

# *Digital Printing Summer Camp 2009*

*July 27-31, 2009*

**Sugarloaf Mountain Hotel  
Carrabassett Valley, Maine**

## **Ink Jet Academy: Theory of Ink Jet Technology**

*July 27-28, 2009*

A 1 1/2 day comprehensive course describing the latest advances in ink jet and ink technologies, led by Dr. Alan Hudd of Xennia Technology and Mike Willis of Pivotal Resources

## **Digital Printing Markets**

*July 27-28, 2009*

A detailed view of 3 key market sectors (Home, Office & Business; Photographic and Commercial & Industrial), led by Marco Boer of I.IT. Strategies, Don Franz of Photofinishing News and Robert Palmer & John Shane of InfoTrends, the course focuses on critical issues shaping the future of digital printing markets.

## **Ink Jet Ink Manufacturing**

*July 29-30, 2009*

A comprehensive course describing the issues of ink testing, scale up for manufacture and manufacturing technology, led by Dr. Alan Hudd and Dr. Natasha Jeremic of Xennia Technology

## **Surface Tension, Wetting & Capillarity**

*July 29-30, 2009*

An advanced course describing the field of interfacial phenomena and wetting as it relates to ink jet printing and other industrial applications, led by international expert in this field, Prof. Abraham Marmur, Technion - Israel Institute of Technology

## **Color & Color Management**

*July 30-31, 2009*

An in-depth course describing critical elements in color reproduction for digital printing devices, led by Dr. Gabriel Marcu, Senior Scientist, ColorSync Group, Apple Inc.

## **Managing Product Development for Value™**

*July 30-31, 2009*

A one-of-a-kind course designed to provide fundamental skills for the entire chain of steps required for successful innovation (utilizing an integrated system of lecture and case based teamwork) led by George A. Gibson of Xerox Innovation Group

## Summer Camp Introduction

Once again IMI brings together six top digital printing courses. Past Summer Camp programs have been a great success and once again we are in Carrabassett Valley, Maine - a quiet location where there is much recreational potential and opportunity to enjoy nature while increasing your knowledge. Here, in a relaxed atmosphere, we offer courses to give you a deeper grounding in some of the key technologies and markets for today's and tomorrow's digital printing industry.

IMI's **Digital Printing Summer Camp 2009** brings together six of the best courses currently offered in the industry. Each has been prepared and is presented by acknowledged and experienced leaders in their fields. These are timely courses providing the latest information and insights that simply are not available from any other source. There is simply no better information available.

## THE LOCATION

Sugarloaf is a major eastern ski resort and summer recreational area located in Carrabassett Valley in the western mountains of the State of Maine. Celebrating over 50 years of operation, Sugarloaf offers a wide range of summer activities including golf, hiking, mountain biking, fly fishing, swimming, white water rafting, canoeing or just relaxing in a beautiful, natural environment. It is a great place to combine your learning experience at IMI's **Digital Printing Summer Camp 2009** and a family vacation where you can experience the wonders of nature and healthy outdoor activities such as:

### Golf

The Sugarloaf Golf Club is the number one rated course in Maine and Golf Digest rated the course one of the top 75 resort courses in the United States. Designed by Robert Trent Jones, Jr., the 18-hole course is known for its quality of play and scenery. It plays through the valley with mountains overhead and winds over and around the Carrabassett River.

The awe-inspiring 18-holes that make up the Sugarloaf Golf Club & Golf School have proven, for so many golfers, an unforgettable experience. An experience punctuated by the rugged, demanding terrain that is the hallmark of mountain golf.

Golf Digest called Sugarloaf Golf Club a "top 10 for memorability" and a "top 10 for aesthetics." And its legendary designer, Robert Trent Jones, Jr. calls it "One of the most spectacular courses I've ever been associated with."

IMI's **Digital Printing Summer Camp 2009** participants will receive a special weekday (M-F) golf rate of \$75 per person for 18 holes including cart.

## Getting to Sugarloaf

To access all this wonderful natural beauty, it is obvious that Sugarloaf is not located in an urban center! However, it is closer than you think.

For those flying into the Northeastern U.S., we recommend flying into one of the following airports and renting a car so that you can enjoy the wonderful scenic auto routes throughout New England as you travel to Sugarloaf.

Portland International Airport, Portland, Maine – 2 ½ hour drive  
Bangor International Airport, Bangor, Maine – 2 ½ hour drive  
Manchester Airport, Manchester, New Hampshire – 3 ½ hour drive  
Logan International Airport, Boston, Massachusetts – 4 hour drive

For those of you located in the Northeastern U.S. or once you've rented your car, you will want to plan your trip to and from Sugarloaf to pass by such places as L.L. Bean in Freeport, Maine, the Old Port Waterfront District of Portland, Maine (named in April 2009 as the most liveable city in the U.S. by Forbes Magazine), numerous small coastal and lake communities and many of the other attractions of Maine – that's why it says "Vacationland" on our license plates.

## Hiking

Hiking opportunities abound in the Western Maine Mountains. You can hike the 4,237 foot summit of Sugarloaf right outside the hotel or to one of the surrounding mountains in the Bigelow Range. You can also connect with the Appalachian Trail [www.matc.org](http://www.matc.org) and the newly opened Maine Huts & Trails system [www.mainehuts.org](http://www.mainehuts.org) with two beautiful wilderness lodges located near Sugarloaf. Hiking trails for all abilities provide wilderness beauty on many miles of alpine terrain.

## Mountain Biking

Sugarloaf maintains mountain bike trails featuring some of the choicest single track in New England, wide open dirt roads, the historic Narrow Gauge Railroad bed (don't worry-the tracks and ties have been removed) along the picturesque Carrabassett River and a trail network that has supported some of the biggest mountain bike races in the Northeast.

## White Water Rafting

The Kennebec River is one of the most popular whitewater rafting runs in the country. It combines a beautiful wilderness setting with Class 5 rapids and narrow passages. A full day Kennebec trip is a great family or group adventure for ages 12 and up. Trips can be arranged with numerous rafting companies. [www.raftmaine.com](http://www.raftmaine.com)

## Moose Watching

Maine's infamous moose love the Carrabassett Valley. Hotel staff can direct you to spots where you will have a good chance of seeing moose or you can join organized "Moose Cruises." At the very least, you'll enjoy great wilderness scenery and the setting sun over Crocker Mountain.

## Just for For the Kids

Sugarloaf offers **Outdoor Adventure Camp July 6-August 14, 2009** for kids **ages 4 to 13**. Camp hours are Monday-Friday, 9 AM - 3:30 PM. Campers may participate for single days, or by the week. Reservations are required to ensure appropriate staffing levels. Same-day enrollment will depend on space availability in each age group. For activities, fees and registration info, visit [www.sugarloaf.com/EventsActivities/camp.html](http://www.sugarloaf.com/EventsActivities/camp.html)

## Planning Your Supplemental Recreation

We could go on about fly fishing, canoeing, swimming in a crystal clear mountain stream, relaxing wilderness picnics, etc. but we think you get the idea that combining some outdoor, wilderness related activities with IMI's **Digital Printing Summer Camp 2009** would be fun and easy to do. Most of these activities can be done on your own or you can make arrangements by contacting Sugarloaf at +1-207-237-2000.

When you register for one or more of the courses at IMI's **Digital Printing Summer Camp 2009**, we will provide you with an information package covering summer activities and recreational opportunities at Sugarloaf and in the adjacent areas. It will provide detailed directions and options for enhancing your trip, whether it be just for a brief visit or more extended vacation.

Additional useful Web Sites for Sugarloaf Area Information  
Sugarloaf Resort - [www.sugarloaf.com](http://www.sugarloaf.com)  
Town of Carrabassett Valley, Maine - [www.carrabassettvalley.org](http://www.carrabassettvalley.org)  
The Stanley Museum - [www.stanleymuseum.org](http://www.stanleymuseum.org)  
University of Maine at Farmington - [www.umf.maine.edu](http://www.umf.maine.edu)  
State of Maine - [www.state.me.us](http://www.state.me.us)  
Maine Office of Tourism - [www.visitmaine.com](http://www.visitmaine.com)  
Maine Tourism Association - [www.mainetourism.com](http://www.mainetourism.com)

Dress for IMI's **Digital Printing Summer Camp 2009** will be casual - **you'll be in Vacationland!**

**To Register Online**

Visit

[www.imiconf.com](http://www.imiconf.com)

# Ink Jet Academy: Theory of Ink Jet Technology

Sugarloaf Mountain Hotel  
Carrabassett Valley, Maine

July 27-28, 2009

Ink jet printing is the fastest growing imaging technology for office and graphics applications and particularly for digital fabrication, 3D modeling, printable electronics and many other industrial applications. These many new applications are opening up extensive opportunities for materials suppliers, media developers, consumables manufacturers, systems suppliers and others. But entering the ink jet market or just branching out into new parts of it can present a considerable technical challenge with many barriers to commercial success. Understanding the fundamentals is a prerequisite to any development. **The Ink Jet Academy: Theory of Ink Jet Technology** offers a course covering the basic theory of all the diverse types of ink jet technology in use today. Learn how the printheads work, what materials are used in their fabrication and the theory of operation. Learn about inks and media, how they are formulated and the supply and support systems.

Led by Dr. Alan Hudd, Xennia Technology and Mike Willis, Pivotal Resources, **The Ink Jet Academy: Theory of Ink Jet Technology** provides a program and convenient format to get an expert start in the ink jet field, to get an update or to open up new ink jet fields.

## Monday, July 27, 2009

12:00 Noon Registration

1:00 p.m. Opening Session

### WELCOME & INTRODUCTIONS

Alvin G. Keene, President, Information Management Institute, Inc., Carrabassett Valley, Maine

### INTRODUCTION

- Course Overview
- Types of Ink Jet Technology
- Brief History
- Drop on Demand Technologies
- Thermal & Piezo Ink Jet
- State of the Art
- Office & SOHO Markets & Applications

### INDUSTRIAL APPLICATIONS

- Evolution Of Industrial Ink Jet Ink Printing
- Technology Advances
- Printheads & Printers
- Ink Technologies
- Current Status & Emerging Applications

### INK TECHNOLOGY

- Understanding the Ink Jet Ink Printing Process
- Designing an Ink Jet Ink
  - Piezo Drop on Demand
  - Continuous Ink Jet
  - Thermal Ink Jet
- Properties influencing Ink Jet Performance
- Typical Performance Issues
- Diagnosing Typical Ink Problems
- Ink Types: Solvent, Aqueous & UV Cure
- Testing an Ink for Reliability: Methods & Characterization

### DOD PRINthead DESIGNS & VENDORS

- Thermal Ink Jet
- Piezo Ink Jet
  - Piston Mode Designs
  - Roof Mode Actuators
  - Stacked Piezo Technology
  - Shear Mode Designs
  - Silicon Printheads

5:30 p.m. Reception

## Tuesday, July 28, 2009

7:30 a.m. Breakfast

8:30 a.m. Session 2

### MATERIALS FOR INK JET INKS

- Typical Material Requirements for Successful Ink Jet Printing
- Polymers, Dyes & Pigments
- Pigment Dispersion Technology & Processing Techniques
- Key Suppliers
- Advances in UV Curing Ink Technology
- Formulation Considerations
- Challenges, Properties & Current Performance

### DOD PRINthead DESIGN CONSIDERATIONS

- Drop Ejection Frequency
- Crosstalk
- Printhead Life
- Temperature Control
- Drop Placement Accuracy
- Considerations For Page Arrays
- Greyscale Techniques
- Drive Waveforms

### PRINT & IMAGE QUALITY

- Factors Affecting Print Quality
- Technologies To Improve Print Quality
- Improving Image Quality

12:00 Noon Lunch

1:00 p.m. Session 3

### SYSTEM DESIGN ISSUES

- Nozzle Maintenance
- Drop Detection
- Filling/Bubble Removal
- Ink Supply & Replacement

### FUTURE DEVELOPMENTS

- Evolution Of Current Technology
- Hardware & Ink Technology Advancements
- Status & Development of Ink Technology
- Important Future Applications
- Recent & Projected Trends

5:00 p.m. Adjournment

## Ink Jet Academy Leaders

**Dr. Alan L Hudd**, Chief Executive Officer, Xennia Technology Limited, Letchworth, Hertfordshire, UK

In 1996, Dr. Hudd founded Xennia Technology; the world's first independent contract inkjet technology house dedicated to the industrial and office inkjet industries. Since then, Dr. Hudd has grown Xennia into a leading player in the rapidly emerging market for industrial inkjet technologies. Under Dr. Hudd, Xennia has developed a unique set of inkjet chemistry, engineering and problem solving capabilities that has resulted in a number of important technology innovations, especially in the field of inkjet dispensing of difficult materials.

Prior to establishing Xennia, Dr. Hudd was for 8 years the Fluids Technology Manager at Domino Printing Sciences, developing a wide range of inkjet inks for diverse applications and is credited with a number of patents and significant innovations within the industrial inkjet industry. He spent almost eight years with the Ministry of Defence and Royal Ordnance in the UK, developing new solid polymer rocket propellants for air to air missiles. Dr. Hudd graduated with B.Sc. Honours degree in Chemistry and Physics, M.Sc and Ph.D research degrees in Polymer Chemistry from Manchester University.

Xennia is the world's leading chemistry driven industrial inkjet integrator. Xennia provides a complete contract R&D service to support the development of new applications. Xennia supplies printers and inks for production line solutions to OEM's and end-users across a range of industrial applications. Xennia is part of the Royal Tencate Group.

**Mike Willis**, Managing Director, Pivotal Resources Limited, Cambridge, UK

Mr. Willis founded Pivotal Resources, a consultancy in the digital printing industry, in 1995. He has experience in a wide range of technologies and markets including drop-on-demand and continuous ink jet printing, electro-photographic technology, greyscale and colour reproduction methods and light sensitive materials.

Prior to founding Pivotal Resources, Mr. Willis was Director of Electronic Printing at Meta Generics. He was a founder member of Xaar - a spin-off company from Cambridge Consultants where Mr. Willis spent ten years working in a number of roles, culminating as Group Leader of Non-Impact Printing. Before that, he spent six years at Gestetner developing photocopiers.

Mr. Willis graduated from the Polytechnic of Central London with an honours degree in Photographic Sciences.



# Digital Printing Markets

Home, Office & Business - Photographic - Commercial & Industrial

Sugarloaf Mountain Hotel  
Carrabassett Valley, Maine

July 27-28, 2009

IMI's **Digital Printing Markets** course provides a program and format to obtain a timely update and understanding of key digital printing markets and applications areas. Led by prominent industry consultants, IMI's **Digital Printing Markets** course provides comprehensive analysis of market status, opportunities and dynamics. While conventional printing declines, digital printing offers personalization, cost savings, improved output options and other opportunities to end users as the transition from an analog to digital world accelerates.

## Monday, July 27, 2009

12:00 Noon Registration

1:00 p.m. Session 1

### Home, Office & Business Printing Markets

Robert Palmer, Director, Printer Research, & John E. Shane, Director, Communication Supplies Consulting Service U.S. & Europe, InfoTrends, Inc., Weymouth, Massachusetts

#### WELCOME & INTRODUCTIONS

Alvin G. Keene, President, Information Management Institute, Inc., Carrabassett Valley, Maine

#### HARD COPY IMAGING: UNDERSTANDING CURRENT TRENDS AND FUTURE OPPORTUNITIES IN A MATURE MARKET

- Market Sizing & Forecasts
  - Home/Consumer
  - Office (SMB, Enterprise)
- Emerging Technologies
- A4 Migration into the Office Workgroup
- Color Adoption & Future Penetration
- Role of Channel & Shifts in Distribution
- Global Imaging Trends

#### BUSINESS INK: BIGGER THAN YOU THINK

- Current Roster of Products & Players
- Worldwide Business Inkjet Forecast by Serial & Page-wide Technologies
- Understanding the Value Proposition, Customer Trends & Market Drivers
- Competitive Positioning & Emerging Technologies

#### SUPPLIES MARKET DYNAMICS

- Electrophotography & Inkjet Forecasts
- OEM & Aftermarket Competition
- Intellectual Property Issues
- Eco/Green Supplies Issues
- Managed Print Services - Impact & Opportunities for Supplies
- Total Print Volume Trends
- Shift to Color Trends
- Distribution Channel Dynamics & Shifts

#### GLOBAL HARDWARE & SUPPLIES MARKET PERSPECTIVES

- Developing vs. Emerging Markets
- U.S.
- Western Europe
- Brazil, Russia, India & China

5:30 p.m. Reception

## Tuesday, July 28, 2009

7:30 a.m. Breakfast

8:30 a.m. Session 2

### Photographic Printing Markets

Don Franz, Group Publisher, Photofinishing News International Media Group, Bonita Springs, Florida

#### DEFINING THE PHOTO INDUSTRY

- Personal/Consumer Photography
- Professional Photography
- Managing the Transition to Digital
- Camera Phones, Web Cams, etc.
- Photo Sharing/Social Networks

#### IMAGE CREATION HAS CHANGED & CONTINUES TO CHANGE

#### MARKETS & TRENDS FOR PHOTO OUTPUT

- Retail Photofinishing: Onsite & Offsite
- Online Finishing
- Home Based Printing
- Photo Gifts & Novelties
- Photo Books (Personal to Production)
- Personalized Photo Products
- Convergence of Consumer and Professional Segments

#### OUTPUT TECHNOLOGY OPTIONS, TRENDS & DEVELOPMENTS

- Ink Jet
- Thermal Dye Transfer
- Toner Based/Electrophotography
- Silver Halide Based
- Media Developments & Usage

#### KEY SUPPLIERS & PRODUCTS

- Cameras & Image Devices
- Output Devices
- Consumables
- Software & Enabling Technologies
- Output Service Bureaus

#### MARKET DYNAMICS

- Digital Photo Creation & Output Trends
- Impact of Print Quality, Speed, Cost, Permacence, Ease of Use, etc.
- Impact of World Economic Trends
- Price Erosion thru Intense Competition

#### WORLD IMAGE CAPTURE, PRINTER & SUPPLIERS MARKET SIZES & FORECASTS

- North America
- Western Europe
- Eastern Europe
- Asia Pacific
- Developing Nations

#### FUTURE DEVELOPMENTS

12:00 Noon Lunch

1:00 p.m.

Session 3

### Commercial & Industrial Printing Markets New Opportunities Beyond the \$120 Billion Desktop Printer Market

Marco Boer, Vice President, I.T. Strategies, Hanover, Massachusetts

#### DEFINING THE MARKETS

- Digital Presses
- Large Format Graphics
- Packaging
- Labeling
- Textiles
- Decorative Laminates
- Printed Electronics & Microdeposition
- Other

#### HOW CAN DIGITAL PRINTING POSSIBLY PLAY A ROLE IN THESE HEAVY DUTY MARKETS?

- Technology Improvements
  - From 4 ppm to 2,600 ppm
  - From Uncoated Paper to Innumerable Media Types

#### USER TRENDS

- Relevance vs. Cost/Piece
- Inventory Control Motivation
- Distributed Printing
- Reduced Transportation Cost Goals
- Image Quality Requirements
- Permacence Requirements
- Look/Feel Requirements
- Impact of World Economic Trends
- And More

#### SIZING THE MARKETS

- Analog vs. Digital
- 2008 vs. 2014

#### TECHNOLOGY TRENDS & DEVELOPMENTS: SPECIFIC ROLES FOR EACH TECHNOLOGY

- Ink Jet
- Toner Based
- Thermal Transfer
- New Technologies: MemJet, ToneJet & Others

#### KEY SUPPLIERS & PRODUCTS

- Output Devices
- Consumables
- Software & Enabling Technologies
- System Integrators

#### FUTURE DEVELOPMENTS

- Competitive Threats to Print
- Beyond "Print"

5:00 p.m.

Adjournment

See page 10 for  
Course Leader Biographies

# Ink Jet Ink Manufacturing Course

## Manufacturing Ink Jet Inks for Performance & Reliability

Sugarloaf Mountain Hotel  
Carrabassett Valley, Maine  
**July 29-30, 2009**

IMI's popular course, "The Ink Jet Academy," provides a good background to the types of ink jet inks and materials that are used in today's ink jet printers. But how are inks actually made? Why does colored water cost up to \$2,000 per liter? Is pigmented ink really more expensive to make than dye-based ink? What is involved in manufacturing advanced ink jet inks?

IMI's **ink Jet Ink Manufacturing** course is designed for those wishing to develop, source or commission the development and manufacture of ink jet inks. It will help you understand the issues of development and testing, scale-up for manufacture and the manufacturing processes themselves. As well as being of interest to ink jet technologists, managers will benefit from an understanding of the ink jet ink manufacturing process to set realistic project and revenue plans and to decide whether to manufacture in-house or externally source ink.

### Wednesday, July 29, 2009

7:30 a.m. Registration & Breakfast

8:30 a.m. Session 1

#### WELCOME & INTRODUCTIONS

Alvin G. Keene, President, Information Management Institute, Inc., Carrabassett Valley, Maine

#### CRITICAL ASPECTS OF INK JET SYSTEMS DESIGN

- Printheads
- Ink
- Ink Systems
- Motion Control

#### INK FORMULATION CONSIDERATIONS FOR MANUFACTURING

- Ink Jet Ink Ingredients
- Ink Jet Ink Design & Requirements

#### CREATING ROBUST MATERIAL SPECIFICATIONS:

##### PRAGMATIC vs. SYSTEMATIC

- Dyes
- Pigments
- Polymers
- UV Cure Materials
- Solvents
- Additives

12:00 Noon Lunch

1:00 p.m. Session 2

#### TESTING PROTOCOLS & VALIDATION

- Optimization & Testing
- Test Schedules
- Protocols
- Testing for Reliability & Robustness
- Relationship with Printer
  - Printhead
  - Color Tables
  - Ink Management System

#### INK MANUFACTURING

- Quality Control Processes
  - QC Laboratory Infrastructure
  - QC Laboratory Equipment
- Scale Up for Manufacture
  - Lab Processes
  - Pilot Plant Trials
  - SPC Parameters
- Ink Jet Ink Requirements
  - Jet Break-up
  - Nozzle Plate Inspection
  - Drop Velocity & Volume
  - De-cap & Latency
  - Expanding Printing & Lifetime
  - Image Quality Analysis

#### MANUFACTURING & INK PLANT REQUIREMENTS

- Layout
- Equipment Selection
- Manufacturing Practices
- Quality Standards

5:30 p.m. Reception

### Thursday, July 30, 2009

7:30 a.m. Breakfast

8:30 a.m. Session 3

#### MANUFACTURING PROCESSES

- Mixing Regimes
  - Water Based Inks
  - Solvent Based Inks
  - UV Cure Inks
- Milling Processes
- Filtration Processes
- Degassing
- Purification
- Bottling
- Packaging

#### COMMERCIAL CONSIDERATIONS

- Markets
- Strategies
- Cost Structure
- Positioning
- Value Chain

12:00 Noon Adjournment



#### Course Leaders

**Dr. Alan L Hudd, CEO, Xennia Technology Limited, Letchworth, Hertfordshire, UK**

See Dr. Hudd's biography on page 3.

**Dr. Natasha Jeremic, Principal Chemist, Xennia Technology Limited, Letchworth, Hertfordshire, UK**

Dr. Jeremic joined Xennia in 2004. Since then she has worked on multiple projects involving different ink jet chemistries and applications. Her ink jet experience covers UV, aqueous and solvent chemistries in graphics, packaging and textile applications, work on the deposition of different functional materials such as ceramics, biomaterials, conductive materials etc. Natasha obtained BSc in Organic Chemical Technology and Polymer Engineering at the University of Belgrade in Serbia and her PhD in Chemical Engineering at the University of Newcastle upon Tyne in the UK with the main focus on the field of the heat and mass transfer in thin films.



# Surface Tension, Wetting & Capillarity

Sugarloaf Mountain Hotel  
Carrabassett Valley, Maine

**July 29-30, 2009**

IMI's **Surface Tension, Wetting & Capillarity Course** will present the concepts and measurement techniques that are required in order to understand how surface tension, wetting and capillarity affect printing processes. The first goal will be to develop the understanding of surface tension and interfacial tension, which are essential properties of the materials involved in printing systems, (e.g. ink, plastic substrates, paper, etc.). Then, the various modes of wetting and capillarity penetration, which are the basic processes underlying most printing operations, will be discussed.

This course is directly relevant to anyone working in the fields of ink jet in formulation and development, substrate development – such as papers, films, coatings as well as metal, glass or other nonporous substrates – and the development of ink jet printheads. It is also relevant to all other industries (personal care products, cleaning products, etc.) whose products and their performance rely upon the properties of surface tension, wetting and capillarity.

## Wednesday, July 29, 2009

7:30 a.m. Registration & Breakfast

8:30 a.m. Session 1  
**SURFACES AND INTERFACES**

### WELCOME & INTRODUCTIONS

Alvin G. Keene, President, Information Management Institute, Inc., Carrabassett Valley, Maine, USA

### SURFACE TENSION AND INTERFACIAL TENSION

- Models Of Interfaces
- Units & Typical Values
- Temperature Dependence

### SHAPES OF DROPS AND BUBBLES

- The Young-Laplace Equation
- Applications Of The Young-Laplace Equation
- Very Small Drops & Bubbles

### SURFACE TENSION MEASUREMENT

- Force Methods
- Maximum Bubble Penetration
- Shape Methods

12:00 Noon Lunch

1:00 p.m. Session 2  
**WETTING ON SURFACES**

### CONTACT ANGLE: THEORY AND MEASUREMENT

- Contact Angle On Ideal Surfaces
- Contact Angle On Real Surfaces
- Contact Angle Measurement

### CONTACT ANGLE HYSTERESIS

- The Hysteresis Concept
- The Mechanism Of Contact Angle Hysteresis
- Implications To Measurement

### DYNAMIC WETTING PHENOMENA

- Phenomenology
- Kinetics Of Wetting
- Wetting By Liquid Mixtures
- Wetting By Surfactant Solutions
- Wetting Of Rough Surfaces

5:30 p.m. Reception

## Thursday, July 30, 2009

7:30 a.m. Breakfast

8:30 a.m. Session 3  
**WETTING IN POROUS MEDIA**

### LIQUID PENETRATION INTO CAPILLARIES

- Mechanism Of Penetration
- Height Of Rise & Kinetics Of Penetration
- Penetration Of Small Drops

### LIQUID PENETRATION INTO POROUS MEDIA

- Height Of Rise
- Penetration Of Small Drops Into Paper

### CHARACTERIZATION OF POROUS MEDIA

- Kinetics Of Horizontal Flow
- Kinetics Of Vertical Flow

12:00 Noon Adjournment



## Course Leader

**Professor Abraham Marmor, Department of Chemical Engineering, Technion – Israel Institute of Technology, Haifa, Israel**

Professor Abraham Marmor received his Ph.D. in 1974 from Technion – Israel Institute of Technology. Then he spent two years as a postdoc at the State University of New York at Buffalo. Later he was a visiting professor at the University of Wisconsin – Madison and a visiting scientist at the IBM Almaden Research Center.

Professor Marmor has been working in the field of interfacial phenomena and wetting for over twenty-five years. He has published many papers on the theory and practice of wetting processes and has been consulting for major companies involved in the design and utilization of ink jet printing systems.

He has also participated in many international conferences and has been active in lecturing on interfacial phenomena in universities and industrial sites in many countries. In addition, Professor Marmor was an Editor of Reviews in Chemical Engineering and was on the advisory committee of the Journal of Colloid and Interface Science and the Journal of Adhesion Science and Technology.





# Color and Color Management

## Color Fundamentals, Quality, Calibration & Management

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**July 30-31, 2009**

IMI's **Color & Color Management** course presents the most important elements in color reproduction for printing devices and how to control and correct color at different stages during the reproduction process. We will discuss the roles of measurement, computation and interpretation of data; how to derive and represent a color gamut; the advantages and limitations imposed by color specification - focusing on their implications for color quality of the reproduction. The importance of test images, reference images and color standards will be highlighted. A number of demonstrations will illustrate the key points of the tutorial course.

**Benefits - This course will enable you to:**

- Understand the additive and subtractive principle of color reproduction
- Understand the role of color spaces: their suitability, advantages and disadvantages for color reproduction
- Understand the color difference  $\Delta E/\Delta L^*$  and become confident in using them
- Compare and classify basic halftoning techniques, their performance and limitations
- Understand the color separation process, under color removal (UCR) and gray component replacement (GCR) techniques
- Understand the advantage of a multicolor printing process over the conventional four component printing process
- Understand the gamut differences, gamut mapping and how a device is characterized for accurate color reproduction
- Understand the basic concepts of device characterization and calibration
- Differentiate between CMM based and sRGB based color reproduction approaches and understand the advantages and limitations of each approach
- Understand the importance of the viewing conditions when examining a color reproduction

IMI's **Color & Color Management** course is intended for engineers, scientists and managers who are new to color reproduction and those interested in refreshing or enhancing their current knowledge of color reproduction. Participants should have familiarity with color imaging and computer systems.

**Thursday, July 30, 2009**

12:00 Noon      Registration  
1:00 p.m.        **Opening Session**

**WELCOME**

Alvin G. Keene, President, Information Management Institute, Inc., Carrabassett Valley, Maine

**COLOR FUNDAMENTALS**

- Light & The Human Visual System
- Color Matching Functions (CMF)
- Tristimulus Values
- Metamerism
- CIE XYZ Space & The Cone Of Visible Colors
- CIE 1931, CIE1976 Chromaticity Diagram
- White Point Temperature & the Black Body Locus
- Psychophysical & Psychological Aspects Of Color Perception

**DIGITAL COLOR CODING**

- Device Dependent Color Specification
- Device Independent Color Specification
- Color Spaces
- RGB, CMYK, HSV, HSL, CIELAB & CIELUV
- What Color Space to Use?

**COLOR REPRODUCTION PRINCIPLE**

- Color Mixing
- Color Gamut
- Role of Color Model
- Measuring Color
- Analytical / Empirical Color Models
- Gamut Representation – 2D vs, 3D

**ADDITIVE / SUBTRACTIVE DEVICES**

- Printing Principle
- When Is Halftoning Necessary?
- Dot Gain: Optical & Physical
- Compensation For Dot Gain
- Tone Reproduction Curves
- Three Component Printing Process & Its Limitations
- Four Component Printing Process & Its Pros/Cons
- Color Separations
- Black Generation Process
- Under Color Removal (UCR)
- Gray Component Replacement (GCR)
- Colorant/Media Interaction
- Colorant/Colorant Interaction
- Color Models
- Computing Color Gamut

**DIGITAL HALFTONING**

- Black & White Halftoning Techniques
- Amplitude Modulation Techniques: Cluster Order, Cluster Random & Artistic
- Frequency Modulation Techniques: Stochastic Screening, Blue Noise Mask, Error Diffusion, Pulse Density Modulation & Direct Binary Search
- Combined Techniques
- Color Halftoning
- Multilevel & Multicolor Halftoning
- Interference & Interaction Between Color Layers
- Influence Of Halftoning On Color Gamut
- Dot On Dot, Dot Of Dot Halftoning
- Moire Free Amplitude Modulation Color Halftoning

5:30 p.m.                      Reception

**Friday, July 31, 2009**

7:30 a.m.            Breakfast  
8:30 a.m.            **Session 2**

**GAMUT MAPPING**

- What Is Gamut?
- Influence Of The Viewing Conditions
- Why Gamut Mapping?
- Out Of Gamut Colors
- Where Is Gamut Mapping Used?
- Gamut Optimization
- Color Gamut Dependency On Technology, Primaries, Dot Gain, Media, Halftoning, UCR/GCR, Ink Coverage, Viewing Conditions and Adaptation
- Gamut Mapping Techniques

**COLOR MANAGEMENT**

- Device Characterization & Calibration
- Principle Of Color Management
- Device Profile
- ICC Approach On Color Management
- Element Of An ICC Printer Profile
- Profile Connection Space
- Color Management At The System & Document Levels
- Color Data Transformations Within The Color Management Workflow
- Reproduction Intents (Colorimetric, Perceptual & Saturation)
- ColorSync Color Management Framework
- Alternate Solutions To ICC Approach: sRGB Color Encoding
- Advantages/Limitations Of The sRGB Approach

12:00 Noon            Lunch  
**Program Continued on Next Page**

**VIEWING CONDITIONS**

- Appearance Of Color
- Reference Viewing Conditions
- Color Difference In The Reference Viewing Conditions
- Matching Color Between Reproductions
- Perceptual Gamut

**COLOR QUALITY FACTORS IN COLOR REPRODUCTION**

- Color Quality Evaluation
- Role Of Test Images
- Creating/Selecting Test Images
- Reproduction Technology
- Resolution/Addressability
- Contrast Ratio
- Modulation Transfer Function
- Contrast Sensitivity Functions
- Maximum Luminance
- Primaries
- Flare
- Halftoning
- Graininess
- Sharpness
- Smoothness
- Tone Reproduction
- Optimizing Color Gamut
- Color Layer Interference
- Gamut Mapping
- Color Management
- Viewing Conditions
- Conclusions



Don Franz - Photofinishing News



George Gibson, Xerox, leading discussion group



Marco Boer  
I. T. Strategies



Prof. Avi Marmur  
Technion



Dr. Gabriel Marcu  
Apple



Robert Palmer  
InfoTrends

**Color & Color Management Course Leader**

**Dr. Gabriel Marcu, Senior Scientist, ColorSync Group, Apple Inc., Cupertino, California**

Dr. Gabriel Marcu is Senior Scientist in the ColorSync Group at Apple Inc. This tutorial course is an illustration of his experience acquired in developing software drivers for ink jet printers, designing and programming color applications on color analysis, 3D visualization of color spaces, color classification, halftoning and gamut mapping. Dr. Marcu has taught seminars on color computing for Shizuoka University, Japan, University of California at Berkeley, IS&T/SPIE's Electronic Imaging; on color quality in desktop printing for IS&T/SID's CIC, PICS' and NIP and on Color & Color Management for IMI and IMI Europe.

**Digital Printing Summer Camp Leaders**



Mike Willis  
Pivotal Resources



Dr. Alan Hudd  
Xennia



Dr. Natasha Jeremic  
Xennia



John E. Shane, InfoTrends



# Managing Product Development for Value™

Sugarloaf Mountain Hotel  
Carrabassett Valley, Maine

**July 30-31, 2009**

More and more one hears bad business news; markets plummeting, people losing their jobs, companies in trouble. Some companies we have known as icons have lost their luster; many have scaled back the resources they have devoted to new product development. Some have ceased to exist. History shows us however that these troubled economic times present a significant opportunity for innovation. The best companies today recognize that in crisis there is opportunity and are looking for those key investments which will ensure their prosperity. Those of us involved in the creation and maturation of new technologies have a distinct opportunity. We are in a position to help identify those opportunities and investment options. But how will we identify the right ones? In general new product success rates are alarmingly low. **At this critical time we need a framework that will give us an edge. That is the true core of this course.**

The unique course, **Managing Product Development for Value™** is an integrated system of lecture and case based teamwork that will help you learn how to choose a better mix of new product development projects to maximize their chance of success and to maximize their value. This course is designed primarily for research and product development professionals who are trying to increase the value that their firms derive from new product development efforts. You will learn an integrated approach to product development that focuses the entire process around three fundamental questions:

- How Will You Identify & Create Customer Value?
- How Will You Deliver That Value to Those Customers?
- How Will You Extract some of That Value for Your Firm?

Case study and team based exercises address corporate new product development environments and entrepreneurial opportunities as well as process and product improvements. The course develops your fundamental skills for the entire chain of steps required for successful innovation. This full process focus will improve your ability to identify new product or service opportunities that will have the largest payoff for your organization.

Helping to make the lessons most relevant to the challenges you face day to day, the course integrates the lecture with a participative teamwork based on a new product development simulation centered on the new product development challenges faced by a fictitious company in our industry. This case based learning method deepens your understanding of the techniques by providing an opportunity to use the techniques right away. Consolidating your learning in this manner also improves your ability to quickly begin applying the lessons when you return to your organization.

## Thursday, July 30, 2009

12:00 Noon Registration

1:00 p.m. **Opening Session**

### WELCOME

Alvin G. Keene, President, Information Management Institute, Inc., Carrabassett Valley, Maine

**INTRODUCTION** to each other, statement of goals & expectations and course overview

**MARKET SIZING & SEGMENTATION:** Learn a number of fundamental ways in which market sizing & segmentation are done & how to use that information to guide new product development

**INTRODUCTION TO THE CASE & 1<sup>st</sup> TEAM EXERCISE:** Consolidate your knowledge of the techniques by sizing and segmenting the market for a novel product presented in a case format

**TEAM REVIEW:** See how the different teams approached this exercise, compare and contrast the groups' results

**OPTIMIZING THE OFFERING:** Learn how to maximize the value possibilities of your product by engineering the entire customer experience

**CUSTOMER VALUE MODELING:** Learn techniques to model customer value

**2<sup>nd</sup> TEAM EXERCISE:** Consolidate your knowledge of the techniques by structuring an offering for the product and modeling the customer value created by the offering you began to explore in the first case

**TEAM REVIEW:** See how the different teams approached this exercise, compare and contrast the groups' results

5:30 p.m. Reception

## Friday, July 31, 2009

7:30 a.m. Breakfast

8:30 a.m. **Session 2**

**MARKET PENETRATION:** Learn to model the penetration of new products

**COSTS AND RISKS:** Learn a systematic approach to product development and delivery as well as the other costs material to the return

**ECONOMIC RETURNS:** Learn to calculate a variety of measures of economics

**3<sup>rd</sup> TEAM EXERCISE:** Consolidate your knowledge of the techniques by calculating the financial returns for the offering you began to explore in the first case

**TEAM REVIEW:** See how the different teams approached this exercise, compare and contrast the groups' results

**Program Continued on Next Page**

## Why the Managing Product Development for Value™ Course?

IMI is committed to helping people get the information they need to be successful at innovation in the digital imaging industry. Much of that required information centers around technology – **BUT Technology Alone Is NOT Enough!**

The brilliant and innovative technology that seems to hold enormous potential often quickly disappears because one or more of the other steps in the commercialization process was executed poorly. Unfortunately, this statement has nearly become a cliché.

Of the roughly 10,000 new products that are likely to be introduced this year, a majority of them will not last a single year. If history is a guide, within 3 years approximately 80% will have failed. IMI has a long history of helping people get the technology right. Continuing our commitment to facilitate innovation, we are now offering a course that will teach you to apply a product development methodology to your technology in a way that maximizes your chances for commercial success.

David Packard famously observed, "Marketing is too important to be left to the marketing department." This is just the tip of the iceberg. In order to maximize your chances of success in innovation you need to be knowledgeable about all of the steps required to get from great idea to the profitable creation of customer value. Not that you should be your company's subject matter expert in all of the diverse disciplines that are required, but you must be a smart customer for those who own the other pieces of the innovation chain. You must know:

- What Questions Need to be Answered?
- What Are The Strengths & Weaknesses Of Those Tools?
- What Path Is Most Likely To Succeed?
- What Are The Primary Tools Used To Get Those Answers?
- How Do You Sort Out Optional Paths?

This unique **Managing Product Development for Value™** course will provide you the information you need to forge the link between success in technology and successful innovation.

## Program Continued

12:00 Noon Lunch

1:00 p.m. **Session 3**

**GOING FORWARD:** Learn methods of implementing plans for managing product development for maximum value

**ACTION PLAN DEVELOPMENT:** Develop a plan to begin using what you have learned when you go home

**ACTION PLAN SHARING:** Share Developed Action Plans

**COURSE REVIEW & EVALUATION:** Discuss **Managing Product Development for Value™** Course, methods of achieving desired results and the real life process of implementing course results in your work environment

4:00 p.m. Adjournment

### Managing Product Development for Value™ Course Leader

**George A. Gibson, Program Manager, Novel Ink Jet Platforms, Xerox Innovation Group, Xerox Research Center, Webster, New York**

Mr. Gibson has led research, development & manufacturing organizations involved in non-impact printing for over 20 years. Originally trained as a chemist, he did his undergraduate and graduate work at Binghamton University. He also holds an MBA from the Univ. of Rochester's Simon Graduate School of Business. He holds 52 patents and has written more than 20 published papers in imaging and colloid science and the management of research & development. George is a frequent lecturer in imaging technology, R&D productivity, portfolio management and technology evaluation. Over the past year he has presented a series of lectures on product development related topics including:

- "Dreaming with your Customers: Link Product & Service Development & your Customers" presented at the PDMA/IIR Linkages Conference
- "Creative Destruction: Portfolio Renewal Rate & Returns Optimization" presented at PDMA/IIR Portfolio Management for Products & Services Conference
- "Good/Fast/Cheap in New Product Development - Don't Settle for Just Two" presented at the American Society for Quality (ASQ) Reliability Division

Mr. Gibson is also the author of a forthcoming book "**Finding the Golden Eggs: An R&D Professional's Guide to Managing New Product Development Through Valuation.**"

### Don't Miss IMI's Other Upcoming Programs

#### **Ink Jet Academy: Practice of Ink Jet Technology**

June 15-18, 2009 & October 19-22, 2009  
Letchworth, UK

#### **6th Annual Security Printing Conference**

Fall, 2009

Dates & U.S. Location to be Announced

#### **Ink Jet Academy: Theory of Ink Jet Technology**

November 2-3, 2009

#### **17th Annual European Ink Jet Printing Conference**

November 4-6, 2009

Barcelona, Spain

#### **Ink Jet Academy: Theory of Ink Jet Technology**

February 1-2, 2010

#### **13th Annual Toner Printing Conference**

February 1-3, 2010

#### **21st Annual Thermal Printing Conference**

February 1-3, 2010

#### **19th Annual Ink Jet Printing Conference**

February 4-6, 2010

Chandler (Phoenix), Arizona

## Digital Printing Markets - Course Leaders

**Marco Boer, Vice President, I.T. Strategies, Hanover, Massachusetts**

Marco Boer is recognized as a trusted consultant to the digital printing industry. He has a reputation for being able to put complex information and concepts into a context that is easily understood by his audience. With more than 20 years of experience advising and guiding senior executives of Fortune 1000 and smaller innovative companies to successful business solutions in emerging digital printing markets, he has developed an extensive network of industry contacts in both the printing and investor community. He focuses on product planning for graphics, transaction, and publishing printers and emerging industrial digital printing applications such as label printing, packaging, printing & other non-document applications. During his tenure in the industry he has concentrated on researching applications and sizing markets for ink jet and laser printing technology, and has been a proponent for the use of digital color printing in business and industrial applications.

Prior to joining I.T. Strategies, Mr. Boer was manager of IDC's Printer Market Research service. Prior to IDC, Mr. Boer was a senior printer analyst at BIS Strategic Decisions. He holds a BS in marketing and international business from the Univ. of Maryland.

**Don Franz, Group Publisher, Photofinishing News International Media Group, Bonita Springs, Florida**

Don Franz has been involved with the photograph & photofinishing industry as an analyst/reporter/consultant for 38 years, covering both the amateur/consumer and professional segments. As Group Publisher of the Photofinishing News International Media Group, he is responsible for both the Asia and International Editions of Photo Imaging News, the various published reports and the Syndicated Photo Market Forecasting Service with market estimates from 2000 and forecasts out to 2013. He also writes for several international photoimaging industry publications, and has been involved in most of the International IS&T Symposia on Photofinishing Technology and Marketing, organized European Photofinishing Symposia, and has spoken to numerous professional groups in the U.S.A, Europe, India, Japan, China, Australia, and South Africa. He frequently travels to international destinations to study the local/regional markets.

**Robert Palmer, Director, Printer Research, InfoTrends, Inc., Weymouth, Massachusetts**

As Director of Printer Research for InfoTrends' Office Document Technologies Group, Robert Palmer leverages his knowledge and expertise to provide product coverage; trend analysis; primary market research; and hardware, channel, and service and supplies forecasts for the Digital Peripherals Consulting Service. He also attends speaking engagements and contributes coverage of events. Mr. Palmer is recognized as a leading consultant and industry analyst for the consumer and office printing markets. He is a frequent speaker at major industry conferences around the world, and is frequently quoted or published in industry trade magazines and leading business publications, including the Wall Street Journal, Forbes, and Business Week.

Mr. Palmer has over 17 years of experience in the printer and office equipment industry, with a broad background in printing and imaging technology. Prior to joining InfoTrends, he served as Director of Lyra Research's Digital Photography Advisory Service. Prior to that, he was Managing Editor of Lyra's Hard Copy Observer newsletter. In this capacity, he was responsible for researching and writing about a broad range of digital imaging products and markets.

**John E. Shane, Director, Communication Supplies Consulting Service, InfoTrends, Inc., Weymouth, Massachusetts**

John Shane is a leading industry expert on marking materials such as toner, OPC, inkjet ink, and cartridges. As a Director for the Communication Supplies Consulting Service, Mr. Shane is responsible for all forecasts, research reports, consulting, and client care concerning those topics. He is a well-known authority on all-in-one toner cartridges, the cartridge recycling industry, and the world toner industry. In addition, he has conducted extensive research following similar trends related to inkjet cartridges, refills, and compatibles. Having consulted on these markets since 1988, Mr. Shane is a frequent expert presenter at industry conferences and trade events.

Prior to joining InfoTrends, Mr. Shane spent seven years at BIS Strategic Decisions, where he served as an Analyst as well as Director of the company's Hard Copy Supplies Service. He also served as a Consultant for International Data Corp. (IDC) and a Site Manager of a consumer research center within the U.S. Testing Company. Mr. Shane holds a B.A. Degree (Cum Laude) in Marketing and an M.B.A. Degree from the University of Massachusetts at Amherst.

## REGISTRATION INFORMATION: IMI's Digital Printing Summer Camp 2009



### Registration Fees:

\$1095 per registrant per course

\$995 for second person and each additional registrant from same company to same course or for same registrant to additional courses when registered as a group.

The registration fee for each course includes attendance at all course sessions, all scheduled meals shown in the program agenda, coffee breaks and the course reference binder.

Cancellations will receive a 100% refund if made 72 hours prior to the start of the program. Substitutions may be made at any time. Cancellations made less than 72 hours prior to the start of the conference will be charged a \$300 cancellation fee.

To register for IMI's **Digital Printing Summer Camp 2009**, submit the registration form below with payment to Susan Meldrum, Conference Administrator, Information Management Institute, Inc., 1106 Valley Crossing, Carrabassett Valley, ME 04947 USA. You may reserve space by calling +1-207-235-2225, sending a fax to +1-207-235-2226 or by sending an email message to [imi@imiconf.com](mailto:imi@imiconf.com) or visiting our web site [www.imiconf.com](http://www.imiconf.com)

### Registration Form

**Ink Jet Academy: Theory of Ink Jet Technology**  
**July 27-28, 2009**

**Digital Printing Markets**  
**July 27-28, 2009**

**Ink Jet Ink Manufacturing**  
**July 29-30, 2009**

**Surface Tension, Wetting & Capillarity**  
**July 29-30, 2009**

**Color & Color Management**  
**July 30-31, 2009**

**Managing Product Development for Value**  
**July 30-31, 2009**

Mr. \_\_\_ Ms. \_\_\_ Miss \_\_\_ Mrs. \_\_\_ Dr. \_\_\_

NAME \_\_\_\_\_

JOB TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

COUNTRY \_\_\_\_\_

PHONE \_\_\_\_\_ FAX: \_\_\_\_\_

EMAIL \_\_\_\_\_

Invoice Me  Send Credit Card Authorization Form

### HOTEL INFORMATION

IMI's **Digital Printing Summer Camp 2009** is being held at the Sugarloaf Mountain Hotel located at the Sugarloaf Ski Area base village. The 120 rooms and suites offer modern comfort in natural splendor and appeal of the Western Maine Mountains.

Hotel reservations are the responsibility of each registrant. **Early booking is advised as the reduced rate is guaranteed only until July 7, 2009.** Phone +1-800-843-5623 or +1-207-237-2000 (Ask for Sugarloaf Mountain Hotel Reservations) to make hotel reservations.

To receive the special meeting rate of \$89 (single or double occupancy) in alcove room or \$99 (single or double occupancy) in superior queen room, you must refer to the Information Management Institute, Inc. group.

Reservation agents can also provide information on suites and condominium accommodations available throughout the resort.

All Sugarloaf Mountain Hotel rooms are air conditioned. Complimentary high speed internet access is available in the Sugarloaf Mountain Hotel. The Sugarloaf Sports and Fitness Center, outdoor pool and tennis courts are also available for guest use at no additional charge. Outdoor recreation possibilities such as golf, hiking, canoeing, mountain biking, rafting, moose watching, etc. abound in the area.

All checks should be in U.S. dollars drawn on a U.S. bank and made payable to Information Management Institute, Inc. An invoice with bank transfer details for IMI's U.S. or European bank account will be provided upon request.



The Sugarloaf Mountain Hotel address is

**Sugarloaf Mountain Hotel**  
5092 Access Road  
Carrabassett Valley, Maine 04947  
Phone: 207-237-2000 Fax: 207-237-2874  
[www.sugarloaf.com](http://www.sugarloaf.com)  
Go to Vacation Planning - Lodging