Short Course on

Imaging System and Illumination Design

Wednesday, 02 FEB 2012, 8:40am TO 5:30pm

Venue: NTU, Fusion@MAE (N3.1-B3c-06), NTU (Map)

Introduction

About 40-50 years ago the very first projection lithography systems were built on the basis of photographic lenses. Until then optical projection lithography has dramatically evolved and today employs the most advanced optical imaging systems in the world. . The course will then focus on fast optical imaging lenses, which will in the end lead to the design of projection systems as used in lithographic systems.
Illumination systems are hidden enables for the usage of high performance imaging systems. However until today imaging and illumination design are separate worlds in the optical design community. The nomenclature, the optimization and simulation tools, as well as the design rules are completely different. This goal of this course is to give an introduction into the world of illumination design

About the Speakers

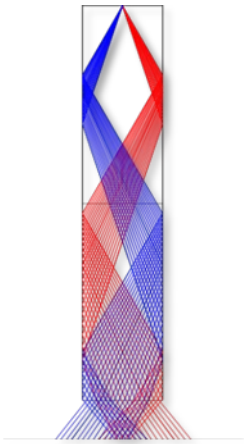
Prof. Dr. Alois Herkommer teaches optical design and simulation at the Institute for Technical Optics (ITO) at the ***University of Stuttgart*** since 2011. During his prior work at Carl Zeiss he gained more than 14years of experience as an optical designer: He worked on the design of high performance projection lenses, metrology and laser systems and later headed the optical systems design group at the ***Carl Zeiss SMT GmbH***. His main research focus is the optical design of complex imaging and illumination systems for industrial and medical applications, as well as design methods.

Dr. Fan Hua obtained his Ph.D from Xi'an Jiatontong university, China, major in optics and instrumentation. Prior working experience includes Research Fellow in ***Nanyang Technological University,*** Research Fellow in Singapore Institute of Manufacturing Technology **(SIMTech)** and Senior Optical designer in ***QIOPTIQ***. Currently he is the principal designer of ***Wavelength Technology***. His main research area is the precision optical measurement, optical vision inspection and optical design of imaging and laser optics for industrial and defence applications.

Mr.K.Vijaya Mohan Raj studied Master of Science and technology in Engineering Physics with specialization in Photonics from ***National Institute of Technology, Warangal.*** He was working as Senior Technical Support Engineer in ***Wavelab Scientific Pte Ltd***, Singapore. He worked on projects of 2000X High Photovoltaic Concentrators using Zemax software, Organic Solar cell, laser scribing, increasing the extraction efficiency of Small Molecular Organic Light Emitting Diode in ***Moser Baer India Limited***. He worked on design of LED street light, Panel Light, Down lighting, High Bay lighting in Varroc Engineering Private Limited and ***Greenstar Engineering*** Private Limited.

Programme

8:30 am	**Registration**
8:50 am	**Welcome Address** **OPSS Chair/WAVELAB CEO**
9:00 am – 12:00pm **Morning Session** **Tea&Coffee Break** **10:45 – 11:00am**	**Imaging System Design—From Camera Lens To Microlithography** <u>Abstract</u> The course follows along this path and guides the audience from the design principles of photographic lenses towards high performance lithographic projection systems. After a short general introduction into the optical design of imaging systems, various types of photographic lenses such as triplets, double-gauss objectives, telescope and wide angle lenses are explained. The performance, limiting aberrations and design rules are discussed. Moreover refractive and reflective systems are illustrated. **<u>Structure of the course First Part</u>** ***(Conducted by Prof Alois)*** - General introduction in imaging design. Performance measures. - Types of photographic lenses: Triplet, Double Gauss, Telephoto, Wide-angle. - Limiting aberrations and their correction. - Refractive and reflective system. - Fast non-vigentted imaging systems & projection systems. - Evolution and architecture of lithographic projection lenses. **<u>Second Part</u>*(Conducted by Dr Fan Hua)*** - Imaging lens design process - Optimization - Performance Analysis and diagnose - Tolerancing analysis - Lens design examples - Telescope design - Zoom lens design - Infrared imaging lens and design
	Lunch

2:00-5:00pm Afternoon Session **Tea&Coffee Break** **3:45 – 4:00pm**	**Illumination Design-Mixing Rods And Optical Arrays** Abstract  Starting from basic photometric relations, illumination design rules and performance measures are introduced. After this introduction the two most important tasks in illumination design are discussed: a) efficiently transporting radiation from the source to the target, and b) homogenizing the light distribution at the target. For the first task basic strategies and limitations are discussed, employing the concept of phase space. For the second task the most commonly used homogenizing elements in illumination design are discussed: mixing rods and optical arrays. Design rules for the use of such elements are presented and limiting effects are discussed. At the example of flexible illumination systems for lithography, the architecture and benefit of complex illumination systems are explained. The course is suited for beginners in illumination design, however some background in general optics and optical design is helpful. **Structure of the course Frist Part(*Conducted by Prof Alois*)** - General introduction in photometry and radiometry. - Introduction in phase space optics and connection to illumination design. - Operation principles and limitations of mixing rods and optical arrays - Design and application examples - Flexible illumination systems **Second Part(*Conducted by Mr Vijay*)** - General introduction in radiometry and photometry - Source Models: IESNA and Eulumdat Models - Design of Freeform Lens - Light Pipes - Parabolic Concentrator - Compound Parabolic concentrator - LCD Backlighting

Who Should Attend

R&D Managers, Optical engineers, Laser engineers, system engineers, photonics professions, Lecturers. Some knowledge of Optics is required to fully appreciate the course

Organizer Introduction

OPSS

The Optics and Photonics Society of Singapore is a spin-off from the original Singapore Chapter of SPIE which is no longer in existence. With Optics and Photonics making inroads into virtually all areas of science and engineering, this society will provide a forum for discussion and growth among the various multidisciplinary groups within academia, research institutes and industry

Wavelab Scientific

Wavelab Scientific is the regional Photonics software and hardware provider in most Asian region. We distribute major brands that are reputable global market leaders in their respective fields. These names include Radiant ZEMAX Inc.Cambridge Technology, Sill Optics, laser components, Photon Design etc
Company objective is to enhance customer satisfaction & achieve Continuous Improvement of the management system. We strive to meet and exceed customer requirements at every time and all the time.

The Centre for Optical & Laser Engineering (COLE)

COLE aims to be a research centre where cutting edge research in the area of Optical Engineering that is currently dispersed in the School will come under one roof. The strong pool of qualified researchers would contribute to manpower and talent development to address the growing needs of this sector. This will also provide one stop shop for industry interaction through projects and consultations. The centre hopes to attract leading researchers and scientists from around the world for collaborative projects, short courses and conferences and seminars. It would thus be a magnet for budding optical engineers starting from the High School and Polytechnics to undergraduates to choose a career in Optical Engineering.

Cost and Registration (20% discount for OPSS member and 2 or above registrations from same organization)

Name:		Phone:	
Email:		Fax:	
Company:		Mobile:	
Address:			

Course	Dates	Your Registration	Cost (SGD)
Imaging System and Illumination Design	02 Feb 2012		490 exclusive GST

Please send this form to training@wavelab-sci.com or fax to +65 65649627

Contact Us

For technical enquiries, please contact: email: info@wavelab-sci.com, telephone: 65643659 ext 102 mobile: 97885542,