of Electric Machine Design
 - How SPEED works — its structure and philosophy as a CAD tool
 - The union of analytical and numerical methods, with examples
 - The relationship between field theory and circuit theory
 - Types of electrical machine in modern technology
 - Future demands: electric/hybrid vehicles, renewable energy, high efficiency, high speed

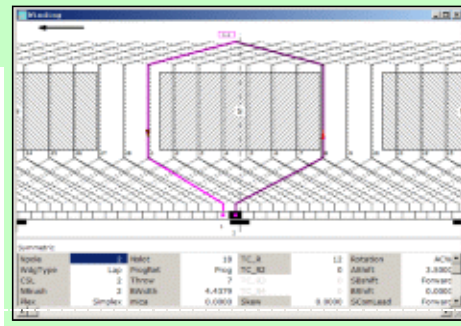
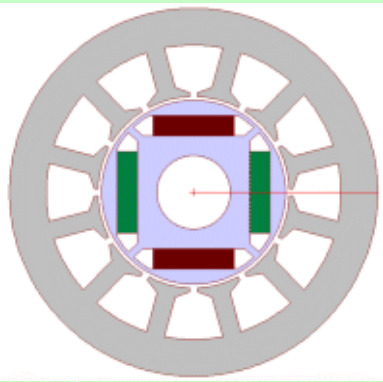
p.m.
2h

- Demonstration of Electric Machine Design using SPEED
 - Initial sizing
 - Geometric definition
 - Winding design and layout
 - Choice of materials
 - Key performance calculations
 - Special calculations for faults or unusual conditions
 - Optimization and scripting
 - Product inventory and characterization

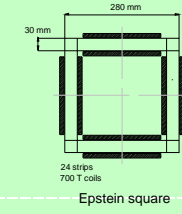


Outline Editor

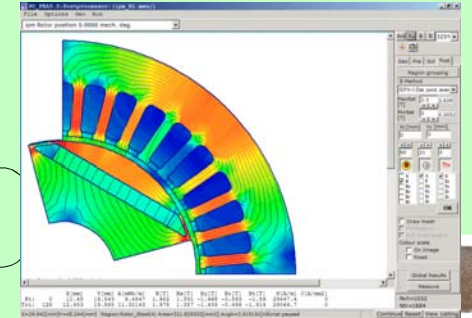
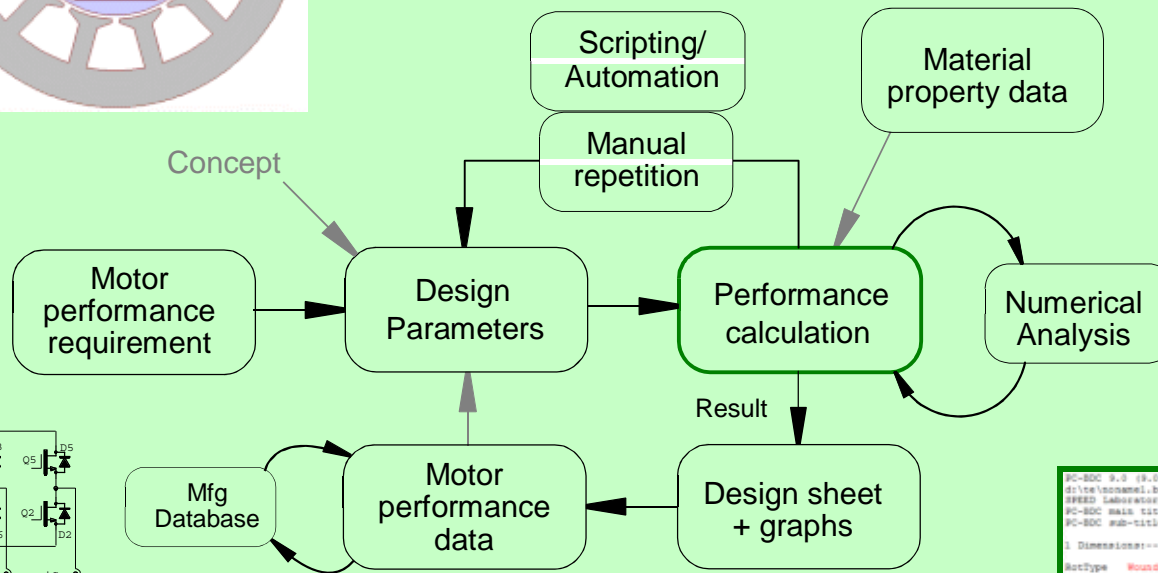
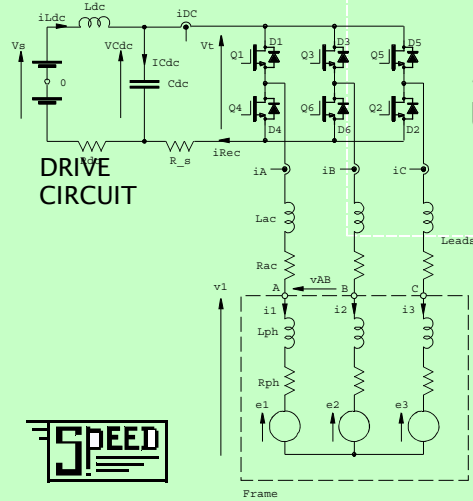
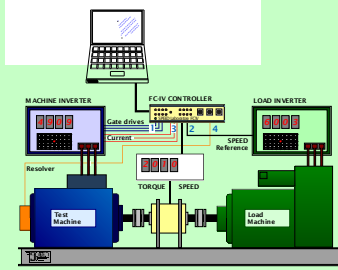
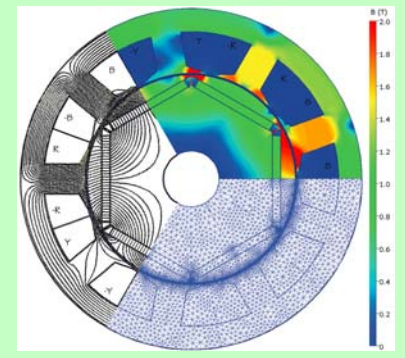
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LM	5.5000
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R_rpf	0.0000
Notch	0.0000
qFlat	0.0000
R_qf	0.0000
R_qff	0.0000
Edges	Bridged
Cweb	0.0000
Poles	4
Nmbp	1
Slots	12
LamShape	Circle



WINDING EDITOR (PC-WFC)



NUMERICAL ANALYSIS



DESIGN SHEET

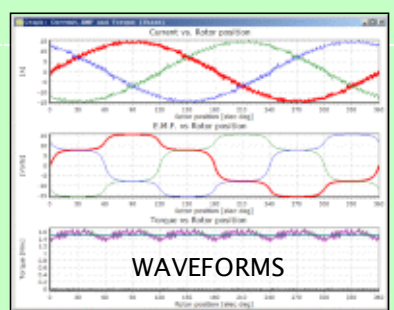
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 SPEED Laboratory 2011
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1 Dimensions-----

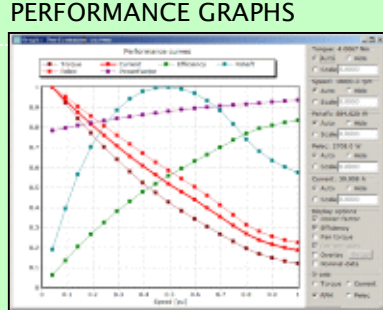
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Stator..	100.0000	ASD	14.0000 mm	SP	3.0000
Stator0D	10.0000	ASD	39.5000 mm	S Slot	0.9700
Reel3	80.0000	ASD	14.0000 mm	SD	2.0000
TMR	8.0000	ASD	20.0000 mm	Stang	0.8700
TSD	1.0000	ASD	20.0000 mm		
Stator..					
MCE	5.0000	ASD	20.0000 mm	Skew	0.0000
Rotax0D	10.0000	ASD	20.0000 mm	Gap	0.0000
LM	8.0000	ASD	142.0000 mm	beta	0.7889
Reel3	10.1584	ASD		RadIS	10.0000
Stator..					
Wound-Field	ASD				
Wound-Field	ASD				
DC	39.0000	ASD		Damper	False
PoleWid	18.0000	ASD	8.0000 mm	CW	0.0000
PoleFace	Chamfer	ASD	1.0000 mm	BetaC	120.0000
WSPole	5	ASD	20.0000 mm	BarDia	1.0000
CWD	true	ASD	20.0000 mm	REB	24.0000
vEdge	8.0000	ASD	80.0000 mm	vEdge	10.0000
PoleCap	Laminated	ASD	19.0000 mm	BarExt	0.0000
ERAL	0.0000 mm ²	ASD	0.0000 mm ²	LeaT	0.0000
ASAC	0.0000 mm ²	ASD	0.0000 mm ²	LeaT	0.0000
LatK	80.0000	ASD	80.0000 mm	LeaT	0.0000

2 Field Winding Data-----

WFTType	SalientF	wFF	10.0000 A	wFWM
wFF	60	wFOLA	2.0000 mm	wFWM
wFWRsp	BarDia			



WAVEFORMS



PERFORMANCE GRAPHS