



**DESIGNING YOUR INDUCTION MOTOR WORKSHOP**  
**HYATT REGENCY IN GARDEN GROVE, CA**  
**MAY 11-12, 2011**

This two day workshop will cover all the ins and outs of induction dc machines, including squirrel cage and wound field types.

**What makes this workshop so unique?**

1. Attendees will be encouraged to share the practical problems they face in their work environment to better understand how to apply the theory to real problems.
2. Jim Hendershot has over 50 years of experience in motor design and manufacturing. He has written several books on the topic and has been honoured by associations such as IEEE and SMMA.
3. Combining theory and design procedure discussions with hands-on sessions using a motor design software package to perform detailed analysis.

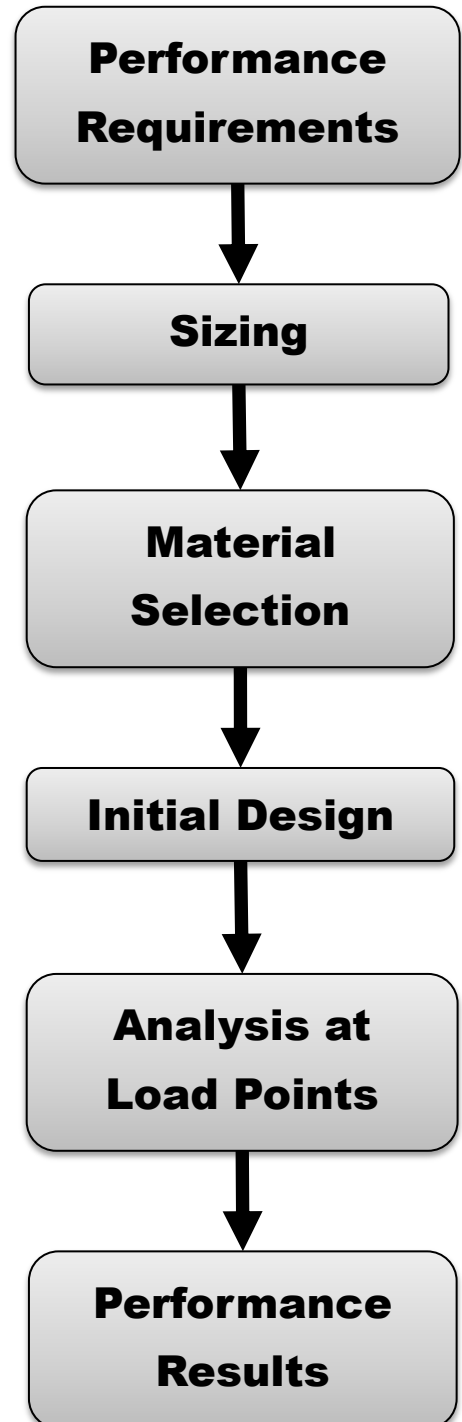
**Motor design strategy based on requirements**

Discussion of topics will include initial sizing, material selection, dimensioning, load point analysis and design iterations. Each topic will include extensive discussion on manufacturing and other constraint-based design of electric machines as typically provided by a specification sheet.

Physical effects such as cooling requirements, aging and optimum performance will also be covered.

Attendees will receive a printed copy of the workshop material presented and a trial of the motor design software tool to use during the workshop's hands-on session.

Registration fees also include a parking voucher, refreshments and lunch each day.



## Theory and Examples - May 11, 2011

### *Introduction to Induction Motors*

- Principles of operation (principle of magnetization, torque production, analytic expressions for torque calculations)
- - Equivalent circuits for IMs
  - o Equivalent circuit equations
  - o D-Q space representations.
- - General control strategy for induction machines (direct torque control, V/f control, field oriented control)

### *General Design Strategy of Induction Machines*

- Performance requirements
- Initial sizing
- Selection of machine configuration, phase, pole selection
- Material selection
- Initial dimensioning of rotor and stator
- Winding design (balanced winding configurations, winding types)
- Design performance; torque-speed characteristics, machine efficiency, machine analysis types

### *Squirrel Cage Induction Machine for traction application Example*

- Performance specification
- Initial design (machine type and configurations) based on design requirements
- Initial rotor and stator dimensioning (setting dimensions, skewing)
- Material choices; comparison between different material choices
- Discussion of material core losses; Steinmetz equation and iron loss calculations.
- Winding design; winding type selection (concentric, lap winding), choice of balanced windings, winding factors, winding harmonics
- Design analysis; power output, torque-speed characteristics, efficiency, losses
- Ways to reduce losses.

## Practical Experience - May 12, 2011

The second day of this workshop will apply the topics covered in-class thus far in a hands-on session which attendees will practice the motor design strategy. The attendees will be able to specify their design needs and use modern motor design software to carry out the actual design. Extensive discussions and question/answer sessions on each design step.

## EVENT LOCATION

Hyatt Regency Orange County  
11999 Harbor Blvd.,  
Garden Grove, California, USA 92840  
Tel: +1 714 750 1234  
Fax: +1 714 740 0465  
[Maps & Directions](#)

## DATES and TIME

Wednesday, May 11<sup>th</sup>, 2011 & Thursday, May 12<sup>th</sup>, 2011  
8:00 AM to 5:00PM  
Registration and Continental Breakfast begins at 7:30AM

## COST

\$895 USD until April 25<sup>th</sup>, 2011  
\$995 USD after

## PAYMENT & CANCELLATION POLICY

You can complete and fax back the attached form or register online at  
<https://www.jh-workshop.com/register/>

If you need to cancel your registration, we must receive written notice. Our policy is as follows:

On or Before April 25, 2011 – **Full refund**  
Between April 26<sup>th</sup> and May 7<sup>th</sup>, 2011 – **50% refund**  
After May 7<sup>th</sup>, 2011 – sorry, **no refund**

For questions, contact Chad Ghalamzan:  
[info@jh-workshop.com](mailto:info@jh-workshop.com)  
514 849 8752 x 300

# Registration Form

**DISCOUNT DEADLINE APRIL 25, 2011**

You can also registration online at <https://www.jh-workshop.com/register/>

Please select from the following

<b>BRUSHLESS DC MACHINE</b>	<b>MAY 9 &amp; 10, 2011</b>	<b>Hyatt Regency Orange County</b>		
This two day workshop will cover all the ins and outs of brushless dc machines, particularly surface mounted and interior permanent magnet (IPM) types.				
<b>Advance Discount/Regular</b>		<b>Quantity</b>	=	<b>Price</b>
\$895	\$995	X		
<b>INDUCTION MACHINE</b>	<b>MAY 11 &amp; 12, 2011</b>	<b>Hyatt Regency Orange County</b>		
This two day workshop will cover all the ins and outs of induction dc machines, including squirrel cage and wound field types.				
<b>Advance Discount/Regular</b>		<b>Quantity</b>	=	<b>Price</b>
\$895	\$995	X		
<b>BRUSLESS DC MACHINE &amp; INDUCTION MACHINE</b>				
This includes a 4 day workshop that will cover two days on BLDC and two days on IM.				
<b>Advance Discount/Regular</b>		<b>Quantity</b>	=	<b>Price</b>
\$1695	\$1795	X		

**TOTAL** \_\_\_\_\_

## First Attendee or Contact Person Information

Name: \_\_\_\_\_ Company: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP: \_\_\_\_\_

Phone: \_\_\_\_\_ Email: \_\_\_\_\_

## Credit Card Information

MasterCard  Visa

Cardholder Name: \_\_\_\_\_

Billing Address: (if different than above)

City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP : \_\_\_\_\_

Account Number: \_\_\_\_\_

Security Code: \_\_\_\_\_ Expiry (mm/yy): \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Please complete this form and fax to (514) 849-4239  
Your registration confirmation will be sent via e-mail upon receipt of this form.  
If you have any questions: [info@jh-workshop.com](mailto:info@jh-workshop.com)