

AOMATT CHINA 2008

The 4th SPIE International Symposium on
Advanced Optical Manufacturing and Testing Technologies



中国光学学会
The Chinese Optical Society



中国科学院光电技术研究所
THE INSTITUTE OF OPTICS AND ELECTRONICS
THE CHINESE ACADEMY OF SCIENCES



The International Society
for Optical Engineering



Technical Program

Chengdu China
19-21 November 2008

AOMATT 2008 Daily Event Schedule General

<i>Date</i>	<i>Time</i>	<i>Content</i>	<i>Place</i>
TUE. Nov. 18, 2008	9:00-22:00	Registration	Lobby of Wufu Buldoing of Chengdu Wang Jiang Hotel
Morning WED. Nov. 19, 2008	8:30-8:50	Opening Ceremony	Auditorium of Chengdu Wang Jiang Hotel
	8:50-12:30	Plenary 1-6	Auditorium of Chengdu Wang Jiang Hotel
<i>Lunch Time</i>			
Afternoon And Evening WED. Nov. 19, 2008	13:30-17:10	Session 1-1 Session 2-1 Session 3-1 Session 4-1	Conference room1 Conference room2 Conference room3 Conference room4
	18:30-20:30	Welcome Banquet	Banquet Hall of Chengdu Wang Jiang Hotel
Morning THU. Nov. 20, 2008	8:30-12:10	Session 1-2 Session 2-2 Session 3-2 Session 4-2	Conference room1 Conference room2 Conference room3 Conference room4
Afternoon And Evening THU. Nov. 20, 2008	13:00-17:00	Post Presentation Workshop On New products and technology	Auditorium 1 and 2 Chengdu Wang Jiang Hotel
	18:30-20:30	Closing Ceremony	
FRI. Nov. 21, 2008	The whole day	Touring around City of Chengdu	
SAT. Nov. 22, 2008	The conference closing		After Nov. 22, 2008 Self Payment Touring

AOMATT²⁰⁰⁸

The 4th SPIE International Symposium on

Advanced Optical Manufacturing and Testing Technologies

19-21 November 2008

**Wang Jiang Hotel
Chengdu China**

Sponsored by:

COS - The Chinese Optical Society

IOE - Institute of Optics and Electronics,
- Chinese Academy of Sciences

SPIE - The International Society of Optical Engineering
- (*Technical Co-Sponsor*)

Supported by:

Ministry of Science and Technology of China

Chinese Academy of Sciences (CAS)

National Natural Science Foundation of China

Honorary Chair:

WANG Daheng, Academician, CAS & CAE (China)

Symposium General Chair:

ZHOU Bingkun, President of Chinese Optical Society
(COS), Academician, CAS

Four Conferences:

1 Large Mirror and Telescopes

2 Advanced Optical Manufacturing Technologies

**3 Optical Test and Measurement Technology
and Equipments**

**4 Design, Manufacturing and Testing of Micro
and Nano Optical Devices and Systems**

AOMATT 2008

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Technical Program

Advanced Optical Manufacturing and Testing Technologies

19-21 November 2008

Chengdu China

INVITATION

Dear Authors and Friends!

After the world known earthquake in May 12, 2008 in Wenchuan of Sichuan, the city of Chengdu is still more beautiful full of smooth and steady, the 4th International Symposium on Advanced Optical Manufacturing and Testing Technologies will be no any change following the initial schedule to be held in Chengdu in Nov.19-21, 2008.

Advanced optical manufacturing and testing technology has become an important interdisciplinary field between optical sciences and manufacturing sciences. They are closely associated with technologies development of information, bioscience, materials and nano technologies. At the same time, optical manufacturing has been developed into a new huge global high tech. business. So that the international symposium of AOMATT has become more and more popular time by time in domestic and abroad.

On behalf of the organization committee of the symposium, I would like sincerely to invite you to participate in the AOMATT08 and to submit your abstracts and manuscripts to the conference in time. Your submitting is a kind support not only to the conference but also to the Afflicted Area of Wenchuan Earthquake some how and some what. We believe that Chengdu and also the successful symposium of AOMATT08 will leave you a pleasant and impressive memory.

We are looking forward to meeting you at the symposium in Chengdu.

Sincerely



Prof. ZHANG Yudong
Chairman of the Organization Committee of AOMATT08
Director of the Institute of Optics & Electronics, CAS

AOMATT 2008 Technical Program Organizations & Committees

Sponsored by:

COS - The Chinese Optical Society



中国光学学会
The Chinese Optical Society

IOE - Institute of Optics and Electronics, Chinese Academy of Sciences



中国科学院光电技术研究所
THE INSTITUTE OF OPTICS AND ELECTRONICS
THE CHINESE ACADEMY OF SCIENCES

SPIE - The International Society of Optical Engineering (*Technical Co-Sponsor*)



**The International Society
for Optical Engineering**

Cooperating Organizations:

- Committee of Optical Manufacturing Technology, COS
- State Key Lab. of Opt. Tech. for Microfabrication (China)
- SOS - Sichuan Optical Society

Supported by:

- Ministry of Science and Technology of China
- Chinese Academy of Sciences (CAS)
- National Natural Science Foundation of China

Honorary Chair:

WANG Daheng, Academician, Chinese Academy of Sciences and Chinese Academy of Engineering (China)

Symposium General Chair:

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CAO Jianlin, Vice Director, Ministry of Science and Technology of China

ZHANG Yudong, Director of the Institute of Optics and Electronics (IOE), Chinese Academy of Sciences

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Edgar Bader, Lithographic Optics Division, Carl Zeiss SMT AG (Germany)

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Jim Burge, University of Arizona (USA)

David D. Walker, University College Landon (U.K)

Yoshiharu Namba, Chubu University (Japan)

Hexin Wang, Optical Technology Carl Zeiss AG (Germany)

Masaomi Kameyama, Nikon Corporation (Japan)

WU Fan, Institute of Optics and Electronics, CAS (China)

Rongbin Li, Hong Kong Polytechnic University (Hong Kong)

Tadashi Hatano, Tohoku University (Japan)

LI Jingzhen, Shenzhen University (China)

Mike DeMarco, QED Technologies (USA)

James R. Torley, University of Colorado (USA)

LI Xiaoping, Shanghai Micro Electronic Equipment Co Ltd China)

Robert Smythe, ZYGO Corporation (USA)

Richard Freeman, ZEEKO Ltd (UK)

Gaven F. Chapmam, Moore Precision Tool (USA)

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QIN Yuwen, Natural Science Foundation of China, Co-Chair

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Myung K. Cho, NOAO, (USA) Co-Chair

Bernard Delabre, ESO (Germany)

YU Huadong, Changchun University of Science and Technology (China)

Magomed A. Abdulkadyrov, Lytkarino Optical Glass Factory (Russia)

Jose M. Sasian, University Arizona (USA)

Ming liu, Institute of Microelectronics, CAS (China)

XIN Qiming, Beijing Institute of Technology (China)

LI Wei, Chengdu Fine Precision Optical Engineering Research Centre (China)

Paul Klocek, ELCAN Optical Technologies (USA)

YU Jingchi, Suzhou Univ. (China)

CHENG Xuemin, Tsinghua University (China)

ZHANG Xuejun, Changchun Institute of Fine Mechanics and Physics, CAS (China)

Mary G. Turner, InfoTek Information Systems (USA)

Han Changyuan, Optical Testing Technology Committee, COS (China)

Masahide Katsuki, Toshiba Machine Co. Ltd (Japan)

Liang Ying Chun, Harbin Institute of Technology (China)

Matthias Pfaff, OptoTech Optikmaschinen GmbH (Germany)

Michael Sander, Satisloh GmbH (Germany)

Thomas Danger, Schneider GmbH (Germany)

Mike Conroy, Taylor Hobson Limited (England)

Secretary General of the Symposium:

YANG Li, Committee of Optical Manufacturing Technology, COS

Jinxue Wang, SPIE Technical Advisor (USA)

Symposium General Chair:

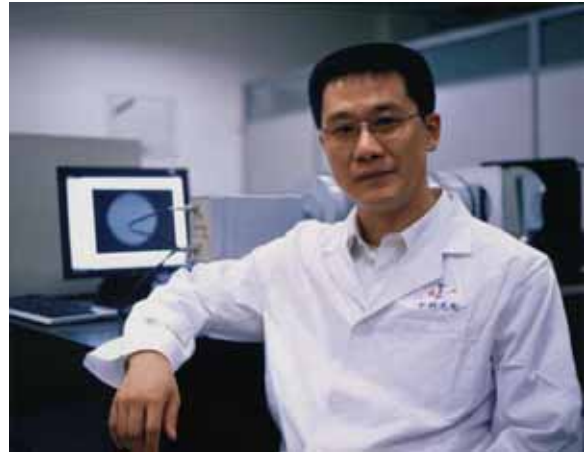


Prof. Zhou Bingkun, President of Chinese Optical Society (COS), Academician, Chinese Academy of Sciences

Prof. Zhou Bingkun was born in Sichuan, China in 1936. He graduated from Tsinghua University, Beijing, China in 1956. Since 1956 he has been with the Electronic Engineering Department at the same University. From 1960 to 1962 he was a visiting scholar at Leningrad Electrotechnical Institute, Leningrad, former USSR. From 1983 to 1984 he was a visiting scholar and then professor of Applied Physics Department, Stanford University, U.S.A. From 1985, he has been a professor of Electronic Engineering Department at Tsinghua University, Beijing, China. He was elected as a member of Chinese Academy of Sciences in 1991 and was elected as a member of the Third world Academy of Sciences in 2001. At present he is president of the Chinese Optical Society and vice-chairman of the science and technology committee of Ministry of Education. He was the vice-president of the National Natural Science Foundation of China (1996-2003), director of Information Science Department of CAS (2003-2006), the Chairman of the Steering Committee of Optoelectronic Devices and System Integration Technology, High Technology Research & Development Program of China and the Director of National Research Center for Optoelectronic Technology, Beijing (1987-1996). He is fellow of the Optical Society of America and Chinese Institute of Electronics.

He has been engaged in laser and optoelectronics research and teaching for a long time. In 1984, He made key contributions to development of diode pumped, narrow linewidth and frequency stable Solid State Lasers. He with his research group has made scientific research achievements in the area of "Single Mode, Narrow Linewidth, Frequency-Stable and Tunable External Cavity Semiconductor Lasers"; "semiconductor laser pumped solid state laser"; "fiber ring cavity and their application"; "doped fiber amplifiers and lasers" and "DWDM optical fiber transmission technology". He has won 11 national and ministry-level prizes. He is the author or co-authors of about 100 papers, presentations, patents and one book: "Laser Principle", which was awarded the state excellent prize.

Symposium General Co-Chair:



Dr. ZHANG Yudong, President of Institute of Optics and Electronics, CAS (China)

Dr. Zhang Yudong, PhD and Research Professor, President of IOE (Institute of Optics and Electronics), CAS (Chinese Academy of Sciences) is a member of the Appraisal Expert Team of Information Directorate of NSFC (National Natural Science Foundation of China), a vice-chair of Bio-optics and Laser Medicine Subcommittee of COS (Chinese Optical Society), a vice-Chair of Electro-Optical Specialty Committee of Chinese Society of Astronautics, and a committeeman of Quantum Electronics and Electro-Optical Subcommittee of CIE (Chinese Institute of Electronics), an adjunct professor of UESTC (University of Electronic Science and Technology of China) and Zhejiang University respectively.

Dr. Zhang received his BS from Zhejiang University in 1984, his MS from IOE in 1987, and his PhD from Shanghai Institute of Optics and Fine Mechanics, CAS, in 1991. From 1991 to 1997 he held the technical posts of Research Assistant, Research Associate Professor and Research Professor in Fujian Institute of Research on the Structure of Matter, CAS. He has been working in IOE since 1998 and serving as President since 2003.

For more than 10 years, he has carried out many frontier researches in the fields of adaptive optics, microlithography and new materials of non-linear optics and has obtained many innovative achievements which are leading in China or advanced in the world. He has won one first-grade award of CAS Prize for S&T Progress and CAS Prize for Invention respectively. Altogether, he has applied for and obtained 38 pieces of patents, and published more than 50 theses among which 30 are included in EI Database and 10 in SCI Database.

From 1985 to 1987, he participated in the development of Wavefront Correction System with Dither Technology for the ICF (Inertial Confinement Fusion) experiment in China and proposed an adaptive search method for multiple-extreme optimization. It is the first time to successfully apply the adaptive optical technology to laser atomic fusion system in the world.

From 1988 to 1991, he engaged in the development of Submicron Excimer Laser Lithography System, which worked out the first prototype system in China. He successfully developed the precision submicron objective lens which was the core component of the system and obtained two related patents.

From 1991 to 1997, he took part in the research into new nonlinear optical crystal materials and related devices, obtained five national invention patents and won one first-grade award of CAS Prize for Invention.

From 1998 to present, he has been taking charge of the development of the adaptive optical (AO) system for imaging live human eye retina with high resolution. The system is the first practical compact AO system for this application in the world.

He is also in charge of the development of Dynamic Wavefront Correction AO System for the new generation of ICF prototype system in China. It is the first AO system which can reduce the wavefront distortion of laser beam in ICF system from 9λ to about 1.5λ in China. This extends the application of adaptive optics in the ICF field and is at the advanced world level.

AOMATT 2008 Daily Event Schedule

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AOMATT²⁰⁰⁸ Symposium Committees

Morning WED. Nov. 19, 2008

Plenary Presentation

8:30-8:50----Opening Ceremony /Chair: YANG li (Secretary General of AOMATT08)

8:50-12:30---Plenary Presentation

For Session 0-1, Plenary Presentation Order No.1-3 /Chair: Dr.JinxueWang (Vice Secretary General of AOMATT08, Representative of SPIE, USA)/

For Session 0-2, Plenary Presentation Order No.4-6 /Chair:Dr. SenHan (SPIE Fellow,Chair of Conference4 of AOMATT08, USA)

	<i>Order</i>	<i>Time</i>	<i>Presentation</i>	<i>Title of the lecture</i>	<i>Note</i>
Session 0-1	1	8:50-9:25	Dr. Myung K. Cho	Design and Development of the Telescope Optics for the Thirty Meter Telescope (TMT) (USA)	NOAO, U.S.A
	2	9:25 - 10:00	Dr. Eric RUCH	Gran Telescopio Canarias optics: A step towards the Extremely Large Telescope REOSC (France)	SAGEM Défense Sécurité REOSC Department France
	3	10:00 - 10:35	Dr. Mike DeMarco	Sub-aperture Stitching Interferometry(SSi®) and Magneto-rheological Finishing (MRF®) of precision optics from millimeter to multi-meter size	QED,USA
10:35-10:45 Tea Break					
Session 0-2	4	10:45-11:20	Dr. Richard Freeman	A review of the evolving technologies relevant to the production of ultra-precision free-form surfaces.	Zeeko Ltd Unitd Kindom.
	5	11:20 - 11:55	Prof. Fritz Klocke	Advances in Optical Manufacturing Technologies at Fraunhofer IPT	Fraunhofer Institute Germany
	6	11:55 - 12:30	Dr. Masaomi Kameyama	The Evolution of Wavelength Shrinkage in Lithography	Nikon Corporation (Japan)

WED. Nov. 19, 2008---- THU. Nov. 20, 2008 (including chair)

AOMATT 2008 Session Schedule and Session Chair

	<i>Time</i>	<i>Conf 1</i>	<i>Conf 2</i>	<i>Conf 3</i>	<i>Conf 4</i>	<i>Post</i>	<i>workshop</i>
		Room 1	Room 2	Room 3	Room 4	Auditorium 1	Auditorium 2
Nov. 19, 2008	13:30 -17:10	Session 1-1 Chair Prof. Wu Fan	Session 2-1 Chair Dr. Wan Yongjian	Session 3-1 Chair Prof. Wu Shibin	Session 4-1 Chair Dr. Luo Xianggang		
Nov. 20, 2008	8:30 -12:10	Session 1-2 Dr. Chair Fan Bin	Session 2-2 Chair Dr. Zhang Rongzhu	Session 3-2 Chair Dr. Jin Hongwei	Session 4-2 Chair Dr. Yao Jun		
Nov. 20, 2008	13:00 -17:00						New products and technology
Nov. 20, 2008	13:00 -14:00					Poster Preparation	
Nov. 20, 2008	14:00 -17:00					Poster	

**Wednesday
19 November 2008**

**AOMATT 2008
Opening Ceremony**

8:30 to 8:50 am
Auditorium of Chengdu Wang
Jiang Hotel
Chair: Yang Li (CHINA)

**AOMATT2008 Plenary
Talk**

8:50 at to 12:30 am
Auditorium of Chengdu Wang
Jiang Hotel

Chair : Dr. Jinxue Wang (USA)
Dr. SenHan (USA)

P.P. Session 0-1

Chair: Dr. Jinxue Wang (USA)

8:50-9:25 Myung K.Cho

9:25-10:00 Eric RUCH

10:00-10:35 Mike DeMarco

P.P. Session 0-2

Chair: Dr. SenHan (USA)

10:45-11:20 Richard Freeman

11:20-11:55 Fritz Klocke

11:55-12:30 Masaomi Kameyama

Plenary Talk 1

**Design and Development of
the Telescope Optics for the
Thirty Meter Telescope (TMT)**



Dr. Myung K.Cho
National Optical Astronomy
Observatory (USA)

ABSTRACT

The Thirty Meter Telescope Project is a collaboration of the California Institute of Technology, the University of California, and the Association of Canadian Universities for Research in Astronomy. This telescope will be used for research in astronomy at visible and infrared wavelengths and its optical design is a Ritchey-Chrétien. The telescope is a 30 meter diameter f/15 system with a segmented primary mirror (M1); a 3.2 meter diameter, convex secondary mirror (M2); and an elliptical (3.5 meter in major axis and 2.5 meter in minor axis) flat tertiary mirror (M3). These will deliver an f/15 beam to adaptive optic systems and science instruments located on two Nasmyth platforms. This talk will describe an overview of the telescope optical systems (M1, M2, and M3) of TMT. Current design concepts, status of developments, and the optical performances of the telescope optics will be addressed.

BRIEF BIOGRAPHY

Dr. Myung Cho serves as a principal engineer at the National Optical Astronomy Observatory (NOAO). He has been involved in the design and development of the optical telescopes and optical instruments including the Thirty Meter Telescope Project, the Advanced Technology Solar Telescope, the Large Synoptic Survey Telescope, the GEMINI 8m Telescopes, the WIYN 3.5m telescope, Gemini Near Infrared Spectrograph, and a variety of other telescopes and optical systems. Prior to joining NOAO, he was on the faculty at the College of Optical Sciences at the University of Arizona. Dr. Cho also serves as an adjunct professor at the Engineering Mechanics and the College of Optical Sciences. He earned his Ph.D. from the University of Arizona in 1989.

Plenary Talk 2

**Gran Telescopio Canarias
optics: A step towards the
Extremely Large Telescope**



Dr. Eric RUCH
SAGEM Défense Sécurité REOSC
Department France

ABSTRACT

The REOSC High Performance Optics Department of SAGEM Défense Sécurité has been selected by GRANTECAN SA to manufacture the Gran Telescopio Canarias Zerodur primary mirror segments and the lightweighted Beryllium secondary mirror. The first set of six hexagonal, 1,8 m point to point, primary mirror segments has been delivered in March 2004 and the last batch of segments in December 2005. The secondary mirror has been delivered in March 2006. The paper will present the project and the optical requirements of the telescope primary and secondary mirrors. The technology developments that were made in the field of optical manufacturing as well as mechanical and optical metrology will be presented. Final optical performance of the 42 segments of the primary mirror and the secondary mirror will be reported.

Several recent studies have been undertaken to analyze the requirements of the next generation of Extremely Large Telescope optics, in which several hundreds of segments will have to be produced in a limited time frame. Based on the experience gained on the production of the segments of the Gran Telescopio Canarias, we will present the challenges that will face the optical manufacturing community to be able to produce these segments at a rate and a price compatible with the budgets available for the ELT projects.

BRIEF BIOGRAPHY

Eric Ruch is graduate in optical engineering from the Institute of Optics in Paris. He has joined REOSC in 1985, has work in lens design and has been project manager for several space and astronomy projects. Since 2006, he is responsible for the business development for the space and the astronomy

activities of the REOSC department in SAGEM.

Plenary Talk 3

Sub-aperture Stitching Interferometry (SSI®) and Magneto-rheological Finishing (MRF®) of precision optics from millimeter to multi-meter size



Dr. Mike DeMarco
QED, USA

ABSTRACT:

Today's optical designs often call for surfaces with increasingly larger clear apertures, higher numerical apertures, and tighter figure error tolerances. Optics manufacturers are challenged with smaller batch sizes, shorter lead times, and increasing competition from overseas producers: all of this during a period of dwindling optician resources that the industry has relied on for many years. Modern optics shops are transitioning from traditional manufacturing approaches to the adoption of CNC grinding and polishing tools, in particular, deterministic processes such as MRF.

However, the optics finishing process is only as good as the metrology that feeds it. Metrology tools used to measure optical surfaces must keep pace with advances in manufacturing. Commercially available interferometers for optical surface testing are severely limited in the size and numerical aperture of the surfaces they can measure. Furthermore, the accuracy of the measurements is limited by the quality of reference artifacts, or the reliability of complicated absolute calibration methods.

BRIEF BIOGRAPHY

Mike DeMarco, Sales Manager for QED Technologies, has spent his entire career in the fields of precision optics manufacturing and optical system assembly and testing. He has been on QED's Marketing and Sales team since

2001. Prior to joining QED, he managed the Optical Assembly and Test Department for Perkin Elmer and SVG Lithography Systems in Wilton, CT. His academic background includes an MBA degree in Marketing and Operations from the University of Connecticut, and a BS degree in Optical Engineering from the University of Rochester. He is the author of many articles and papers in his chosen fields of interest.

Plenary Talk 4

A review of the evolving technologies relevant to the production of ultra-precision free-form surfaces



Dr. Richard Freeman
Zeeko Ltd
United Kingdom

ABSTRACT

Over the last ten years a number of technologies and additional techniques have emerged to enable the efficient and deterministic production of free-form ultra-precision surfaces. Included in this area of development are ultra-precision grinders, generators, polishers and single point diamond turning machines. These machines must then be supported by free-form metrology solutions as well as new ways to fabricate the near net shape substrates essential for the efficient production of such surfaces. Included here are the precision moulding of glass, techniques for forming ceramics, the use of slumping, electroforming, rapid prototyping, sintering and other precision forming techniques. From these building blocks of technology have appeared production solutions that a decade ago would not have seemed feasible and this paper discusses these solutions and the process chains that they have created. Almost all such processes include the requirement for a near net shape substrate, a precision forming technology, a measurement solution and a finishing technology. The paper examines the

solutions available, as well as some of the latest ones to emerge commenting on where they have been adopted thus far.

BRIEF BIOGRAPHY

Richard Freeman is Managing Director of Zeeko Ltd, a fast growing hi-technology manufacturing company based in the UK. Zeeko Ltd designs, develops and builds machines for the corrective polishing of free-form surfaces as used in high precision optics, precision moulds, orthopaedic implants and components for the tool and die industry. In addition Zeeko has recently introduced a number of metrology products for the measurement of free-form ultra-precision surfaces.

He is a mechanical engineer by qualification. Formerly Richard was Managing Director of Rank Taylor Hobson (Worldwide) – responsible for both the Measurement Division, the diamond turning business (at that time named Rank Pneumo – and now absorbed by Precitech), as well as the Cooke precision lens business.

He was for some years a member of the Measurement Advisory Committee to the UK Government. Zeeko Ltd was formed in late 2000 and since then, building it to a position of influence in this tightly defined area has been his single minded focus.

Plenary Talk 5

Advances in Optical Manufacturing Technologies at Fraunhofer IPT



Prof. Fritz Klocke
GERMANY



Dr. Richard Zunke
GERMANY

ABSTRACT

The Fraunhofer IPT is conducting a great variety of research activities in the field of optics manufacturing whereby both ways, direct and replicative manufacturing, are addressed. Important technologies are ductile and ELID grinding; conventional and ultrasonic assisted diamond turning; polishing, coating and precision glass molding of complex optical components. The research group focuses on developing transparent, deterministic material removal mechanisms and cutting models. The group then transposes these theoretical models into industrial practice. CAX technologies are used to maintain the necessary flexibility and accuracy of the machine control to manufacture a great variety of

geometries from planar to free form. The aim is to provide components which feature surface qualities in the nanometer range and form accuracies in the submicron range.

The modern equipment combined with the latest measurement technology to research and optimize the above mentioned technologies matches the increasing demands of the industry. The facilities provide the opportunity to efficiently research the according technologies but also manufacture complex glass surfaces such as large aspheric optics with high dimensional accuracy or large glass substrate surfaces with small structures in the micro-meter range. Additionally, the institute covers the whole process chain for precision glass molding, from mold and die making to coating technologies up to glass molding itself. In this context, the institute and the spin-off Aixtooling provide molds and, among other services, feasibility studies mainly for the European market.

BRIEF BIOGRAPHY

Professor Fritz Klocke was a research fellow at the TU Berlin at the Institute for Machine Tools and Manufacturing Technology until 1981, and then as head engineer until 1984, receiving his engineering doctorate in 1982. Professor Klocke worked at Ernst Winter & Sohn in Hamburg from 1984 until 1994. In 1995 he was called to the RWTH Aachen as Professor of Manufacturing Engineering Technology at the WZL Laboratory for Machine Tools & Production Engineering and the Fraunhofer Institute for Production Technology IPT.

Plenary Talk 6

The Evolution of Wavelength Shrinkage in Lithography



Dr. Masaomi Kameyama
Nikon Corporation (Japan)

ABSTRACT

Optical lithography has driven the development of miniaturization in the microelectronics industry, thus fulfilling the so-called Moore's Law. To achieve this lithographers have steadily reduced the wavelength of the illumination light used in the optical systems. However, this reduction has brought many challenges, as we have reduced the wavelength we are typically moving from the visible spectrum through ultra-violet and now towards the soft x-ray regime. The majority of these challenges are related to material properties. Reduction of wavelength narrows the available materials that are sufficiently transparent the further are radiation resistant. We also have a finite amount of wavelengths that can be produced with sufficient power to provide a production worthy light source. In this paper we will examine the history of wavelength transition in optical lithography explaining which material developments have allowed some wavelengths, such as 248nm, to be highly successful, while others such as 157nm and 126nm have failed.

BRIEF BIOGRAPHY

He received MS degree in Industrial Chemistry at Seikei University at 1975. He joined Nikon R & D Center in 1975, and then moved to Exposure Tool Designing Department in 1984. Since 1984, he has been in the center of Exposure Tool developments. He is the active member of ITRS Lithography ITWG and the ex-representative of Japan Lithography TWG in 2002 - 2005.

Workshop on

- **Topic : Technologies for Manufacturing Ultra-Precision Freeform Surfaces by Zeeko Ltd**
Mr Richard Freeman
Zeeko Ltd.

Time: 13:00-14:00

Place: Auditorium 1 at forth floor

- **Topic : The Automated Aspheric Manufacturing Cell - ACG 120 and ACP 120**
Dr. Clemens Volker Heimlich
Schneider Opticmachines

Time: 14:00-15:00

Place: Auditorium 1 at forth floor

Tea Time 15:00-15:15

- **Topic : Precise Measurement of the Stress Birefringence Distribution in Optical Materials and Components**
Mr. Henning Katte
ilis GmbH
- **Topic: Optical Metrology for Astronomical Optics**
Mr. Stephen Martinek
4D Technology

Time: 15:15-17:00

Place: Auditorium 1 at forth floor

Asian Manager of Schneider Opticmachines

Dr. Clemens Volker Heimlich

TOPIC:

The Automated Aspheric Manufacturing Cell - ACG 120 and ACP 120

ABSTRACT

Aspheric machine - ACG120 and ACP120, which is developed through the combination between German Technological Departments, Schneider Ltd., Carl Zeiss AG and Jena Optical Ltd., is a one site machining system. It integrated the grinding, polishing and testing together. The aspheric auto-manufacture is completed for the first time.

Schneider Opticmachines with headquarters in Steffenberg, an hour north of Frankfurt/Germany, is a private-owned company with a successful growing business since 1986. 200 employees develop and manufacture high-end machines for the ophthalmic and precision-optical industry.

Powerful Partner in Shanghai

OEC Desino Zhenxia Technologies co.,Ltd.

Asia Pacific Plaza A-1216

Huaqiao International Business Park

No.18. Zhaofeng Rd.

Huaqiao, Kunshan

215332 China

**Product Name:**

Zeeko Intelligent Robotic Polishers (IRP Machines) & associated software known as Precessions.

About Zeeko & Product Description:

Zeeko Ltd manufactures corrective polishing machines for fabricating high precision optics, orthopaedic joints, semiconductor applications and precision moulds in a number of different materials. The machines are supplied with software and processes suitable for the production of the most complex freeform artefacts. Covering a range of sizes from 1.5mm to 6m they utilise patented processes including the mechanical "ZeekoClassic" technology and the "ZeekoJet" solution. These cost effective solutions are deterministic and scalable from the smallest cell-phone requirements to the largest astronomy applications and are suitable for polishing most materials from traditional optics materials, through stainless steel, tool steels etc to both tungsten carbide and silicone carbide.

Topic: "A review of the evolving technologies relevant to the production of ultra-precision free-form surfaces."

By Mr Richard Freeman (Zeeko Ltd)

Abstract:

Over the last ten years a number of technologies and additional techniques have emerged to enable the efficient and deterministic production of free-form ultra-precision surfaces. Included in this area of development are ultra-precision grinders, generators, polishers and single point diamond turning machines. These machines must then be supported by free-form metrology solutions as well as new ways to fabricate the near net shape substrates essential for the efficient production of such surfaces. Included here are the precision moulding of glass, techniques for forming ceramics, the use of slumping, electroforming, rapid prototyping, sintering and other precision forming techniques. From these building blocks of technology have appeared production solutions that a decade ago would not have seemed feasible and this paper discusses these solutions and the process chains that they have created. Almost all such processes include the requirement for a near net shape substrate, a precision forming technology, a measurement solution and a finishing technology. The paper examines the solutions available, as well as some of the latest ones to emerge commenting on where they have been adopted thus far.

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ZEEKO ^{Ltd}

ULTRA-PRECISION POLISHING SOLUTIONS FOR COMPLEX SURFACES

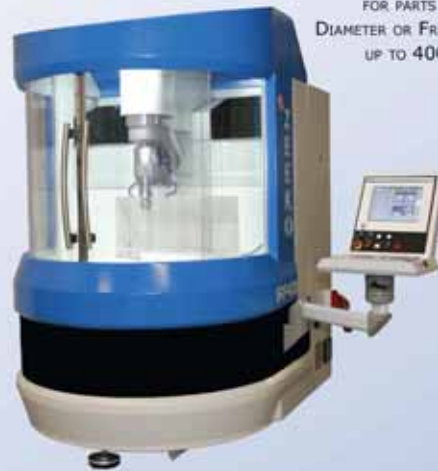
IRP200

FOR PARTS UP TO 200MM
DIAMETER OR FREE-FORM PARTS
UP TO 200MM X 200MM

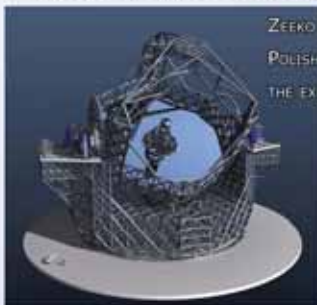


IRP400

FOR PARTS UP TO 400MM
DIAMETER OR FREE-FORM PARTS
UP TO 400MM X 400MM



THE 42 METRE EUROPEAN EXTREMELY LARGE TELESCOPE



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POLISH AND GRIND
THE EXPERIMENTAL COMPONENTS

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FOR PARTS UP TO 1200MM
DIAMETER OR FREE-FORM PARTS
UP TO 1200MM X 1200MM



IRP800

FOR PARTS UP TO 800MM
DIAMETER OR FREE-FORM PARTS
UP TO 800MM X 800MM



Zeeko Machines are equipped to change quickly between ZeekoClassic (inflated membrane tool), TurboJet (aggressive Jet Polishing), ZeekoJet (abrasive jet finishing process) and Grolishing.

For more information please contact us:

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Topic: Precise Measurement of the Stress Birefringence Distribution in Optical Materials and Components

By Mr. Henning Katte
(ilis GmbH)

Abstract: In demanding optical applications highly homogeneous glasses and crystals such as SiO₂ and CaF₂ are used. Due to the effect of stress birefringence, residual stresses in the material influence the polarization of light, which is unwanted in many optical applications, especially in the fields of micro lithography, laser optics and astronomy. In order to meet the increasing requirements regarding repeatability, lateral resolution and measuring speed, a new type of automated imaging polarimeters has been developed. The measuring apparatus determines the two-dimensional stress birefringence within a large field of view at a high lateral resolution and within a short measuring time.

Topic: Optical Metrology for Astronomical Optics

By Mr. Stephen Martinek
(4D Technology)

Abstract: Continuous advancement in wavefront sensors, adaptive optics and control systems have enabled a wide range of innovative light weight, high aspect ratio large aperture and segmented primary mirror designs for both ground and space based astronomical applications. The manufacture of these typically long radius and aspheric optical elements generate a variety of optical testing challenges. Dynamic interferometry systems provide a unique tool to address the challenges inherent in the component and system level testing of these optics and can provide high accuracy, repeatable results. Various dynamic interferometry technology approaches will be presented, trade-offs discussed and performance assessed.

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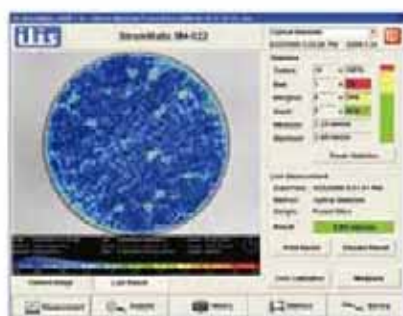


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imaging polarimeter systems for the automatic and objective measurement of stress birefringence in glass and plastics.



Wednesday-Thursday, 19-20 November 2008 • Proceedings of SPIE V. 7281

Large Mirror and Telescopes

Conference Chairs: **JIANG Wenhan**, Academician, Chinese Academy of Engineering (China)
Roland GEYL, REOSC Optics, SAGEM (France)
Myung K. Cho, National Optical Astronomy Observatory (USA)
WU Fan, Institute of Optics and Electronics, CAS (China)

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YU Jingchi, Suzhou Univ. (China)
Sung-Kie Youn, Korea Advanced Institute of Science and Technology (KAIST) (Korea)
GAO Bilie, Nanjing Institute of Astronomical Optical Technology, CAS (China)

- Mirrors for large astronomical and space telescopes
- Light-weighted mirror technology
- Large deployable mirror and telescopes
- New and innovative mirror and telescope designs
- Advanced testing methods for large mirror
- Support systems and structures
- New material for large mirrors

WED, 19 November 2008

SESSION 1-1

25min/report; Room 1 Wed. 13:30-17:10;

Chair: Wu Fan

- ✓ Four decades of ZERODUR® mirror substrates for astronomy
Thorsten Döhring, Ralf Jedamzik, Thomas Westerhoff, Peter Hartmann(Germany)..... [1-017]
- ✓ Study on the surface of large-aperture optical elements in frequency domain
Shimeng Li, Rongzhu Zhang(China)..... [1-009]
- ✓ A novel method of phasing segmented mirrors
Qiudong Zhu, Shanshan Wang, Genrui Cao(China) [1-042]
- ✓ Influence of optical surface error on scattering loss of optical mirror
Dongliang Wu, Yifan Dai, Guilin Wang(China)..... [1-006]

Tea Time (15:10-15:25)

- ✓ Control System for the Multi-motor Friction Drive of Large-scale Optical Telescope
Mao Yao, Ma Jia-guang, Bao Qi-liang, YANG Song-hua(China)..... [1-039]
- ✓ FEM analysis and experiment study of Ultra Thin Active Mirror
NI Ying, Guo Pei-ji,Huang Qi-tai YU Jing-chi(China) [1-007]
- ✓ Subaperture Stitching Interferometer for Large Optics
Shengyue Zeng, Yifan Dai, Shanyong Chen(China) [1-020]
- ✓ Figure analysis and adjustment of large aperture reflector
Chen Xiao li, Ruan Ning Juan, Ma Jun,Su Yun(China) [1-024]

THU, 20 November 2008

SESSION 1-2

25min/report; Room 1 THU. 8:30-12:10;

Chair: Fan Bin

- ✓ Analysis deforming and moving feature, when using stressed lap on both convex and concave hyperboloids
Gao Billie, Wu Fan(China) [1-018]
- ✓ Decoupling control for position error and surface error of segmented primary mirror
Dong Bing, Yu Xin, Zhang Xiaofang, Wang Xiao(China)..... [1-026]
- ✓ Optimizing attaching area in ultra-thin active mirror system
Xie Bin, Ni Ying(China) [1-043]
- ✓ Observer Based Higher Order Sliding Mode Control for Large Optical Astronomical Telescope
Wangping Zhou, Xiaoling Ye, Wei Guo, Li Yu(China) [1-032]

Tea Time (10:10-10:25)

- ✓ Acceleration feedback control for low velocity friction in servo control system
Tao Tang, Yongmei Huang, Chengyu Fu, Jiaguang Ma(China)..... [1-021]
- ✓ Aberration Analysis for Development of Large- Aperture Reflector by Finite element
Yuanjing Penga, Lvjun Yuan(China) [1-038]
- ✓ Analysis of piston error of optical sparse-aperture imaging system
Juan Zhao, Dayong Wang, Yuhong Wan, Zhuqing Jiang, Shiquan Tao(China) [1-033]
- ✓ Forward Kinematic Analysis on the Parallel Supporting Structure of Large Opto-electronic Equipments
Cheng Gang, Ge Shi-Rong, Wan Yong-Jian(China) [1-031]

POSTER

We will provide a broad with the dimentions of length of 2.5 metres and breadth of 1 metres for each post papers. Please prepare your post materials yourself.

WED. Nov. 20, 2008	13:00-14:00 Preparation	14:00-17:00 Opening	Auditorium 1
✓	Research on Structure and Dynamic Characteristics of Fast-Steering Mirror Jianmin Zhou, Hongyan Yin, Yonghui Wang(China)		[1-004]
✓	Numerical Simulation of the Airflow in 2m Telescope Zhao Fu, Wang Ping, Gong Yanjue, Zhang Li, Meng Chunling, Lin Jianlong(China)		[1-012]
✓	Configuring a Membrane Reflector with Electrostatic.Potentials Exerted on Distributed Electrodes G. F. Shi, G. Jin , P. Zhang, C.Y. Liu (China)		[1-013]
✓	Study on High Precision Membrane Mirror Shaping Method LIU CHUN-yu, JIN Gang, SHI GUANG-feng(China)		[1-014]
✓	The mathematical analysis, when using four-bar linkage structure to off-axis segment Gao Billie, Wu Fan(China)		[1-019]
✓	The Optical design of reflecting telescope with large field GONG Duna, WANG Hong, TIAN Tie-yin, YUAN Jia-guang(China)		[1-022]
✓	Limit ability study of shaping aspheric surfaces by FEM ZENG Chunmei, YU Jingchi(China)		[1-023]
✓	Fabrication and testing 600mm diameter brazing SiC mirror ZHANG Bin-zhi, WANG-Xu, WANF Xiao Kun, ZHANG Zhong-yu, ZHANG Xue-jun(China).....		[1-025]
✓	Method for Detection of Primary mirror figure deformation in space WANG Xiao, MAO Heng, ZHAO Da-zun(China).....		[1-027]
✓	Orientation error analysis of alt-alt photoelectric telescope Han Xue-bing, Zhang Jing-xua Zhao jin-yu(China)		[1-028]
✓	Diffraction Effects on Image Quality of Segmented Mirror with Quasi Annulus Sector WEN Yan, YAN Ji-xiang, WANG Bi-ru, Xiao Man-jun(China).....		[1-029]
✓	The research on electric method for testing co-phasing error Zhao Weirui, Cao Genrui(China).....		[1-030]
✓	A hybrid algorithm in phase diversity wavefront sensing Xin Wang, Dazun Zhao, Heng Mao, Xiao Wang(China).....		[1-034]
✓	The application of adaptive optics to space-ground large deployable optics system Zhang Xiaofang, Yu Xin, Yan Jixiang, Dong Bing, Huang Yu, Wang Xiao(China)		[1-036]
✓	Real-time Orbit Prediction in Large Telescope System YANG Song-hua*, MAO Yao, MA Jia-guang(China)		[1-040]
✓	Inverse Kinematic Analysis of the Parallel Supporting Structure Based on Rodrigues Parameters Cheng Gang, Ge Shi-Rong, Wan Yong-Jian(China)		[1-041]
✓	The Cooling Technology Research for Large-Aperture Solar Telescope's Primary Mirror Wang Qingping, Zhang Haiying(China).....		[1-044]
✓	Research for Extra Long Focal Length and Large Field of View (FOV) Segmented Synthetic Aperture Optics (SAO) Design and Analysis Chen Qi-hai, Deng Jian, Zhang Wei(China)		[1-010]
✓	One Direct Drive Simulation Bed for Telescope Drive System Ren Changzhi, Zhang Zhenchao, Wang Daxing, Wang Guomin(China)		[1-003]

Wednesday- Thursday, 19-20 November 2008 • Proceedings of SPIE V. 7282

Advanced Optical Manufacturing Technologies

Conference Chairs: **YANG Li**, COMT, COS (China)

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- [Advanced optical manufacturing technologies](#)
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WED, 19 November 2008

SESSION 2-1

20min/report; Room 2 Wed. 13:30-17:10;

Chair: Wan Yongjian

- ✓ Direct Diamond Turning of Steel Molds for Optical Replication
Fritz Klocke, Olaf Dambon, Benjamin Bulla, Michael Heselhaus(Germany) [2-077]
- ✓ Double-swing method used for polishing off-axis aspherical mirrors
Wang Peng, Li Jun-feng, Xuan Bin, Chen Xiao-ping, Song Shu-mei, Chen Ya(China) [2-095]
- ✓ A mechanistic cutting force model for diamond fly-cutting of microstructured surface
Qingliang Zhao, Bing Guo, Hui Yang, Xiaohu Zhang(China) [2-171]
- ✓ Precision compression molding process of low Tg glass aspheric lenses
Tao Ma, Jingchi Yu(China) [2-044]
- ✓ Fabrication of Micro Glass Lens Mould by Using Ultra-Precision Micro-Grinding Process
Yin Shaohui, Tang Kun, Zhu Yongjian, Chen Fengjun, Fan Yufeng, Guo Li(China) [2-097]
- ✓ Study on calculation and application for asphericity of rectangle off-axis aspherics
LI Jun-feng, XUAN Bin, WANG Peng, CHEN Xiao-ping, Zhang Hong, (China) [2-089]

Tea Time (15:10-15:25)

- ✓ Polishing of Silicon Based Advanced Ceramics
Fritz Klocke, Olaf Dambon, Richard Zunke, D. Waechter(Germany) [2-080]
- ✓ A freeform turning lathe with direct drives and aerostatic bearing
GUAN Chao-liang, DAI Yi-fan, YIN Zi-qiang, YANG Fan(China) [2-037]
- ✓ Influence of slurry pH on material remove rate and surface roughness of super precision polishing of LBO crystal
Jun Li*, Yongwei Zhu, Dunwen Zuo, Yong Zhu, Chuangtian Chen(China) [2-009]
- ✓ Point Spread Function Estimation based on àtrous Wavelet Transform
Chen Bo, Geng Ze-xun, Peng Hong-gui, Yang Yang(China) [2-117]
- ✓ Material removal rate based on edge effects in ultra precision polishing process
Yang Wei, Guo YinBiao, Xu Qiao(China) [2-002]

THU, 20 November 2008

SESSION 2-2

20min/report; Room 2 THU. 8:30-12:10;

Chair: Zhang Rongzhu

- ✓ GLASS AND SILICON FOILS FORMING FOR X-RAY SPACE TELESCOPES
Martin Mika(Czech Republic) [2-079]
- ✓ The Finite Element Simulation and Experimental Research in Cutting Forces of KDP Crystal
Jinghe WANG*, Qingxin MENG, Hongxiang WANG, Shen DONG, Jian GUO(China) [2-177]
- ✓ Experimental investigation on the effect of abrasive grain size on the lapping uniformity of sapphire wafer
Donghui Wen, Zhiwei Wang, Kehua Zhang(China) [2-167]
- ✓ Study on the influence and disposal method of the micro-cracks of optical components
CHEN Xiao-ping, XUAN Bin, WANG Peng, LI Jun-feng, SONG Shu-mei, Zhang Hong, XIE Jing-jiang(China) [2-130]
- ✓ Experimental Investigation on Polishing of Ultra Smooth Surface in Nanoparticle Colloid Jet Machining
Xiaozong Song, Yong Zhang, Feihu Zhang, Dianrong Luan(China) [2-098]

Tea Time (10:10-10:25)

- ✓ Optical Design and Optimization of 350X Optical Zoom Lens with Diffractive Optical Element and Digital Signal Processing
Yi-Chin Fang, Han-Ching Lin(Taiwan, China) [2-081]
- ✓ Effects of velocity and pressure distributions on material removal rate in polishing process
Yaguo Li, Jian Wang, Qaio Xu, Wei Yang, Yinbiao Guo(China) [2-006]
- ✓ Development of ultra-precision three axes micro milling machine
Peng Zhang*, Bo Wang, Yingchun Liang(China) [2-137]
- ✓ Deterministical magnetorheological finishing of optical aspheric mirrors
Song Ci, Dai Yifan, Peng Xiaoqiang, Li Shengyi, Shi Feng(China) [2-036]
- ✓ Image density property of the optical information recording microcapsule material
Weidong lai, Xiaowei Li, Xinzheng Li, Guangsheng Fu(China) [2-143]

POSTER

We will provide a broad with the dimentions of length of 2.5 metres and breadth of 1 metres for each post papers. Please prepare your post materials yourself.

WED. Nov. 20, 2008	13:00-14:00 Preparation	14:00-17:00 Opening	Auditorium 1
✓	Study on experiment of grinding SiC mirror with fixed abrasive WANG Xu,ZHANG Xue-jun(China)		[2-003]
✓	Structures and graphics of spacial spherical parallel grids with laser direct writing Changhong. Hu, Zhezhou. Yu, Zhe. Wang(China)		[2-004]
✓	The transfer matrix method and dispersive formula of light in thin films The transfer matrix DAI Hong-xia, LIU Qi-neng(China)		[2-005]
✓	Design of aspherical surfaces for panoramic imagers using multi-populations genetic algorithm WANG Li-Ping, Liang Zhong-zhu , JIN Chun-Shui(China).....		[2-007]
✓	Three regions in the material removal rate with the increase of the concentration of abrasives slurry Guo YinBiao,Yang Wei,Xu Qiao,Li YaGuo(China).....		[2-008]
✓	Annealing induced optical properties of YSZ thin films prepared by EB-PVD Li Chao-Yang, Xing Guang-Jian, Yang Yong-Jun, Jiang Wei(China)		[2-010]
✓	Study of PZT Actuated Deformable Aspheric Polishing Lap Ziqiang Hu, Ning Ling, Junhua Pan, Wenhan Jiang(China).....		[2-011]
✓	The research on deposition of chromium atoms under different laser power Zhang Wentao, Zhu Baohua(China).....		[2-012]
✓	Infrared Anti-Reflection DLC Films by Femtosecond Pulsed Laser Deposition Shuyun Wang, Yanlong Guo, Xiaobing Wang, Yong Cheng, Huisheng Wang, Xu Liu(China).....		[2-014]
✓	Influence of Cutting Velocity on Surface Roughness of KDP* Y. F. Peng ¹ Y. B. Guo Q. Xu(China).....		[2-015]
✓	Influence of Tool Presetting Error on Surface Accuracy in Ultra-precision Machining Guo LI, Bo WANG, Xuesen ZHAO, Shen DONG(China).....		[2-016]
✓	Research on realization technique of precision forming for laser shock Yin Sumin, Qi Shandong(China).....		[2-017]
✓	Experiment and Simulation of Micro-Milling Process for Plastic Material Yazhou Sun*, Qingxin Meng, Haitao Liu(China)		[2-018]
✓	IAD-Si coatings on RB-SiC space mirrors for ultra-smooth surfaces Lingdi XU, Xuejun ZHANG, Ruigang Li, Feng ZHANG, Xu WANG(China)		[2-019]
✓	Research of optical flats in pad polishing Jian Wang, Yinbiao Guo, Yaguo Lee ¹ , Qiao Xu, Wei Yang(China)		[2-020]
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✓	Near-field diffraction simulation on three-dimensional mask model with off-axis illumination Cheng Lin*, Cao Peng-fei, Liu Jia, Zhang Xiao-ping(China)		[2-023]
✓	Manufacturing of the 1070mm F/1.5 ellipsoid mirror Guo peiji Yu jingchi Zhang yaoming Qiu gufeng(China)		[2-024]
✓	Fast Tool Servo System for On-line Compensation of Error Motion on an Ultra-precision Lathe Xiaohui Wanga , Tao Suna(China)		[2-025]
✓	Smoothing treatment of high order aspherical surface Jianfeng Ren, Binfei DAI, Guanghua Xu(China).....		[2-026]
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✓	Grating Torque Sensor Design Based on Wavelet Signal Quality Assess System YU Hong-lin, WANG Yuan-gan(China)		[2-028]
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- ✓ Optical design of long focal length and wide field on aerial CCD camera
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- ✓ LED Optical Engine Based on Rectangular CPC for Micro-Projection Display
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- ✓ Prepare TiN Solar Spectrally Selective Absorbing Thin Film by DC Magnetron Sputtering
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✓	Effect of adaptive optical system on the capability of lidar detection in atmosphere Tan xue-chun,Wu zhi-chao, Liang zhu(China).....		[4-012]
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Symposium Location

Chengdu Wang Jiang Hotel 5★

We take pleasure in informing you that the venue for the symposium AOMATT08 has been adjusted to Chengdu Wang Jiang Hotel from the Tibet Hotel Chengdu, we believe that every attendee will enjoy the change much more when you arrive in the conference. The hotel reservation you have made early are still effective, you don't need to make a new reservation. Wang Jiang Hotel with the room style, room rate and room number you ordered will keep no change.

Wang Jiang Hotel is the only five-star hotel sited in a great garden in Chengdu. It is located in eastern area of the well-known historical city Chengdu, 5km to centre city, 20km away from the airport and 9km from the railway station. It covered an area of over 200mu where hundreds of flowers and trees are planted. The everlasting green trees, colorful flowers, singing birds, booths and waterside pavilions and the running water are all combined with top-grade villas among them. WangJiang Hotel is featured in unique traditional buildings of Western Sichuan with advanced modern facilities, perfect accessories and individualized earnest service. It is a combination of top large-scale restaurant, entertainment, accommodation, meeting, traveling, relaxation and an ideal place for high-grade amenity activities.

WangJiang Hotel assembled modern high-tech and hearty service that make guests feel easy at home. There are totally 417 rooms which would allow over 700 people to be served at the same time. There are more than twenty different types of meeting rooms with the capacity from 24 to 500 persons. All rooms are luxuriously equipped with central air-conditioner, broad band internet access, telephone, satellite TV, fridge, electronic safety deposit box, network locker, automatic smoke alarm and water spray, etc.

It is acceptable of credit card include American Express, Master, Visa, DinersCard, JCB, Great Wall. MuDan, etc..



望江宾馆位置及行车路线图



酒店交通

距机场约16公里，车程约25分钟，出租车费用约60元，巴士费用约10元
 距火车站约10公里，车程约15分钟，出租车费用约20元，巴士费用约2元
 距市中心天府广场5公里，车程约5分钟，出租车费用约10元，巴士费用约2元

Overseas Visitors Airport Picking up

Authors from outside of the mainland will be picked up at ShuangLiu Airport (Chengdu) by Conference Organization.

Please take me to the Wang Jiang Hotel, Thank you.

请送我到成都望江宾馆，谢谢。

Oral and Poster Presentation

For Oral Presentation, we will provide a computer to release the paper with the format of PPT (Microsoft PowerPoint).

For Poster presentation, we will provide a bulletin board in an individual room to release the paper.

Currency Exchange

In China, only RMB is used. However, exchange centers can be found at airports, most hotels and large shopping centers. When exchanging money, please keep your receipt by which you can change any remaining RMB back to foreign currency when leaving China. Visa, Master, American Express, Diners Club, JCB, and other credit cards are accepted in many department stores and hotels. But it might be difficult to draw cash with credit cards. The Bank of China and most hotels can cash travelers cheques issued by and foreign bank or financial institution. Traveler's cheque signed over to a third party cannot be cashed in China, but can be presented for collection through for the Bank of China.

Travel Information

Chengdu is one of the three best cities (Chengdu, Hangzhou, Dalian) for traveling in China, capital of Sichuan province, is not only China's important industrial base, but also a well-known historical and cultural city in southwest China, with a history of 2,500 years. In the vicinity of the city, there are a 2000-year-old water conservancy project, Dujiangyan Irrigation System, a Taoist mountain called Qingcheng Shan (Green-city mountain). In addition, about 160 kilometers away from Chengdu lies the largest Buddha statue Leshan Grand Buddha and a Buddhist sacred mountain, Mt. Emei. All the historical sites and scenic spots are well worth a visit, not to say, the tea houses, the local cuisine and the traditional arts and crafts.

Chengdu is the main gateway to Tibet; there are daily flights to the Potala Palace at Lhasa, When the word Tibet is mentioned something icy chills the readers' nerves. In fact it snows only once or twice in a year and owing to the perpetuity of bright sunshine. Tristar piles the ruins is a distance 5000 to 3000 about ancient SiChuan cultural remains site, the area amounts to 12 square kilometers now, is Chinese one of 20th century significant archaeology discoveries. The world famous Base of Panda is home to panda. The historical sites of Temple of San Su is well worth a visit.

Located south of Chengdu, Jiuzhaigou Valley which is fantastic fairyland belongs to carbonate barrier lake landform with high mountains and deep valleys. There are nine old Tibetan villages in the gorge, hence the name Jiuzhaigou Valley.



Dujiangyan



Leshan Giant Buddha



the Base of Panda



Cultural Relic of Tristar Piles

望江宾馆位置及行车路线图



酒店交通

距机场约16公里，车程约25分钟，出租车费用约60元，巴士费用约10元
距火车站约10公里，车程约15分钟，出租车费用约20元，巴士费用约2元
距市中心天府广场5公里，车程约5分钟，出租车费用约10元，巴士费用约2元

成都望江宾馆总平面图

The Plan of Wangjiang Hotel

