OPTICS & ENERGY CONCEPTS

OEC

Agenda

5th Optics-Design Symposium – Workshop and Lectures
Forum am Deutschen Museum, Munich/October 7, 2005

Workshop

09:30 **Optics-Design Live - Discuss with us all Steps of the Design Process!**
Prof. Dr. Harald Ries (Chairman of the Supervisory Board and Chief Scientist, OEC AG; Physics Department, Philipps-University, Marburg)

We start with a rather simple and universal task: to design a condenser consisting of a single lens element for a finite size light source. First we study fundamental physical laws such as the conservation of étendue, Snell' s Law and the principle of equal optical path length as well as the implications these principles have for our example. We shall learn how to assess the feasibility of desired features based on the above - how to define feasible specifications. Then we will explore a selection of imaging and non-imaging design venues and visualize the corresponding design. Finally we shall learn how to verify the design as well as to assess various manufacturing errors and we will discuss other technical issues such as color uniformity etc. During the entire design process we will use various optics design- and analysis programs and calculation software tools.

Calculations are presented live - this gives us the possibility to react to all questions and to adapt the workshop to the interests of the audience!

All participants are invited to discuss with us all steps of the optics design process!

(includes 15 minutes break)

12:00 lunch

Lectures

13:30 **Possibilities and Challenges of Injection Molded Optics**
Dr. Stefan Bäumer (Senior Optical System Designer, Philips Applied Technologies)

An overview on current state of the art injection molding technologies is given. Special attention is paid to the interfaces between design, manufacturing and testing.

14:05 **Applications of Tailored Surfaces for Future Space Interferometers**
Christoph Voland (Project Manager for Optical Engineering, Contraves Space AG), Julius Muschaweck (CEO, OEC AG)

Tailored surfaces give opportunity to improved performance of optical systems. In particular, the requirements for optical systems of future space missions demand performance close to the physical limitations. We present an application of tailored surfaces for building beam-shaping optics that shall enhance fiber-coupling performance as core part of a space based interferometer in the future DARWIN mission. After having assessed the theoretical background and the feasibility of manufacturing it is intended to build a proof of concept demonstrator to evaluate the achievable performance of such an optical system.

14:40 break

15:10 **The SMS Method of Design of Free-Form Optical Surfaces**
Prof. Dr. Juan-Carlos Miñano (Chief Scientist LPI; Universidad Politécnica de Madrid, CEDINT, ETSI Telecomunicación)

A reflecting surface is enough to transform a spherical wave into a plane wave within the framework of geometrical optics. This surface is the well known parabolic reflector which is one of the Cartesian ovals, Levi-Civitta generalized the result proving that a single deflecting surface (which can be refractive or reflective) is enough to transform a wavefront into another wavefront, being both wavefronts quite arbitrariy chosen. As a step further in this direction, the Simultaneous-Multiple-Surface (SMS) design method has proved that, in general, 2 surfaces are enough to transform two orthotomic ray sets into another two. The idea can be generalized to more couples of wavefronts. The method provides an optical system with at least two free-form surfaces that deflect (by refraction or by reflexion) the rays of the input bundles into the rays of the corresponding output bundles and vice versa. We present here an overview of the method and show some application examples.

15:45 **Lessons in Optical Engineering: The Florida Image Slicer for Infrared Cosmology and Astrophysics (FISICA)**
by Dr. Kevin Thomson (Vice President of the Optical Engineering, Optical Research Associates) presented by Bruce Irving (Manager of International Distribution, Optical Research Associates)

Based on concepts developed by David Content, “image slicing” refers to a technique for slicing up a two-dimensional image in real-time, feeding these slices through a spectrometer slit, and then recreating a 3-D spatial/spectral data cube. This talk describes the development and implementation of an integral spectrometer based on this technique by the FISICA team.