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**Regional Report on  
Laser Applications in South East Asian  
Countries**

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# PART 1

## Introduction

Since the invention of laser in 1960 and the development of the fibre optics in 1970, laser and optical technologies have grown up quickly. Despite of nearly forty years of the establishment of the field, research and development as well as applications of lasers has never ceased to an end. The application of laser technologies has revolutionised many fields of science and is becoming a device whose applications touch all our life. Today, lasers have been found wide applications in many areas such as in medical fields, in microelectronics and optoelectronics, in information devices, in optical communications and optical information processing, in areas of industry for materials processing, machining and tooling, as well as in environmental monitoring. Lasers have also been developed for use in sophisticated military weapons and even in space exploration. Therefore, laser technology will be one of the most rapidly growing and promising fields in the twenty-first century.

The scope of this work is focused on the survey of laser applications in South East Asian (SEA) countries in the areas of research and development (R & D), industries, hospitals, and in environmental monitoring. The purpose of the survey is to identify geographical areas in the regions where laser techniques and applications can be introduced or improved through appropriate actions taken by the ICS-UNIDO.

Part 2 gives the overview on the diffusion of laser technologies in SEA countries including Singapore, Malaysia, Indonesia, Thailand, Vietnam, the Philippines, Brunei, Cambodia, Laos, and Myanmar.

The appendices at the end of the report contain the detailed information obtained in this survey on laser applications in SEA countries.

## **PART 2**

# **Overview on Laser Applications in South East Asian Countries**

## 2.1 Singapore

The developments and applications of laser technologies in Singapore have been advanced rapidly since the early 1990's. Today, laser technologies have found applications in various areas including R & D, industries, hospitals and in environmental monitoring in Singapore.

The main research institutes and universities that are involved in R & D programmes on lasers are Nanyang Technological University (NTU), National University of Singapore (NUS), GINTC Institute of Manufacturing Technology (GINTIC), Singapore Productivity and Standards Board (PSB), Defense Science Organisation (DSO) National Labs, Institute of Materials Research & Engineering (IMRE), Data Storage Institute (DSI), Ngee Ann Polytechnic, Singapore Polytechnic and Nanyang Polytechnic. Several research centres for Lasers, Photonics and Optoelectronics (e.g., Photonics Group, Microelectronics Centre at NTU, Centre for Optoelectronics at NUS) were also set up within these organisations, aiming at establishing Singapore as the Photonics Research Centre of South-East Asia.

The laser research activities undertaken by the Singapore Institutions span a wide range of areas from basic aspects of laser physics, nonlinear optics and spectroscopy in physics and chemistry to the practical applications in industry, medical and environmental monitoring, including: laser applications in microelectronics and optoelectronics, laser material processing, laser lithography, laser manufacturing, laser machining and tooling, laser digitising, laser precision engineering, laser rapid prototyping, developments of high power lasers, diode pumped solid state lasers, semiconductor lasers, and quantum well lasers, optical networking, photonics sensors and display, lasers in biomedicine, and laser remote sensing. The research laboratories were equipped with various types of laser systems such as excimer lasers, CO<sub>2</sub> lasers, Nd:YAG lasers, N<sub>2</sub> lasers, diode pumped Nd:YVO<sub>4</sub> lasers, Ti:Sapphire lasers, argon ion lasers, He-Cd lasers, He-Ne lasers, and diode lasers in fulfilling the R & D work. In addition, the research groups were also staffed with highly qualified and experienced personnel for their activities. Some of research achievements on laser

technology attained by them, e.g., Laser Mold Cleaner, Laser Microtexturing System, Laser Disk Tagging System and Laser Deflash System, have been transferred to industrial applications.

In Singapore, laser technologies have also been widely used in industries, such as manufacturing, materials processing, automation inspection and control, precision engineering, microelectronics and optoelectronics, semiconductor and hard disk industry, as well as laser medical instrumentation. The organisations, such as GINTIC, PSB, DSO, DSI, IMRE, which are staffed by very experienced researchers on lasers from around the world, provide comprehensive services to laser industries. For example, the Advanced Machining Technology Group in the industrial-oriented R & D research institute (GINTIC) develops high power lasers (e.g., diode pumped solid state lasers, CO<sub>2</sub> lasers) for materials processing in industry. The Precision Engineering Application Centre (PEAC) in PSB employs high power lasers like Nd:YAG laser, excimer laser and CO<sub>2</sub> laser for laser precision engineering in industry. The Standards and Metrology Division in PSB also uses stabilised laser systems aimed at raising the level of the standards and techniques for precision measurements in Singapore. The II-VI Singapore Pte Ltd company is a sole manufacturer and supplier of infrared laser optics in the ASEAN region, supplying optics for high and low power CO<sub>2</sub> and YAG laser processing industry. Some manufacturing companies, for example, the Hypertronics Pte Ltd and the Wintec Laser Technology Pte Ltd, produce high power Nd:YAG lasers and CO<sub>2</sub> lasers for industrial applications in laser cutting, welding, marking, engraving, drilling, trimming, etc. The Wintec Laser Technology Pte Ltd company also has the products of medical lasers such as CO<sub>2</sub> therapy lasers and pulsed Nd:YAG lasers for medical applications. There are many companies applying various laser systems (e.g., CO<sub>2</sub> laser, excimer lasers, Nd:YAG lasers, He-Ne lasers, diode lasers) into material processing (cutting, engraving), tooling and machining, printing, and many other uses in business and manufacturing to the commercial sector. Overall, about 18 companies are currently involved in laser cutting machines and servicing, four companies in laser inspection equipment, five companies in laser printing and engraving services, and about 23 companies in laser manufacturing or distribution and maintenance services. These companies also have a group of highly trained engineers and technicians on lasers who are dedicated to serve the customers better.

There are about eight hospitals and medical research centres in Singapore using laser technologies for surgical operation and R & D purposes in the fields of laser refractive surgery and eye surgery (both photorefractive keratectomy (PRK) and laser-assisted *in situ* keratomilieusis (LASIK)), laser heart surgery, laser dermatology, laser plastic and cosmetic surgery, laser general surgical operations, laser endoscopy, etc. These medical hospitals and research centres are Singapore General Hospital (SGH), National Cancer Centre (NCC), National University Hospital (NUH), National Skin Centre (NSC), Tan Tock Seng Hospital (TTSH), Singapore National Moypia Correction Eye Center, Eye Cataract and Refractive Surgicenter (C. H. Low Asia Medic Eye Centre), and Parkway Group Healthcare Pte Ltd (Mount Elizabeth Hospital, Gleneagles Hospital, East Shore Hospital). The main laser systems utilised in the hospitals are excimer lasers, CO<sub>2</sub> laser, Nd:YAG lasers, pulsed dye lasers and He-Cd lasers.

As for the laser activity in environmental monitoring, the researchers in the Photonics Lab at NTU has developed a Lidar system for atmospheric remote sensing and satellite-based remote sensing by employing a continuum flash-lamp pumped Nd:YAG laser (1.06  $\mu\text{m}$ ) as light source.

## 2.2 Malaysia

Laser applications in Malaysia can be traced to the late 1970's, when the first Laser Research Laboratory aimed at exploring new and advanced field in physics research was established at the University of Malaya (UM) in 1978. After over two decades of efforts by the Malaysian scientists, laser technologies have now been widely utilised in the areas of R & D, industry, military, hospitals, and environmental monitoring in Malaysia.

There are many research institutes and laboratories actively involved in R & D work on lasers in Malaysia. Some of them are University of Malaya, University Putra Malaysia, University Telecom in Malaysia (also named as Multimedia University), University Technology Malaysia, University of Putra in N. Kedah, University Pertanian Malaysia, etc. The researchers in the laser research groups in these universities study a wide range of topics covering both the basic and applied aspects of laser physics and technologies, including: lasers and optical spectroscopy, non-linear optics, plasma physics, metrology, holography and interferometry, acoustics, optical communications, optoelectronics and semiconductors, thin film deposition and silicon wafer, laser machining, laser materials processing (cutting, marking, welding and ablation), high power lasers in manufacturing, laser guided target designation in military, as well as lasers in surgery and medicine and in environmental monitoring. The research laboratories in the institutes and universities are well equipped with state-of-the-art laser systems, such as CO<sub>2</sub> lasers, excimer lasers, N<sub>2</sub> lasers, Cu and CuBr vapour lasers, Nd:YAG lasers, diode pumped solid state lasers, dye lasers, argon ion lasers, He-Ne lasers, and diode lasers, for their basic and applied research. The research staff in the Laser and Photonic Research Laboratory at UM constructed their own high power laser systems, which included N<sub>2</sub> lasers, CW CO<sub>2</sub> lasers, KrF and XeCl excimer lasers, solid-state dye laser, and copper vapour lasers, for R & D, industrial applications and remote sensing. The Standards and Industrial Research Institute of Malaysia also employed the stabilised laser systems such as I<sub>2</sub>-stabilised He-Ne laser and I<sub>2</sub>-stabilised solid/semiconductor lasers



for the improvements of the national standards and precision length/line measurements in Malaysia.

In Malaysia, laser technologies have been widely applied to the sectors of automation industry, manufacturing, materials processing, semiconductor and hard disk industry. Some industrial companies (e.g., Digital-Creations Pte Ltd, Engineering Aide (M) Pte Ltd, Hostar (M) Pte Ltd, Global Videowall Communications Pte Ltd, LVD (M) Pte Ltd) produce different kinds of lasers, especially in constructing high power lasers (e.g., CO<sub>2</sub> laser, Nd:YAG laser) for laser mould, laser ablation, laser cutting, laser welding, laser machining and tooling. Besides producing lasers, the companies also provide the services of laser mould/laser cutting with high power laser systems. In some semiconductor companies, for example, Shin Etsu Handotai (M) Pte Ltd, the ion laser sources are used for detecting the defects of silicon wafer surface. The Ais Auto ID Systems Pte Ltd and the Peripheral Solutions (M) Pte Ltd companies make laser barcode equipment and laser scanners using diode lasers and He-Ne lasers. Some companies utilised laser systems, such as Nd:YAG lasers, CO<sub>2</sub> lasers, argon ion lasers, for laser range finding, ground survey, and aerial photography. Malaysia also applied the laser technology to the traffic enforcement by setting up the laser radar/detectors systems for monitoring vehicle speed on some highways.

Laser technologies have also been used in some hospitals and medical research institutions in Malaysia. The most applicable laser systems in the hospitals are CO<sub>2</sub> lasers, Nd:YAG lasers and excimer lasers. The CO<sub>2</sub> laser is the most common laser system used for dental procedures in Malaysia. Some hospitals like the Hospital Kuala Lumpur and the Niwan Skin Slimming Beauty Centre used CO<sub>2</sub> lasers, Nd:YAG lasers, etc. for the clinical services in the areas of laser dermatosurgery, laser eye surgery and cosmetics surgery, photodynamic therapy (PDT), etc. In the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry at UM, various types of lasers (argon ion laser, CO<sub>2</sub> laser, Nd:YAG laser, Ho:YAG laser, Er:YAG laser, excimer laser) are employed as an adjunct therapy in general dental practice and for soft tissue procedures in oral and maxillofacial surgery. Further applications of laser systems on osseous and dental hard tissue are also in progress in the department.

As for the laser application in environmental monitoring in Malaysia, the researchers in the Laser and Photonics research Lab at UM constructed their own XeCl excimer laser system (60 mJ) to pump a simultaneous dual wavelength dye laser oscillator-amplifier system for remote sensing. They developed a laser Lidar system using DIAL technique for monitoring nitrogen dioxide concentration and mapping of plume in the atmosphere. Recently, more efforts have been made by the research group to construct a higher power KrF excimer laser system (more than 1 J) to deploy this new excimer laser in more advanced atmospheric detection system.

## 2.3 Indonesia

The applications of laser technologies in Indonesia can be grouped into R & D, industry, medical and environmental monitoring.

In research institutions and laboratories in Indonesia, laser applications ranged from spectroscopy in Physics and Chemistry, non-linear optics, holography, light shows, metrology to the active remote sensing/Lidar, optical communications, microelectronics and optoelectronics and materials processing. The main research institutes and universities actively engaged in laser activities are the Indonesia Institute of Sciences-LIPI, Bandung Institute of Technology-ITB, Badan Tenaga Atom National (BATAN) and the University of Indonesia (UI). The most applicable lasers used in these institutions are gas lasers (He-Ne lasers, argon ion lasers) and some diode lasers, in addition to a few flash-lamp pumped and diode pumped Nd:YAG lasers, excimer lasers and CO<sub>2</sub> lasers. The research group for Opto-electrotechniques and applied lasers at UI built up its own laser systems such as TEA CO<sub>2</sub> laser and N<sub>2</sub> laser. The researchers in LIPI, ITB and BATAN have developed high power lasers (CO<sub>2</sub> lasers, Nd:YAG lasers) and compacted diode pumped solid state lasers for the applications of laser steel hardening and laser isotope separations. These laser laboratories also place emphasis on research work on photonic devices, such as development of III-V compound for LED/laser diode as well as development of design and fabrication techniques of micro-optics components; on holography and speckle interferometry for non-destructive evaluation, and on advanced material processing using high-power laser. The main tasks of these laboratories are to conduct research, development, and transfer of knowledge related to the application of laser and optoelectronics technologies to support industrial development in Indonesia.

In some industrial companies, for instance, Indonesia Telecommunication Industry (INTI), Aneka Supplier-Promotion Specialist, and the Trumpf Pte Ltd.(a Germany company in

Jakarta), they have various types of lasers systems especially high power lasers (CO<sub>2</sub> lasers, Nd:YAG lasers, excimer lasers) for the applications of laser materials processing (cutting, welding, engraving), laser surface mounting and laser automations for sheet metal processing. A laser shows and displays company (International Laser Productions) in Bali employs different kinds of lasers, such as argon ion lasers, He-Ne lasers, and Nd:YAG lasers, for the activities of laser event design, laser billboard advertising, as well as laser sales and servicing. The company is also involved in integrating and manufacturing some laser systems like low power He-Ne lasers, Q-switched Nd:YAG lasers, Er:YAG lasers, and CO<sub>2</sub> lasers.

Some Hospitals in Indonesia utilised laser instrumentation for surgical operations in the fields of laser eye surgery (PRK and LASIK), laser dermatology and cosmetic procedures, general surgical operations, endoscopy, etc. These are the Jakarta Eye Centre, Medlite IV Hospital, Department of Ophthalmology at the University of Indonesia, etc. A special Hospital of Ear, Nose and Throat (E.N.T) - Surgery, Proklamasi, which was the "Top Referral Hospital" in its field in Indonesia, also offers clinical services of laser eye surgery and endoscopy for patients. The laser systems used in these hospitals are mainly eximer lasers, CO<sub>2</sub> laser, and Nd:YAG lasers.

For laser applications in remote sensing, a Lidar (Laser Radar) network system for monitoring atmospheric environment was developed in Jakarta city. The lidar systems are designed to probe aerosols caused by forest fires, agricultural fires and slash-and-burn clearing. The lidar network system consists of three lidars, two Mie scattering lidars and one differential absorption lidar (DIAL). The three lidars are controlled from the central station. Three lidars were recently installed at three separate locations (Depok campus of the University of Indonesia, the LIPI Oceanic Research Institute, and the LIPI Headquarters Building) in Jakarta for studying atmospheric boundary layer structure and transportation of atmospheric pollutants over Jakarta city. The Mie scattering lidars employ compact flashlamp pumped Nd:YAG lasers operated at fundamental (1.06  $\mu\text{m}$ ) and harmonic generations (532 nm, 355 nm). The DIAL system employs two Nd:YAG laser pumped optical parametric oscillators. The DIAL is designed for measuring distribution of ozone and SO<sub>2</sub> in the near UV region, and NO<sub>2</sub> in the 450-nm region.

## 2.4 Thailand

In Thailand, there are many research institutions and laboratories doing research and development programmes on lasers. The main academic institutes and universities that are involved in laser activities are the National Electronics and Computer Technology Centre (NECTEC), National Science and Technology Development Agency (NSTDA), Chulalongkorn University, Suranaree University of Technology, Rachmongkol Institute of Technology, King Mongkut's Institute of Technology Ladkrabang, Mahidol University, Chiang Mai University, and Siam University. The R&D efforts in these institutions cover both the basic and applied aspects of laser physics and technology, spectroscopy, non-linear optics, holography, electronics speckle pattern interferometry (ESPI), optoelectronics, semiconductors, multi-quantum well devices, materials processing, optical communications and optical information processing. The main laser systems applied in these activities are excimer lasers, CO<sub>2</sub> lasers, flash-lamp pumped or diode pumped Nd:YAG lasers, Ti:Sapphire laser, tunable dye lasers, argon ion lasers, He-Cd lasers, He-Ne lasers and diode lasers. Some research institutes, for example, the Electro-Optics laboratory at NECTEC/NSTDA and the King Mongkut Institute of Technology, have also built their own laser systems such as CO<sub>2</sub> lasers to do laser marking and cutting research. The aims of their R & D work are to promote the utilisation of laser optical technology in industry, agriculture, medical, education, military and telecommunication in Thailand.

As for laser industrial applications in Thailand, some companies (e.g., Oriental Electric Industry Company Ltd, Loxley Intergraph (Thailand) Ltd, ESRI (Thailand) Co., Ltd.) have laser marking systems using CO<sub>2</sub> lasers as light source, laser cutting system using CO<sub>2</sub> and Nd:YAG lasers, laser light show using argon ion lasers, laser range-finder and positioning systems using Nd:YAG lasers. The national laboratories in the Branch of Optical Technology in NECTEC/NSTDA also use many kinds of lasers, such as Nd:YAG lasers, CO<sub>2</sub> lasers, argon ion lasers, He-Cd lasers, He-Ne Lasers, and diode lasers, for a wide variety of

industrial applications in laser material processing, laser cutting and marking, laser Barcode Reader/Scanner, and laser 3-D Modelling.

Laser technologies have been widely used in the hospitals in Thailand. Many of the state and government-owned or private hospitals (at least 10) equipped with state-of-the-art lasers (such as excimer lasers, CO<sub>2</sub> lasers, Nd:YAG lasers, pulsed dye lasers (PDL), argon ion lasers, He-Cd lasers, He-Ne lasers, and diode lasers) offer a wide variety of laser diagnostic and therapeutic procedures for patients. The areas of clinical applications in the hospitals cover from laser eye surgery, laser refraction and refractive surgery, laser plastic and cosmetic surgery, laser dermatosurgery, laser general operations to the early diagnosis of human cancers (lung, GI tracts, head, neck, etc.) by laser technique. For instance, the Skin Laser Centre at Bangkok Bumrungrad Hospital offers three advanced technology lasers for surgical treatments: The CO<sub>2</sub> laser was used for precisely removing diseased skin tissues and skin resurfacing, the pulsed dye laser (PDL) for treating vascular lesions (such as port-wine stains), and the Q-Switched Nd:YAG laser for treating pigmented lesions. Most of the physicians in the Skin Laser Centre are certified dermatologists who are trained in laser surgery in the United States. The Department of Otolaryngology in the Faculty of Medicine Ramathibodi Hospital affiliated with the Mahidol University have performed early lung cancer diagnosis using the Lung-Imaging Fluorescence Endoscope (LIFE) and He-Cd laser systems.

With regards to laser applications in defense and military, the researchers at the Military Research and Development Centre (MDRC) in Bangkok are applying solid state lasers, such as air-cooled CW Nd:YAG laser, pulsed Nd:YAG laser (10 Hz), and liquid-cooled pulsed Nd:YAG laser (10 Hz), to the projects of laser range-finder (LRF), tank LRF and Ship LRF.

In this survey, however, no information was found on the use of laser systems in environmental monitoring in Thailand.

## 2.5 Vietnam

Laser technologies have found wide applications in the fields of R & D, industry, military and medical surgery in Vietnam since the setting of a laser physics and laser technology industry in the early 1980's.

The basic research work on lasers is done mainly at the research institutions and universities, such as the Academy of Sciences of Vietnam, National Centre for Sciences and Technology (NCST), Institute of Applied Physics, Hue College of Sciences, University of Ho Chi Minh City, University of Technology of Ho Chi Minh City. The laboratories associated with NCST conduct both basic and mostly applied research on lasers. These research institutions have laser laboratories equipped with different kinds of lasers, such as Nd:YAG lasers, diode-pumped solid state lasers, tunable dye lasers, N<sub>2</sub> lasers, excimer lasers, and other gas lasers like He-Ne lasers and argon ion lasers, which are capable of keeping up with the development speed of laser technology to serve the scientific researchers in industry, military and medical applications as well as the speciality practice for students and post-graduate training. The work undertaken by the research laboratories spans from research on the fundamental aspects of laser physics and spectroscopy in Physics and Chemistry to practical applications in semiconductor, fibre optic sensing in industry and environmental controls.

Scientists from the Institute of Materials Science (IMS), National Centre for Sciences and Technology (NCST) used the visible diode laser to develop the fibre optic sensors in the beverage industry and environmental controls. Different types of lasers such as N<sub>2</sub> laser, excimer laser, and diode-pumped solid state laser were constructed in NCST. The applications of lasers to industrial processes (materials processing, machining and tooling) were also developed, though still not so advanced thus far in Vietnam.

In hospitals in Vietnam, laser technology has contributed significantly to advances in surgery as well as to the effective treatment of several diseases. The CO<sub>2</sub> lasers are widely used in the treatment of many diseases such as ophthalmological ailments, leprosy ulcers, operation of osteitis and the surgical treatments of meningiomas at the base of the skull, and benign lesions and mild dysplasia of the cervix. The intravenous He-Ne laser irradiations were implemented in the clinical procedures for treatment of sequela of encephalovascular diseases and Parkinson patients. Diode laser acupuncture is also used for effective relief of stomach ulcer pain and for physical rehabilitation of certain disabilities.

As regards the laser applications in atmospheric monitoring in Vietnam, we did not find such information during this survey.

Today, Vietnam has a highly trained group of experts and officials specialising in laser and optical technologies and other related sectors which are likely to enhance the further development of the nation-wide laser industry and medicine while keeping in touch with international laser applications.



## 2.6 Philippines

In academic research institutions and laboratories in the Philippines, the scientists use different kinds of laser systems for research in the fields of laser physics, optical spectroscopy, nonlinear optics, holography, and laser cooling and trapping. In recent years, some research groups, for example, the Laser Physics Group at the University of the Philippines in Diliman (UPD), have extended the research field to the areas of laser applications in the LIDAR system for atmospheric monitoring, laser materials processing, laser techniques in film and semiconductor, optoelectronics, laser making in packing industry, optical communications, optical image processing, and so on. The types of laser systems used in the research laboratories in UPD, at the Ateneo de Manila University, at the De La Salle and also at the University of Southeastern Philippines are He-Ne lasers, argon ion lasers, pulsed and CW Nd:YAG lasers, excimer lasers, CO<sub>2</sub> lasers, N<sub>2</sub> lasers, flashlamp-pumped dye lasers, and semiconductor lasers. The Laser Physics Group in the University of the Philippines (Diliman) also constructed its own high power laser systems, such as excimer laser, CO<sub>2</sub> laser, N<sub>2</sub> laser, and Dye lasers for laser research activities.

With respect to the laser applications in industries in the Philippines, some semiconductor companies use diode lasers and solid-state lasers for material processing and package device marking. The Scanning Technologies of the Philippines, Inc. (SCANTEK) and Laser Barcode Solutions Inc. manufacture laser products and provide services for Laser Barcode Reader/Decoder, Laser/Contact Scanners; most of the light sources applied to the products are diode lasers and He-Ne lasers. The Wavetek Wandel Goltermann Asia Pacific Pty. Ltd. engages itself in the business of optical fibre communications using diode lasers. The Hilti International Ltd. works in the field of laser technology and laser positioning systems for everyday jobsite uses.

Laser technologies have been used in major private hospitals in Metro Manila, including the Medical City, Capitol Medical Center, Makati Medical Center, Manila Doctors Hospital, and Metropolitan Hospital. The Laser Centre at the American Eye Correction Centre located in the Medical City started laser eye operations in July 1995. With over 2,500 procedures performed annually, the Center holds the distinction of having the largest clinical experience in Southeast Asia in laser refractive surgery and eye surgery (both photorefractive keratectomy (PRK) and laser-assisted *in situ* keratomilieusis (LASIK)). Several laser systems such as excimer lasers, CO<sub>2</sub> lasers and Nd:YAG lasers are used to perform the correction of nearsightedness and astigmatism in eye surgery in these hospitals. The Manila Doctors Hospital also offers numerous state-of-the-art laser surgical equipment (excimer lasers, Nd:YAG lasers, E.N.T lasers, etc.) to aid in diagnosing and treating the eye ailments. The development of laser technology for refractive surgery and eye surgery was accelerated rapidly in the hospitals of the Philippines. Apart from laser eye surgery, laser plastic surgery, laser dental surgery and laser general operations are also carried out in some hospitals.

In the area of laser environmental monitoring in the Philippines, the Manila Observatory first developed the LIDAR (Light Detection and Ranging) system and operated it since January 1996. The laser source used in the LIDAR system is a pulsed Nd:YAG laser with the second harmonic generation of 532 nm (linearly-polarised). The research institutions in Ateneo de Manila University and the University of the Philippines are collaborating with the Manila Observatory on the LIDAR project for environmental monitoring. The work uses the MIE LIDAR system for monitoring urban air pollution, studying of the physical and optical properties of clouds, sensing of the atmospheric boundary layer, and the designing of meteorological instruments as well.

Note that there is a limited number of technicians and experts in the Philippines who are trained on laser systems. Most of experts on lasers are in the research institutions and laboratories, especially in the National Institute of Physics at the University of the Philippines in Diliman. In the universities and colleges, about 5-15 % of laser researchers are presently using the system because of a very limited funding allocation especially in the state or government-owned universities where budgetary constraints is the main problem. The use of laser systems in the industries is very uncommon, only multi-million companies are adopting

this system. The small and medium enterprises are still using the conventional type of equipment. Therefore, there is still a room for improvement in laser technologies in the Philippines.

## **2.7 Brunei**

In Brunei, only one research group at the University of Brunei is involved in the fields, such as laser physics, Raman spectroscopy, non-linear optics and laser spectroscopy, fibre-optic sensors, and holographic interferometry, using laser sources of a tunable diode laser (SDC), He-Ne lasers, a He-Cd ion laser, and an argon ion laser. However, no information was found on the use of laser systems in the sectors of industries, hospitals and environmental monitoring organisations in Brunei.

## 2.8 Cambodia

During this survey, no information was found on the activities of laser applications in Cambodia.

## 2.9 Laos

During this survey, no information was found on the activities of laser applications in Laos.

## 2.10 Myanmar

During this survey, no information was found on the activities of laser applications in Myanmar.

**APPENDIX -**  
**Data on Laser Applications in South East Asian**  
**Countries**



## Laser Applications in Singapore

### I. Research, Development and Engineering in Academy/University

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>Nanyang Technological University (NTU)</b>                      Nanyang Avenue, Singapore 639798                      Tel: +65-7911744                      Fax: 7911604</p> <p><b>Division of Microelectronics                      School of EEE</b></p> <p><b>Photonics Group</b></p> <p><b>Microelectronics Centre (MEC)</b></p>	<p><b>Laser Engineering</b>                      Laser System Research:                      Development of diode-pumped solid state lasers                      Development of semiconductor lasers emitting in the visible to mid-infrared (0.6 to 2.6 <math>\mu\text{m}</math>) regions                      Intelligent control of a nitrogen laser                      Development and application of all solid-state ultrafast lasers and optical fibre soliton lasers                      Development of advanced laser-based characterisation equipment                      Engineered laser applications                      Intelligent control of a nitrogen laser                      Carrier Dynamics and Gain Saturation in Quantum Well Lasers                      Broad-area semiconductor laser amplifiers                      Fabrication of multiple wavelength lasers in GaAs/AlGaAs structures using a one-step spatially controlled quantum well intermixing technique</p> <p><b>Laser Applications in Microelectronic and Optoelectronic Manufacturing</b>                      Laser materials processing (micro-machining, deposition)                      Laser machining and marking                      Laser engraving of photomasks                      Pulsed-laser deposition                      Development and applications of a laser-writing lithography</p>	<p>Q-switched Nd:YAG laser                      Excimer laser                      Ti: Sapphire laser                      Diode-pumped Nd:YVO<sub>4</sub> laser                      Argon ion laser                      He-Ne lasers                      Diode lasers                      N<sub>2</sub> laser                      Semiconductor laser (810 nm)</p>

	<p>system for maskless patterning optical engineering                  Laser writing lithography                  Laser holographic interference system for optical grating fabrication</p> <p><b>Optoelectronics</b>                  Development of optical pulse sources                  Development of semiconductor lasers                  Laser-treated polyimide                  Laser writing system for photonics integrated optics</p> <p><b>Optical Networking</b>                  Optical communications                  Optoelectronics for optical networking</p> <p><b>Photonics Display</b>                  Rapid prototyping integrated optics</p> <p><b>SOL-GEL Photonics</b></p> <p><b>Photonic Sensors</b></p> <p><b>Lasers in medicine</b>                  Lasers and robots in medicine                  Biomedical and Biochemical Sensor /Blood cell counting/ water pollution monitoring                  Fibre Optic Laser Doppler Anemometry                  Laser applications in monitoring in vivo blood flow.</p>	
<p><b>Division of Manufacturing Engineering</b>  <b>School of Mechanical and Production Engineering</b>                  (MPE)                  NTU</p>	<p>Laser materials processing (cutting, welding, cladding, etc.)                  Laser transformation hardening                  Laser hardening of punch and die surfaces                  UV laser micro-machining                  3-D laser digitisation</p>	<p>He-Ne laser                  CO2 laser                  Excimer laser                  Nd:YAG laser                  Diode pumped solid state laser</p>

	<p>Laser application in biomedicine: Laser Doppler Technique for determining blood flow</p> <p>Laser Vibrometry using self compensating system - a novel technique Development of High Speed Laser Measuring System Laser holographic interferometry</p>	Diode laser
<p><b>Division of Communication School of EEE NTU</b></p>	<p>Customised design of Photoresist Patterns UV laser Fibre Bragg Grating Fabrication Maskless laser writing system</p>	<p>Argon ion laser (doubling of 488 nm at 244 nm) KrF (248 nm) excimer laser Pulsed Nitrogen laser</p>
<p><b>Division of materials engineering School of Applied Science NTU</b></p>	<p>Laser Heat Treatment Laser processing of metallic and microelectronics materials</p>	<p>CO<sub>2</sub> lasers Nd:YAG lasers</p>
<p><b>Division of Physics School of Science NTU</b></p>	<p>Laser-based biophysics Lasers in biology and medicine Optical communications, soliton Laser plasma physics</p>	<p>Nd:YAG laser (SHG, THG, FHG). N<sub>2</sub> laser Ar/Kr ion lasers He-Cd laser He-Ne lasers Semiconductor laser</p>
<p><b>The National University of Singapore (NUS) 10 Kent Ridge Crescent Singapore 119260</b></p> <p><b>Laser Spectroscopy and Non-linear Optics Laboratory, Department of Physics Faculty of Science</b></p>	<p>Laser spectroscopy Raman spectroscopy Nonlinear Optics Semiconductor light emitters Quantum well lasers Kerr-lens mode-locked femto-second Ti:sapphire laser (770 nm) Laser ablation</p> <p>Femtosecond time-resolved spectroscopic techniques for</p>	<p>Nd:YAG lasers Ti:sapphire laser Dye laser Argon lasers He-Ne lasers</p>

	<p>semiconductors and composite materials Characterisation of low-K materials by FTIR and Raman spectroscopy.</p>	
<p><b>Department of Chemistry Faculty of Science NUS</b></p>	<p>Laser application in detection of valproic acid in human serum. Blood cell counting Laser applications in Brookhaven particles analysis Laser spectroscopy</p>	<p>Argon ion Laser He-Ne laser</p>
<p><b>Applied Mechanics Division Department of Mechanical &amp; Production Engineering (MPE) Faculty of Engineering NUS</b></p>	<p>Laser applications in microelectronic and optoelectronic manufacturing: Laser material processing Laser processed silicon surface Laser cleaning of electronic materials Laser-texturing processes Laser ablation Laser coloration and bleaching Laser plasma interactions Pulsed laser deposition  Laser Nanolithography  Laser Micro-machining  Laser interferometry</p>	<p>He-Ne laser Argon ion Laser Nd:YAG laser Excimer laser CO2 laser</p>
<p><b>Fluid Mechanics Division Department of Electrical Engineering Faculty of Engineering NUS</b></p>	<p>Laser Doppler Anemometer (LDA) system Laser applications in non-invasive fluid flow measurements Development of laser dry cleaning and laser micro-texturing in industrial applications. Laser micro-processing Laser surface cleaning for microelectronics applications Fibre optic communications Laser medical applications</p>	<p>Semiconductor laser He-Ne laser Nd:YAG laser Excimer laser</p>

	<p>Technology Transfers:                  Laser Mold Cleaner                  Laser Microtexturing System                  Laser Disk Tagging System                  Laser Deflash System</p>	
<p><b>Centre for Optoelectronics</b>                  NUS</p>	<p>Laser manufacturing processes and technologies in die and mould industry                  Laser precision Engineering                  Laser applications in microelectronics and optoelectronics industry (optoelectronic materials and devices, laser microprocessing, optical crystals and magnetic media)                  Non-linear optical properties of superlattices and quantum wells                  Semiconductor lasers                  Semiconductor devices-design, simulation and fabrication                  Application specific semiconductor lasers                  Quantum well photo-detectors and micro-bolometers                  UV and visible LEDs                  Photolithography                  Laser Interferometers.                  Growth of InGaAlAs by MBE                  High current drive heterojunction bipolar transistor (HBT)</p>	<p>Compact middle IR tuneable laser sources                  Blue/Green semi-conductor lasers                  Semi-conductor lasers (4 µm)</p>
<p><b>Singapore Polytechnic</b>                  Mechanical &amp; Manufacturing                  Engineering Department                  500 Dover Road                  Singapore 139651</p>	<p>Laser Digitising                  Holography                  Reverse Engineering</p>	<p>Argon ion laser                  He-Ne laser</p>

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<p><b>Ngee Ann Polytechnic</b> Department of Electronics &amp; computer Engineering Centre for Optoelectronics</p>	<p>Semiconductor laser sensor Holography Holographic interferometry Photonics and Nonlinear optics Tunable laser diode Optical fiber communications Laser show</p>	<p>He-Ne laser Argon ion laser Diode pumped solid state (DPSS) YAG laser</p>
<p><b>Nanyang Polytechnic in Singapore</b> Precision Engineering Centre Singapore</p>	<p>Advanced Machining Technology (Laser/Turret Machining) Advanced Metrology and Quality Engineering (Laser Interferometry Inspection) Rapid prototyping</p>	<p>CO2 laser</p>

**II. Laser applications in industry**

<b>Company/Institution/Hospital/Military</b>	<b>Major Projects and Applications</b>	<b>Laser Systems</b>
<p><b>The Gintic Institute of Manufacturing Technology (GINTIC)</b> 71 Nanyang Drive Singapore 638075</p> <p><b>Advanced Machining Technology Group</b></p>	<p>Laser material processing (cutting, drilling, welding, micro-machining, marking, semi-conductor annealing) Diode-Pumped Solid State Laser development Laser applications in microelectronics Development of high-power lasers</p>	<p>Pulsed Nd:YAG laser with multiple harmonics CW Nd:YAG Laser with Q-switching (M690B NEC) Diode-pumped YAG [Primary (1064 nm), second (532 nm), third (355 nm)] Pulse YAG (350 watts) CO2 laser (200 watts) CO2 laser (3 KW) Excimer lasers (248 nm and 193 nm)</p>
<p><b>Optical Technology Centre GINTIC</b></p>	<p>Laser nano-accuracy machining; Injection moulding for plastic optic components; Machine vision system development.</p>	<p>Various lasers</p>
<p><b>Singapore Productivity and Standards Board (PSB)</b> 1 Science Park Drive, Singapore 118221 Tel: (65)7729570, Fax: (65) 779 4359</p> <p><b>Precision Engineering Application Centre (PEAC)</b></p>	<p>Laser material processing -High power metal processing -Steel automatic processing -Systronic CO2 steel sheet cutting</p> <p>Laser Precision Engineering Laser Die Cutting Machine Mould Design and Fabrication for plastic lenses; Compression Injection Moulding Process for Plastic Optics Manufacture.</p>	<p>Nd:YAG laser Excimer laser CO2 laser</p>

<p><b>Standards and Metrology Division PSB</b></p> <p><b>Optical Radiation Metrology Lab</b></p>	<p>Laser applications in Measurement Technology and Calibrations</p> <ul style="list-style-type: none"> <li>-Dimensional and Length Metrology</li> <li>-Laser wavelength standards</li> <li>-Optical Radiation Measurement</li> <li>-Photometry Measurement and Calibration</li> <li>-Radiometry and Spectroradiometry Measurement and Calibration</li> </ul> <p>Development of standards and techniques for precision measurements of - Photometric quantities, - Radiometric quantities, - Spectrophotometric/Radiometric quantities, - Colour, - Optical properties, of light sources, lasers, LEDs, fibre-optics, colour display devices and materials; characterisation and calibration of photodetectors, optical sensors and instruments used for these measurements.</p>	<p>Various gas lasers Diode lasers</p>
<p><b>Defense Science Organisation (DSO) National Labs Singapore</b></p> <p><b>Centre for Physical Sciences</b></p>	<p>Solid state lasers Development of high-energy laser Nonlinear materials, Devices and applications Optoelectronic measurements and device operations. Diode-pumped solid state laser Optical Parametric Oscillations Laser applications of non-linear dynamics</p>	<p>Pulsed Nd:YAG laser (1.064 μm) Diode-pumped Nd:YALO laser Optical parametric oscillator (OPO)</p>
<p><b>Institute of Materials Research &amp; Engineering (IMRE)</b></p>	<p>Advanced Engineering Materials Biomaterials Nano Materials and Technology Microelectronic Materials &amp; Packaging Optoelectronics &amp; Photonics Organic Light-Emitting Displays</p> <p>MOCVD growth-LED and LD structure design and optical characterisation for GaN, InGaN, AlGaN materials Self-organised growth and characterisation of quantum dots grown by MBE, MOVCD and micro-emulsion techniques</p>	



<p><b>Department of Mechanical &amp; Production Engineering (MPE)</b></p> <p><b>Department of Electrical Engineering</b></p> <p><b>Faculty of Engineering</b> <b>NUS</b></p>	<p>Laser materials processing: Laser surface treatment, cutting, drilling and welding for materials which are difficult to machine. Laser micro-processing Laser microtexturing for disk drive industry Development of laser dry cleaning and laser micro-texturing Laser dry cleaning method for cleaning magnetic heads or media and mold surfaces for IC packaging</p> <p><b>Laser Research Pte Ltd, has also been created to commercialise the laser microtexturing system.</b></p>	<p>He-Ne laser Argon ion Laser Nd:YAG laser Excimer laser CO2 laser</p>
<p><b>Laser Microprocessing Lab/DSI</b> <b>-A joint lab of Data Storage Institute (DSI), and Electrical Engineering Department, National University of Singapore (NUS).</b></p> <p><b>Optical technology Division</b> <b>(Optical systems lab, Optical media lab, Optical Crystals lab)</b> <b>DSI</b></p>	<p>Laser applications in microelectronics and optoelectronics: Laser Cleaning Laser Etching Laser Deposition Laser Texturing Laser Ablation Laser Plasma Application Laser-induced surface modification Laser micro-Processing Laser microfabrication Laser microprocessing of magnetic and microelectronic materials Laser micro-machining applications</p> <p>Laser applications in IC packages and real-time monitoring: Real-time monitoring of laser material interactions Laser-assisted surface inspection and signal detection. Precision Velocity Measurements Precision laser measurement system Laser Doppler Vibrometer (LDV)</p> <p>Nanolithography by Tip-Enhanced Laser Irradiation Controllable laser-induced periodic structures</p>	<p>He-Ne lasers CO2 Laser Q-switched Nd-YAG Laser (1064, 532, 355 and 266 nm) Dye laser CW Argon Ion Laser (514.5 nm, Single line: 2.5 W, Multi line: 5 W) LEXTRA 50 Excimer Laser (KrF, 248 nm) Lambda Physik Excimer Laser Diode-pumped solid state (DPSS) laser (532 nm) Holmium laser Er:YAG laser OPO Other IR and UV lasers</p>

	<p>Laser applications in</p> <ul style="list-style-type: none"> <li>-Pulsed Laser Deposition (PLD) of thin films (organic, inorganic, metal, etc.) by laser ablation</li> <li>-Concurrent deposition by laser ablation and ion beam bombardment</li> <li>-Optical Pick-up design</li> <li>-Optical recording media tester</li> <li>-Vibration tester</li> <li>-Near-field optical recording technique</li> <li>-Compact solid state laser source</li> <li>-Optical characterisation.</li> <li>-Optical Spectroscopy</li> </ul>	
<p><b>Quaestus Singapore Pte Ltd:</b></p>	<p>Design, processing and characterisation of visible LEDs.          Opto-Electronics          Advanced Materials          Semiconductor materials, Optical fibres          Optical Scanners, Laser Printers, Optical Disc Players</p>	<p>He-Ne laser          Diode laser</p>
<p><b>Avimo Electro-Optics Pte (S) Ltd.</b>          14 Fifth Lok Yang Road, Jurong Town          Singapore 629763          Tel: +65-2651479          Fax: +65-2651479</p>	<p>Laser-based instrumentation for medical diagnosis at visible wavelengths          Laser range finder          Night-vision systems</p>	
<p><b>Wintec Laser Technology Pte (S) Ltd</b>          Blk 203B Henderson Road          #10-12 Henderson Industrial Park          Singapore 159548          Tel: 65-2704311          Fax: 65-2705311</p>	<p>Products:          Laser cutting/welding/marketing/engraving/trimming/processing systems and other optical products          New CO2 laser engraving/marketing machines          YAG and CO2 laser welding machines          Industrial standard CO2 laser and Nd:YAG lasers          1. Sealed CO2 laser up to 200W          2. Fast axial flow CO2 laser from 700W to 2000W          3. Nd:YAG laser up to 1000W</p>	<p>Nd:YAG laser (50-700W)          CO2 laser (both scanning type &amp; plot type, 25W, 50W)          YAG Cutting lasers (200W, 500W, 800W, 1KW)          CO2 cutting lasers (1.5KW, 1.7KW, 2KW and 2.5KW)          He-Ne laser          Diode laser</p>

<p><b>Medical Laser Products</b>  <b>CO2 Therapy Laser Instrument</b>          -Various operations for dentistry, stomatology, equipped with special heads suitable for otolaryngology.          Pulsed Nd:YAG lasers          -Dentistry, E.N.T., stomatology, surgery and gynecology.</p> <p><b>Applications:</b>          Precise marking on electronics components such as IC, capacitor, resistor for brand, sign, date, serial number, bar code etc.          Precise marking on watch case and metal tools          Precise marking on keyboard and hand phone for number and character          Precise marking on PCB board for brand, sign, date, serial number, bar code etc. in electronics industries          Engrave pre-ink and rubber stamp for stamp industry          Laser cutting die board, wood, plastic, copper, steel, aluminum.          Power range from 200W, 500W, 800W, to 1KW for both CO2 and YAG laser type. 1.5KW, 1.7KW and 2KW, 2.5KW, for CO2 laser type.</p> <p>Laser trimming machine in trimming circuit parameters, resistance and capacity in thick and thin film.</p> <p>Precise drilling on jewellery, bearing, manmade diamond, hard alloy, china and silicon slice.</p> <p>A manufacturer and integrator of industrial Nd:YAG and CO<sub>2</sub> laser machines.          R &amp; D in laser technology</p> <p>Applications of laser marking/marker, cutting, trimming, and welding in industry.</p> <p>Laser-related products like vision systems, barcode readers, laser chillers for cooling, lamps, shield glass and DI resin.</p>		
<p><b>Hypertronics Pte (S) Ltd</b>          Blk 1022, Tai Seng Ave, #03-3528, Tai Seng Ind Est          Singapore 534415          Tel: (65) 2802691          Fax: (65) 2849910</p>		<p>Q-switched YAG lasers (30W, 70W)          CO2 lasers (10W, 25W)          Diode pump Nd:YAG laser          Diode laser</p>

	<p>Laser markers -Nd:YAG laser marker (Unlimited number of applications in marking, cutting and trimming). -CO2 laser marker -Diode pump Nd:YAG marker -PCB laser marking/marker</p>	
<p><b>Keteca S'pore (Pte) Ltd</b> 35, Tannery Rd #07-06, Tannery Blk, Ruby Ind Complex Singapore 347740 Tel: (65) 7493318 Fax: (65) 7493360</p>	<p><b>Products and services</b> Automation systems &amp; equipment Laser cutting/engraving/marketing/welding machines Laser printing and engraving services Lasers</p>	<p>CO2 laser Nd:YAG laser</p>
<p><b>Zilix Technologies Pte Ltd</b> Blk 5002 Ang Mo Kio Ave 10 #05-07 TECHplace II Singapore 569871</p>	<p><b>Products/Services</b> Laser cutting machines and services Laser gauging systems Laser inspection equipment Laser marking projectors Laser optics Laser pointers Laser printers Laser printing &amp; engraving service Laser profiling systems Laser scanners Lasers</p>	<p>Nd-YAG lasers Diode lasers He-Ne lasers</p>
<p><b>Melles Griot SP, Pte Ltd</b> 994 Bendemeer Road #06-05 Kallang Basin Industrial Estate Singapore 339943, NA 339943 Singapore Tel: (65) 392 5368 Fax: (65) 392 5508</p>	<p><b>Products</b> LASTIP - 2D simulator for semiconductor lasers PICS3D - 3D simulator for semiconductor lasers Laser-Star Display Gas Lasers, Pulsed excimer lasers Blue and Green Air-Cooled Ion Lasers High-Power Blue and Ultraviolet Lasers Diode-pumped solid-state (DPSS) laser systems Chromium-doped LiSAF lasers</p>	<p>Diode laser He-Ne laser Argon ion laser Excimer laser Diode-pumped solid-state lasers Chromium-doped LiSAF lasers He-Cd laser (325 nm, 55 mW) He-Cd laser (442 nm, 170 mw) CO2 laser</p>

	<p>Semiconductor-laser technology Three-dimensional stereolithography and photoluminescence spectroscopy Laser holography</p>	
<p><b>II-VI Singapore Pte Ltd</b> Blk 5012, Ang Mo Kio Ave 5, #05-08/12, TECHplace II Singapore 569876 Tel: (65) 4818215, Fax: (65) 4818702</p>	<p>The sole manufacturer and supplier of infrared laser optics in ASEAN region, supplying optics for high and low power CO2 and YAG laser processing industry. Technical support concerning a wide range of laser and optical applications. Applications include industrial, medical, table-top and electronics processing. 1. Optics for CO2 Laser 2. Optics for YAG laser and other solid state lasers (Ruby, YLF, Alex) from VLOC. 3. YAG Rods, YLF Rods, Ruby Rods and other solid state lasers (Ruby, YLF, Alex) from VLOC. 4. Optics and coatings</p>	

**COMPANIES INVOLVING IN LASER CUTTING MACHINES AND SERVICES**

<p><b>Amada S'pore (1989) Pte Ltd</b> 5611, North Bridge Rd, #01-02A, Eng Cheong Tower Singapore 198782 Tel: (65) 2985033, Fax: (65) 2961713</p>	<p><b>Lynn Jen Tdg Co Pte Ltd</b> 180, Paya Lebar Rd, #03-07, Yi Guang Bldg Singapore 409032 Tel: (65) 7498816, Fax: (65) 7498817</p>	<p><b>Ivente Pte Ltd</b> 20, MacTaggart Rd, #07-01, Khong Guan Ind Bldg, Singapore 368079 Tel: (65) 2849908, Fax: (65) 2849948</p>
<p><b>East Italian Machine Tools Pte Ltd</b> 2, Kung Chong Rd Singapore 159140 Tel: (65) 4736555</p>	<p><b>Haco Far East Pte Ltd</b> 161, Lavender St, #03-04 Singapore 338750 Tel: (65) 2975662, Fax: (65) 2975639</p>	<p><b>Keteca S'pore (Pte) Ltd</b> 35, Tannery Rd, #07-06, Tannery Blk, Ruby Ind Complex Singapore 347740 Tel: (65) 7493318, Fax: (65) 7493360</p>
<p><b>Piasim Corpn (Pte) Ltd</b> 6, Harper Rd, #01-05, Leong Huat Bldg Singapore 369674 Tel: (65) 3822633</p>	<p><b>TRUMPF Pte Ltd</b> 25, International Business Pk, #02-28/29, German Centre Singapore 609916 Tel: (65) 5627780, Fax: (65) 5627788</p>	<p><b>VTS Technology (S) Pte Ltd</b> 20, MacTaggart Rd, #07-01, Khong Guan Ind Bldg Singapore 368079 Tel: (65) 2849908, Fax: (65) 2849948</p>

<p><b>Ying Wah Industries Pte Ltd</b> 16, Kallang Way 5 Singapore 349034 Tel: (65) 7441986, Fax: (65) 7447995</p>	<p><b>Fine Sheetmetal Works Pte Ltd</b> 12, Tuas Link 1 Singapore 638595 Tel: (65) 8636663, Fax: (65) 8636662</p>	<p><b>Ivente Pte Ltd</b> 20, MacTaggart Rd, #07-01, Khong Guan Ind Bldg Singapore 368079 Tel: (65) 2849908, Fax: (65) 2849948</p>
<p><b>Kian Heng Engineering Works Pte Ltd</b> Blk 3006, Bedok North Ave 4, #01-1538, Bedok Ind Pk E Singapore 489972 Tel: (65) 4432739, Fax: (65) 2413292</p>	<p><b>Latech Engrg Pte Ltd</b> Blk 5049, Ang Mo Kio Ind Pk 2, #01-635 Singapore 569552 Tel: (65) 4845507, Fax: (65) 4845508</p>	<p><b>Piasim Corpn (Pte) Ltd</b> 6, Harper Rd, #01-05, Leong Huat Bldg Singapore 369674 Tel: (65) 3822633</p>
<p><b>Sing Chow Metal Works (Pte) Ltd</b> 56, Defu Lane 1 Singapore 539497 Tel: (65) 2802141, Fax: (65) 2847018</p>	<p><b>Shiki Machinery Ents</b> Blk 809, French Rd, #03-192, Kitchener Complex Singapore 200809 Tel: (65) 2917059, Fax: (65) 2923982 (Laser marking projector)</p>	<p><b>Plant &amp; Mill Supplies Pte Ltd</b> 4, Loyang St, Loyang Ind Est Singapore 508839 Tel: (65) 5424211, Fax: (65) 5421318 (Laser gauging system)</p>

**COMPANIES INVOLVING IN LASER INSPECTION EQUIPMENT**

<p><b>Plant &amp; Mill Supplies Pte Ltd</b> 4, Loyang St, Loyang Ind Est Singapore 508839 Tel: (65) 5424211, Fax: (65) 5421318</p>	<p><b>Team Tech Instruments Pte Ltd</b> 1, Rochor Canal Rd, #03-18, Sim Lim Sq Singapore 188504 Tel: (65) 3396171, Fax: (65) 3396173</p>	<p><b>Dynavest Pte Ltd</b> 23, Gul Ave Singapore 629663 Tel: (65) 8611881, Fax: (65) 8617051</p>
<p><b>Nikini Automation Systems (Pte) Ltd</b> 291, Serangoon Rd, #05-00 Singapore 218107 Tel: (65) 2912372, Fax: (65) 2922372</p>	<p>—</p>	<p>—</p>

**COMPANIES INVOLVING IN LASER PRINTING & ENGRAVING SERVICES**

<p><b>Ultra Supplies</b> 1, Queensway, #03-37, Queensway Shopping Centre Singapore 149053 Tel: (65) 4796074, Fax: (65) 4750845</p>	<p><b>Ivente Pte Ltd</b> 20, MacTaggart Rd, #07-01, Khong Guan Ind Bldg Singapore 368079 Tel: (65) 2849908, Fax: (65) 2849948</p>	<p><b>Keteca S'pore (Pte) Ltd</b> 35, Tannery Rd, #07-06, Tannery Blk, Ruby Ind Complex Singapore 347740 Tel: (65) 7493318, Fax: (65) 7493360</p>
<p><b>Leo-Walls Marketing (S) Pte Ltd</b> 200, Victoria St, #03-23, Parco Bugis Junction Singapore 188021 Tel: (65) 3392228, Fax: (65) 2918122</p>	<p><b>VTS Technology (S) Pte Ltd</b> 20, MacTaggart Rd, #07-01, Khong Guan Ind Bldg Singapore 368079 Tel: (65) 2849908, Fax: (65) 2849948</p>	<p>—</p>

**COMPANIES INVOLVING IN LASERS MANUFACTURERS AND DISTRIBUTORS**

<p><b>PDS Int'l Pte Ltd</b> Blk 3, Alexandra Distripark, #08-21/24, Pasir Panjang Rd Singapore 118483 Tel: (65) 2767366, Fax: (65) 2765080</p>	<p><b>Plant &amp; Mill Supplies Pte Ltd</b> 4, Loyang St, Loyang Ind Est Singapore 508839 Tel: (65) 5424211, Fax: (65) 5421318</p>	<p><b>Golden Infra Ent</b> 50, Jln Sultan, #05-01, Jln Sultan Centre Singapore 198974 Tel: (65) 2941684, Fax: (65) 2942245</p>
<p><b>Hawko Tdg Co Pte Ltd</b> 605, MacPherson Rd, #01-15, Citimac Ind Complex Singapore 368239 Tel: (65) 2870011, Fax: (65) 2885805</p>	<p><b>II-VI Singapore Pte Ltd</b> Blk 5012, Ang Mo Kio Ave 5, #05-08/12, TECHplace II Singapore 569876 Tel: (65) 4818215, Fax: (65) 4818702</p>	<p><b>ITE Electric Co Ltd</b> 128, Joo Seng Rd, #02-01, Utech Ind Bldg Singapore 368356 Tel: (65) 2852233, Fax: (65) 2843256</p>
<p><b>Ivente Pte Ltd</b> 20, MacTaggart Rd, #07-01, Khong Guan Ind Bldg Singapore 368079 Tel: (65) 2849908, Fax: (65) 2849948</p>	<p><b>Acoustical Technologies Singapore Pte Ltd</b> 209/212, Nanyang Ave, NTU Innovation Centre Singapore 639798 Tel: (65) 7913242, Fax: (65) 7913665</p>	<p><b>Applied Cutting Technology Pte Ltd</b> 10, Wan Shih Rd Singapore 627908 Tel: (65) 2687766, Fax: (65) 2686782</p>

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<p><b>Diethelm S'pore Pte Ltd (Chemical Dept)</b> 34, Boon Leat Ter Singapore 119866 Tel: (65) 4711466, Fax: (65) 4799104</p>	<p><b>Electech Distribution Systems Pte Ltd</b> 128, Joo Seng Rd, #02-01, Utech Ind Bldg Singapore 368356 Tel: (65) 2869933, Fax: (65) 2843256</p>	<p><b>Island Optical Systems (S) Pte Ltd</b> Blk 221, Henderson Rd, #06-16, Henderson Bldg Singapore 159557 Tel: (65) 2768238, Fax: (65) 2768138</p>
<p><b>Electech Lasers &amp; Optronics Pte Ltd</b> 128, Joo Seng Rd, #04-03, Utech Ind Bldg Singapore 368356 Tel: (65) 2869933</p>	<p><b>James Richards &amp; Li Pte Ltd</b> 315, Outram Rd, #12-10, Tan Boon Liat Bldg Singapore 169074 Tel: (65) 2215255, Fax: (65) 2257838</p>	<p><b>Keteca S'pore (Pte) Ltd</b> 35, Tannery Rd, #07-06, Tannery Blk, Ruby Ind Complex Singapore 347740 Tel: (65) 7493318, Fax: (65) 7493360</p>
<p><b>Lijen Ind Development Pte Ltd</b> 315, Outram Rd, #12-10, Tan Boon Liat Bldg Singapore 169074 Tel: (65) 2215255, Fax: (65) 2257838</p>	<p><b>Manufacturing Integration Technology Pte Ltd</b> 5004, Ang Mo Kio Ave 5, #03-12, TECHplace II Singapore 569872 Tel: (65) 4810511, Fax: (65) 4818955</p>	<p><b>Melles Griot SP Pte Ltd</b> 994, Bendemeer Rd, #06-05, Kallang Basin Ind Estate Singapore 339943 Tel: (65) 3925368, Fax: (65) 3925508</p>
<p><b>Piasim Corpn (Pte) Ltd</b> 6, Harper Rd, #01-05, Leong Huat Bldg Singapore 369674 Tel: (65) 3822633</p>	<p><b>VTS Technology (S) Pte Ltd</b> 20, MacTaggart Rd, #07-01, Khong Guan Ind Bldg Singapore 368079 Tel: (65) 2849908, Fax: (65) 2849948</p>	<p><b>Wintec Resources Pte Ltd</b> Blk 203B, Henderson Rd, #10-12 Singapore 159548 Tel: (65) 2704311, Fax: (65) 2705311</p>
<p><b>Wuxing Tdg</b> Blk 9003, Tampines St 93, #03-182 Singapore 528837 Tel: (65) 7861834, Fax: (65) 7873009</p>	<p><b>Zugo Technology Pte Ltd</b> 55, Kaki Bukit View, Kaki Bukit Techpark II Singapore 415976 Tel: (65) 8440055, Fax: (65) 8440655</p>	<p>—</p>



III. Laser applications in hospitals

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>Singapore General Hospital/National Cancer Centre</b>                      Outram Road                      Singapore 169608                      Tel: +65- 222 3322                      Fax: +65- 222 1720</p> <p><b>Department of Clinical Research</b>  <b>Department of Urology</b>  <b>Department of Pathology</b></p>	<p>Laser applications in surgery and medicine                      PDT, PDD.                      Laser confocal microscopy                      Confocal microscopy for cancer diagnosis                      Early bladder cancer diagnosis</p>	<p>Coherent Mira 900F+Verdi 5 W                      All solid-state diode-pumped                      Nd:YVO<sub>4</sub> laser producing its CW                      green light (532 nm)                      Dye laser                      UV laser light (370-400 nm)</p>
<p><b>National University Hospital</b>                      5 Lower Kent Ridge Road                      Singapore 119074</p> <p><b>Dentistry Department</b>  <b>Cardiac Department</b>  <b>Ophthalmology Department</b>  <b>Oral and Maxillofacial Department</b></p>	<p>Lasers applications in                      Facial Plastic Surgery                      Dentistry                      Heart surgery                      Refractive Surgery                      Photorefractive keratectomy (PRK)                      -Correct myopia and astigmatism                      Laser-assisted in situ keratomileusis (LASIK)                      -Correct nearsightedness and astigmatism                      Blood cell counting</p>	<p>He-Ne lasers                      Lambda Excimer lasers                      CO<sub>2</sub> lasers</p>
<p><b>Tan Tock Seng Hospital/ Singapore</b>                      11 Jalan Tan Tock Seng                      Singapore 308433</p> <p><b>Neurodiagnostic Laboratory and Non-invasive Cardiac Laboratory</b>  <b>Department of Respiratory Medicine</b></p>	<p>Laser surgery                      Laser Bronchology Suite                      LIFE-Lung Fluorescence Endoscopy System for the early detection of lung cancer</p>	<p>He-Cd laser                      CO<sub>2</sub> laser</p>

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<p><b>National Skin Centre</b>          Institute of Dermatology          1 Mandalay Road          Singapore 308205          Tel : (65)-3508401          Fax : (65)-2533225</p>	<p>Laser cosmetic dermatologic surgery:          Skin Resurfacing          Treatment Response of Port-wine Stains          Treatment of Pyogenic Granuloma in Children          CO<sub>2</sub> laser surgery (lesions treated such as viral warts, benign skin growths and naevi, tattoos, other pigimentary lesions, vascular lesions and others)          In situ evaluation of Immune unresponsiveness in lepromatous leprosy lesions with the laser confocal microscope          Phototherapy Clinic</p>	<p>CO<sub>2</sub> Lasers (5 mW-50 W, operating mode- continuous wave, superpulse and pulsed)          Flashlamp-Pumped Pulsed Dye Laser</p>
<p><b>Parkway Group Healthcare Pte Ltd-</b>  <b>Mount Elizabeth Hospital (65) 731 2382/383</b>  <b>Gleneagles Hospital (65) 470 5831/832</b>  <b>East Shore Hospital (65) 340 8600</b>          Singapore</p>	<p>Excimer Laser Surgery such as          Photorefractive Keratectomy (PRK)          (correct short-sightedness, long-sightedness and astigmatism).          Laser-In-Situ Keratomileusis (LASIK)</p>	<p>Excimer Lasers</p>
<p><b>Eye Cataract and Refractive Surgicenter</b>  <b>C. H. Low Asia Medic Eye Centre</b>          3 Mt. Elizabeth, #16-01          Singapore 228510          Tel: 65-7346684/5          Fax: 65-7343189</p>	<p>Lasers in eye surgery          LASIK          PRK          Refractive cataract surgery</p>	<p>Excimer lasers</p>
<p><b>National Myopia Correction Eye Center</b>          Singapore</p>	<p>Laser vision correction          Laser eye surgery</p>	<p>Excimer lasers</p>

IV. Laser applications in environmental monitoring

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>Nanyang Technological University</b>                      School of EEE                      Division of Microelectronics                      Singapore</p>	<p>Research on LIDAR system for atmospheric remote sensing for monitoring pollutant species</p>	<p>Continuum flashlamp-pumped Nd:YAG laser (1.06 μm)</p>

## Laser Applications in Malaysia

### I. Research, Development and Engineering in Academy/University

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>University Malaya</b> Lembah Pantai 59100 Kuala Lumpur Malaysia Tel: 03-7572229 Fax: 03-7572314</p> <p><b>Laser and Photonics Research Laboratory</b></p>	<p>Construction of high power N2, CO2, Copper vapour lasers and excimer (XeCl, KrF) lasers Laser processing machine and manufacturing CO2 laser for cutting workpiece in 2D. laser ablations Lasers in cancer treatment research Laser Lidar system in remote sensing for monitoring nitrogen dioxide concentration and mapping of plume in the atmosphere</p>	<p>Laser systems below built up in the lab N2 laser Copper vapour laser CO2 laser Excimer laser</p>
<p><b>University Malaya</b> Faculty of Science Lembah Pantai 59100 Kuala Lumpur Malaysia</p> <p><b>Department of Physics</b></p>	<p>Laser Physics &amp; Optoelectronics Lasers and Nonlinear Optics Fiber Optics technology Laser Spectroscopy Laser crystals such as titanium sapphire, Cr:LiSAF, Cr:LiCAF, etc. Nonlinear optical materials such as beta barium borate and lithium triborate Design and development of new laser systems Applications on nonlinear devices as tunable laser sources. Study on ultrashort pulses technology Development of optical fibre lasers and devices such as optical amplifiers</p>	<p>He-Ne laser Nd:YAG laser N2 laser CO2 laser Excimer lasers Diode pumped solid state laser Dye laser Diode laser</p>

<p><b>University Malaya</b> Lembah Pantai 59100 Kuala Lumpur Malaysia</p> <p><b>Institute of Advanced Studies</b></p>	<p>Basic and applied research on Laser Physics and Technology</p>	
<p><b>University Putra Malaysia</b> Faculty of Science &amp; Environmental Studies Department of Physics Malaysia</p>	<p>Lasers in Photonics system for defense/Hologram guided target designation Radiation Scattering &amp; Absorption of Biological Samples Bragg optical displacement sensor</p>	<p>Excimer laser Argon ion laser</p>
<p><b>Universiti Telekom in Malaysia</b> (Multimedia University) Faculty of Engineering Malaysia</p> <p><b>Photonics Research Centre</b></p>	<p>R &amp; D in laser technologies and Optoelectronics Laser-matter interactions Semiconductor materials Pulsed laser deposition of materials Solid-state dye and pulsed gas lasers Characterisation of surface defects in silicon wafer Laser Scanning Confocal Microscopy Laser show Ultrafast optics: -Femtosecond Pump-probe experiments -Combining ultrafast optics and near field optics to achieve high resolution temporal and spatial images</p>	<p>Pulsed N<sub>2</sub>, CO<sub>2</sub>, KrF and XeCl lasers Solid-state dye lasers, and CW CO<sub>2</sub> laser Cu and CuBr vapour lasers Brillouin-erbium fibre laser</p>
<p><b>Standards and Industrial Research Institute of Malaysia</b> Malaysia</p>	<p>Laser metrology (length measurement and standard) Laser interferometry (line standard measurement)</p>	<p>I2-stabilised He-Ne laser I2-stabilised Solid/Semiconductor Lasers</p>

<p><b>Universiti Teknologi Malaysia</b> 81310 Skudai, Johor Darul Ta'zim Malaysia Tel: 07-5576160 Fax: 07-5566162</p> <p><b>Institute of Coastal and Off-shore Engineering</b></p>	<p>Laser-Doppler velocimetry Method of Measuring Flows</p>	<p>He-Ne laser Diode laser</p>
<p><b>Universiti Teknologi Malaysia</b> <b>Physics Department</b> Faculty of Science 81310 Skudai, Johor Darul Ta'zim Malaysia Tel: 07-5576160 Fax: 07-5566162</p> <p><b>Technology laser lab</b></p>	<p>Lasers in Optoelectronics Laser acoustics Laser marking/cutting Hydraulic Machinery and Cavitation by high power laser Laser interactions with Solid materials Holographic interferometry Fibre Optics Sensors and systems Optical communications</p>	<p>Diode Laser He-Ne laser Q-switched Nd: YAG laser Nd:YAG laser CO2 laser</p>
<p><b>Universiti Teknologi Malaysia</b> Faculty of Electrical Engineering 81310 Skudai, Johor Darul Ta'zim Malaysia Tel: 07-5576160 Fax: 07-5566162</p> <p>Department of Telematics and Optical Communication Engineering</p>	<p>Lasers in Optoelectronics Optical Fiber communications -An unguided optical communication system for weather monitoring</p>	<p>He-Ne laser Diode laser</p>
<p><b>Univ. of Putra, N. Kedah</b> Malaysia</p>	<p>High-Power Lasers in Manufacturing Laser Material Crystal Growth and Nonlinear Materials and Devices</p>	<p>Pulsed Nd:YAG laser CO2 laser Dye laser</p>

<p><b>Universiti Pertanian Malaysia</b> Department of Physics Faculty of Science and Environmental Studies 43400 UPM, Serdang Selangor, MALAYSIA Tel: (603) 9486101 Ext. 3652/3655/3554/3516/3513 Fax: (603) 9486646</p> <p><b>Applied Optics Group</b></p>	<p>Design non-invasive laser optical techniques and devices in photonics for use by the manufacturing sector.</p> <p>Photothermal and photoacoustic science Infrared Coating Gauge</p>	<p>Laser source (class IV)</p>
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II. Laser applications in Industry

Company/Institute/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>Digital-Creations SDN. BHD</b>                      6-2 Medan Setia 2, Plaza Damansara                      Kuala Lumpur, 50490                      Malaysia                      Tel: +60-3-758-4452                      Fax: +60-3-758-4451                      Laser production company</p>	<p>Custom design of laser control components and controllers for multimedia presentations</p>	<p>Nd:YAG laser                      N2 laser                      CO2 laser</p>
<p><b>Shin Etsu Handotai (M) Sdn. Bhd.</b>                      Malaysia</p>	<p>Laser defect detection system to find the Light Point Defects (LPD) on silicon wafer surface</p>	<p>Air-cooled Argon ion laser system (Uniphase, 75 mW, 488 nm)</p>
<p><b>Global Videowall Communications Sdn Bhd</b>                      Malaysia</p>	<p>Manufacturing various lasers</p>	<p>Various Lasers</p>
<p><b>ENGINEERING AID SDN BHD</b>                      16 &amp; 16A, Jalan Hujan Rahmat Tiga,                      Overseas Union Garden,                      5th Miles, Old Klang Road,                      Malaysia                      (Malaysia Laser Mould Manufacturer)</p>	<p>CO2 Laser Cutting/Welding Machines</p>	<p>CO2 lasers</p>



<p><b>HOTSTAR (M) SDN. BHD.</b>                  No 37, Jalan Emas SD5/1, Bandar Sri Damansara,                  52200 Kuala Lumpur, Malaysia.                  Tel: 603-635 7823, 633 4697                  Fax: 603-635 7833</p>	<p>Laser Mould (specialised in die-cutting mould)                  Laser Mould/Laser Cutting</p>	<p>Nd:YAG Lasers</p>
<p>Manufacturer &amp; Exporter  <b>LVD (Malaysia) Sdn Bhd</b>                  57, Jalan Gandek, Off Jalan San Peng,                  55200 Kuala Lumpur, Malaysia.                  Tel: +603-221 2205 Fax: +603-221 8562</p> <p>LVD is a privately owned company, the founders for                  which the company is named (L) Lefebvre, (V) Vanneste,                  (D) Dewulf.</p>	<p>LVD Laser cutting/Machine</p>	<p>CO2 Laser: 1500, 2000, 3000 w</p>
<p><b>AIS AUTO ID SYSTEMS SDN BHD</b>                  62 Jalan Tengku Badar                  42000 Port Klang                  Selangor Darul Ehsan, Malaysia                  Tel: (603) 365 7989                  Fax: (603) 365 9912</p>	<p>Laser barcode equipment</p>	<p>Diode lasers                  He-Ne lasers</p>
<p><b>PERIPHERAL SOLUTIONS (MALAYSIA) SDN BHD</b>                  Kelana Business Centre                  97 Jalan SS7/2 Kelana Jaya                  47301 Petaling Jaya                  Selangor Darul Ehsan                  Malaysia                  Tel: (603) 582 2188                  Fax: (603) 582 2186                  Lot 515 Block A</p> <p><b>UBI-United Bar Code Industries Inc.</b>                  Metrologic Instruments Inc.</p>	<p>Laser scanners:                  - Wand/Laser Scanners                  - Fixed Mount Laser Scanners                  - POS Desktop Laser Scanners                  - POS Flat Bed Laser Scanners                  - Industrial High Speed Laser Scanners                  - Industrial Fixed Mount Laser Scanners</p>	<p>Diode lasers                  He-Ne lasers</p>

<p><b>Ground Data Systems Sdn. Bhd.</b>          No. 24, Lorong 20/16A          Paramount Garden,          46300 Petaling Jaya,          Selangor, Malaysia.          Tel : (6-03-7730310          Fax : (6-03-7742584</p>	<p>Laser ranging          Ground Survey          Aerial Photography          Transmission line route selection and subsequent mapping of the selected corridor          Determination of the extents of dam reservoirs          Monitoring of vegetation growth within transmission line right of ways          Highway construction          Mining sectors          Forestry management companies</p>	<p>Nd:YAG laser          He-Ne laser          Diode laser</p>
<p><b>Symbol Technologies Inc</b>          No. 8-3, Jalan PJS 8/6,          Mentari Business Park, Bandar Sunway,          46150 Petaling Jaya,          Selangor, Malaysia          Tel: 603-738 8225          Fax: 603-738 8227</p>	<p>Laser interferometry          Laser metrology          3-D non-contact surface metrology          Laser Texture Analysis in the hard disk industry          laser ablation calibration          laser diode optics          Biomedical Optics applications          Laser bar code scanners</p>	<p>He-Ne laser          Argon ion laser          Nd:YAG laser          CO2 laser          Diode laser</p>

<p><b>SIRIM Berhad's Industrial Instrumentation and Electronic Centre</b> Malaysia</p>	<p>Applications of laser technology in material processing, medicine inspection &amp; control; military aerospace, fibreoptic, education, agriculture and many other uses in business and manufacturing to the commercial sector</p> <p>Laser range finding, Lasers for marking, cutting and tooling, Laser cleaning of micro-fine coatings of paint or chemicals Lasers remote sensing for environmental applications Lasers in medicine</p>	<p>Various lasers</p>
<p><b>Laser Speedtraps, Speed Traps in Malaysia</b> Malaysia</p>	<p>Speed traps on PLUS highway in Malaysia Speed monitoring on PLUS highway Laser and radar gun technology</p>	<p>Radar/laser detectors</p>

III. Laser applications in hospitals

Company/Institute/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>University of Malaya</b> Department of Oral and Maxillofacial Surgery Faculty of Dentistry 50360 Kuala Lumpur Malaysia</p>	<p>Laser surgery in soft tissue and dental hard tissue Lasers in dentistry Lasers in oral surgery Laser cuttings on dental hard tissues</p>	<p>TEA CO<sub>2</sub> laser Nd:YAG laser Argon ion laser Ho:YAG laser Er:YAG laser Excimer laser</p>
<p><b>The Hospital Kuala Lumpur</b> Department of Dermatology Malaysia</p>	<p>Laser surgery in clinical dermatology Photodermatology Dermatosurgery Phototherapy Skin Surgery</p>	<p>Argon ion laser CO<sub>2</sub> laser Vascular Lasers</p>
<p><b>Niwan Skin Slimming Beauty Centre</b> 2896-A, 1st Floor, Jln Baru, Seberang Prai Tengah, Bandar Penas, 13600 Butterworth, Malaysia Tel : 04-3970398,  Branch 1: 21-A, 1st Floor, Rangoon Rd, 10400 Penang Tel : 04-2287250  Branch 2: C-135, 1st Floor, Lorong 10, Taman Sejati Indah, 08000 Sungai Petani, Kedah Tel : 04-4313491</p>	<p>laser cosmetics surgery Laser eye, nose, lips &amp; eye bag.</p>	<p>CO<sub>2</sub> laser Nd:YAG laser Excimer laser</p>

IV. Laser applications in environmental monitoring

Company/Institute/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>University Malaya</b>                      Lembah Pantai                      59100 Kuala Lumpur                      Malaysia</p> <p><b>Laser and Photonics Research Laboratory</b>  <b>Department of Physics</b></p>	<p>Laser Lidar system in remote sensing for monitoring nitrogen dioxide concentration and mapping of plume in the atmosphere</p>	<p>Nd:YAG lasers</p>

## Laser Applications in Indonesia

### I. Research, Development and Engineering in Academy/University

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>The Indonesian Institute of Sciences-LIPI</b>                      Laboratory for Laser &amp; Optoelectronics                      Ji. Cistitu No. 21/154D                      Bandung – 40135, Indonesia                      Tel: 022- 2504660, 2504661                      Fax: 022- 2504659</p> <p><b>Research &amp; Development Centre for Applied Physics</b></p>	<p>Applications of laser and optoelectronics technology                      Photonic devices                      III-V compound for LED/laser diode                      Holography and speckle interferometry                      Optical fibre systems                      Material processing using high-power laser                      Development of GaInAsP/InP infra-red laser diode                      GaInAsP/GaAs visible laser diode                      Application of optical fibre interferometer for under-water acoustic sensor (hydrophone)                      Stainless steel hardening using Nd: YAG laser radiation.</p>	<p>He-Ne lasers                      Argon ion laser                      Nd:YAG laser                      Diode laser                      CO2 laser                      Excimer laser</p>
<p><b>University of Indonesia</b>                      Kampus UI Jl. Salemba Raya No. 4                      Jakarta 10430                      Indonesia                      Tel : ( 62 - 021 ) - 3100059, 3146737                      Fax : ( 62 - 021 ) - 322269</p> <p><b>Laboratory for Opto-electrotechniques and applied lasers</b></p>	<p>Laser Applications in                      Optoelectronics                      Spectroscopy                      Optical communications                      Active remote sensing/lidar                      Instrumentation                      Holography and Interferometry                      Metrology                      Thin film                      Nonlinear Optics                      Plasma Physics, etc.</p>	<p>TEA CO2 Laser, 150 mJ, 50 ns, 10.6 <math>\mu</math>                      TEA CO2 laser, 5 Joule, 100 ns, 10.6 <math>\mu</math>                      Excimer KrF laser, 400 mJ, 10 ns, 248 nm                      Nd-YAG Laser, 450 mJ, 8 ns, 1064 nm                      N2 Laser, 5 mJ, 5 ns, 337 nm,                      He-Ne lasers                      Diode lasers</p>

<p><b>Bandung Institute of Technology - ITB</b>                  Department of Engineering Physics                  Jalan Ganesha 10, Bandung 40132                  Official: Jl. Tamansari 64 Bandung - 40116                  Indonesia                  Tel. (62-22) 2503147, 2504048. Fax. (62-22) 431792</p> <p><i>Material Sciences Laboratories</i></p>	<p>Laser applications in interferometry and holography, especially for measurement purposes</p> <ol style="list-style-type: none"> <li>1. Optical Instrumentation: designing and developing measurement devices based on laser optics.</li> <li>2. Optical communications</li> <li>3. Optical switching and computing</li> <li>4. Nonlinear Optics and Materials</li> </ol>	<p>He-Ne lasers                  Argon ion laser                  Diode laser</p>
<p><b>Badan Tenaga Atom National (BATAN)</b>  <b>Badan Tenaga Nuclear National</b>                  Bandung                  Indonesia</p>	<p>Laser interferometry                  Laser isotope separations                  Nonlinear Optics                  Laser Atomic and molecular spectroscopy                  Coherence Anti-Stokes Raman Spectroscopy (CARS)                  Optical frequency stabilisation</p>	<p>He-Ne laser                  Nd:YAG laser                  Dye laser                  Excimer laser</p>

II. Laser applications in industry

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>International Laser Productions</b> Bali, Indonesia</p>	<p>A Laser Display company, specializing in Laser system manufacturing Laser event design Laser billboard advertising Laser Sales and servicing</p>	<p>Nd:YAG laser Argon ion laser He-Ne laser</p>
<p><b>Aneka Supplier - Promotion Specialist</b> Aneka Supplier Jl. Lautze No. 9 Jakarta 10740, Indonesia Tel. : (62-21) 639 4908 Fax: (62-21) 629 5023</p>	<p>Laser Cutting/Engraving</p>	<p>CO2 Laser Nd:YAG laser</p>
<p><b>TRUMPF Pte Ltd</b> <i>(A Germany Company)</i> PT Guna Elektro Jl. Terusan Arjuna 50 Jakarta Barat 11510 Indonesia Tel: (62) 21-565 5010 Fax: (62) 21-565 5030</p>	<p>Offering highly developed laser sheet metal cutting and forming technology.  CNC-laser cutting centres (3-axis) CNC-laser systems for cutting, welding and surface treatment (5-axis) Laser processing with high powered laser Automation systems for sheet metal processing</p>	<p>HF-turbo lasers Nd:YAG lasers</p>
<p><b>Indonesia Telecommunication Industry (INTI)</b> Jl. Moh Toha 77, Bandung 40253 Indonesia Tel: 62-22-2504660 Fax: 62-22-2504659</p>	<p>lasers in surface mount Technology Laser for measure the surface of PCB Laser for detect the condition of component/IC's pin Laser for communication between machine's module</p>	<p>He-Ne lasers Diode lasers</p>



III. Laser applications in hospitals

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>University of Indonesia</b>                      Department of Ophthalmology                      School Of Medicine                      6 Jalan Salemba, Jakarta 10430                      TEL: (62-21) 392.6705                      FAX: (62-21) 392.7516</p>	<p>Refractive Laser Activity                      Photorefractive Keratectomy (PRK)                      LASIK</p>	<p>Excimer lasers</p>
<p><b>Jakarta Eye Center</b>                      Jalan Cik Ditiro 46                      Menteng, Jakarta 10310                      Tel: (62-21) 310.7434/355.600                      Fax: (62-21) 390.4601</p>	<p>Laser eye surgery                      Photorefractive Keratectomy                      LASIK</p>	<p>Excimer lasers</p>
<p><b>Medlite IV Hospital</b>                      Raya Kertajaya Indah 121                      Surabaya - Indonesia                      Tel : (62-31) 594-0070                      Fax : (62-31) 594-0060</p>	<p>Lasers in surgery and dermatology:                      Tattoo removal                      Dermal Pigmented lesions                      Dermatology charts                      Other cosmetic procedures</p>	<p>He-Ne lasers                      Q-switched, frequency doubled, Nd:YAG                      Medical lasers                      Er:YAG Laser                      CO2 Laser</p>
<p><b>The Hospital of Ear, Nose and Throat (E.N.T.)-Surgery, Proklamasi Endoscopy &amp; Laser Center</b>                      Jl. Proklamasi No. 43 Jakarta Pusat 10320                      Tel: +62-21-3900002, Fax : +62-021-3900947</p>	<p>Laser applications in                      Ophthalmology                      Surgery                      Endoscopy, etc.</p>	<p>Excimer laser                      CO2 laser                      Nd YAG laser</p>

IV. Laser applications in environmental monitoring

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>Jakarta (NEDO-LIPI) Lidar</b> The Jakarta Lidar Network Centre Jakarta city Indonesia</p> <p>The LIPI Oceanic Research Institute (Mie lidar)</p> <p>The LIPI Headquarters Building (DIAL)</p> <p>The LIPI Headquarters Building (Central Data Processing System)</p> <p>Depok campus of the University of Indonesia (Mie lidar)</p>	<p>Lidar (Laser Radar) Network System for Monitoring Atmospheric Environment</p> <p>Ground-based measurements of aerosols, clouds, molecular density, ozone, temperature and water vapor</p> <ul style="list-style-type: none"> <li>- Probing aerosols caused by forest fires, agricultural fires and slash-and-burn clearing</li> <li>- Measuring wind profile</li> <li>- Studying atmospheric boundary layer structure and transportation of atmospheric pollutants</li> <li>- Measuring distribution of ozone and SO<sub>2</sub> in the near UV region (300/280 nm), and NO<sub>2</sub> in the 450-nm region.</li> </ul>	<p>Differential absorption lidar (DIAL)</p> <p>Compact pulsed Nd: YAG laser (1064 nm, 532 nm, 355 nm)</p> <p>Nd:YAG laser pumped optical parametric oscillators (OPO x 2 sets)</p> <p>tunable solid-state lasers</p>

## Laser Applications in Thailand

### I. Research, Development and Engineering in Academy/University

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>Chulalongkorn University</b>                      The Department of Electrical Engineering                      254 Phayathai Road Patumwan                      Bangkok Thailand. 10330                      Tel: +662-215-0871-3                      Fax: +662-215-4804</p> <p>Semiconductor Devices Research Laboratory (SDRL)</p>	<p>Laser applications in                      Optoelectronic devices                      Compound semiconductor devices                      Multi-quantum well devices                      Photovoltaic system designs and applications</p>	<p>CO2 laser                      Nd: YAG laser                      He-Ne lasers                      Argon ion laser                      He-Cd laser                      N2 lasers</p>
<p><b>Suranaree University of Technology</b>                      School of Laser Technology and Photonics                      Institute of Science                      Muang District,                      Nakhon Ratchasima 30000                      Thailand                      Tel: +66-44-224194                      Fax: +66-44-224185</p>	<p>1. Laser Physics and Technology:                      Linear and Nonlinear Optics,                      Second Harmonic Generation by high power laser                      Opto-electronics                      Fibre Optics                      2. Optical Information Processing:                      Optical metrology                      Optical pattern recognition                      Optical signal processing                      Optical data storage and processing                      Optical holography</p>	<p>Q-Switched Nd:YAG Laser                      He-Ne lasers                      Tunable flashlamp Excited Dye Laser                      Diode laser</p>

<p><b>National Electronics and Computer Technology Center (NECTEC)</b>  <b>National Science and Technology Development Agency (NSTDA)</b>          Yothee Research Building, Ministry of Science          73/1 Rama VI Rd., Rajdhevee, Bangkok 10400,          THAILAND          Tei: (662) 6448150-99</p> <p><b>Laser Technology Research and Development Laboratory, Optics and Laser Device Research and Development Division</b></p>	<p>Laser technologies for materials processing and fabrications of devices such as sensors, transistors, and IC's.          Development of CO2 laser in industrial application          Laser spectroscopy          Thin film coating          Optoelectronics Materials and Devices Technology</p>	<p>Argon ion Laser          Dye Laser          Excimer Laser          Titanium Sapphire Laser          He-Ne Laser          CO2 laser</p>
<p><b>National Electronics and Computer Technology Center (NECTEC)</b>  <b>National Science and Technology Development Agency (NSTDA)</b>          Yothee Research Building, Ministry of Science          73/1 Rama VI Rd., Rajdhevee, Bangkok 10400,          THAILAND</p> <p><b>Electro-Optics Research and Development Laboratory</b></p>	<p>1. R &amp; D in science and technology of optics (natural light, laser emitting, and other light sources).          2. R &amp; D in Optical system and devices including holographic technology system for the utilisation in industry, agriculture, medical, education, military and telecommunication.          3. Dissemination of optics technology as well as cooperation with private organisation in research and development to build up of devices, system, and process in the utilization of optics technology.</p> <p>Optical metrology          Fiber-Optic devices and Components          New Designed Laser Diode Pumped Nd:YAG Laser and Up-Conversion Optics :          Holography          Laser medical applications</p>	<p>He-Ne lasers          Argon ion laser          CO2 laser          Nd:YAG laser          Excimer laser          Diode laser          Diode pumped Nd:YAG laser</p>
<p><b>Rachmongkol Institute of Technology</b>          Thailand</p>	<p>Laser spectroscopy</p>	<p>Argon ion laser          He-Ne laser</p>

<p><b>King Mongkut's Institute of Technology Ladkrabang</b> Chalongkrung Road, Ladkrabang Bangkok THAILAND 10520 Tel: (+66 2) 3266052, 3266100 Fax: (+66 2) 3267333, 3267324</p>	<p>Laser cutting Development of Optoelectronic Device and Application Fiber Optic Communications</p>	<p>Diode laser CO2 laser</p>
<p><b>Siam University</b> 235 Phetkaserm Road, Bangkok 10163 Thailand Tel: +662- 457-0068 Fax: +662- 457-3982</p>	<p>Laser spectroscopy</p>	<p>He-Ne laser Argon ion laser</p>
<p><b>Mahidol University</b> Physics Department Faculty of Science Rama 6 Road, Rachathaweewee, Bangkok 10400, THAILAND. Tel./Fax. 66-2-246 1381</p>	<p>Laser Physics and applications in Optoelectronics</p>	<p>He-Ne laser Diode laser Argon ion laser</p>
<p><b>Chiang Mai University</b> Department of Physics Faculty of Science Chiang Mai University 239, Huay Kaew Road, Muang District, Chiang Mai 50200 Thailand <i>Laser and Applied Optics Laboratory</i></p>	<p>Light Scattering and Photon Correlation -Application of Optical Technology</p>	<p>He-Ne laser Argon ion laser</p>

II. Laser applications in industry

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>National Science and Technology Development Agency (NSTDA)</b> National Electronics and Computer Technology Center (NECTEC), Ministry of Science Technology and Environment Electro-Optics LAB, Thailand</p> <p><b>Branch of Optical Technology</b></p>	<p>Laser Barcode Reader Laser Marking Laser 3-D Modeling Holography</p>	<p>He-Cd Laser Diode Laser Carbon-Dioxide Laser. Argon Laser</p>
<p><b>Oriental Electric Industry Company Ltd</b> Bang-Chan Industrial Estate, 111 Moo 4, Serithai Road, Kannayao District, Bangkok 10230 Thailand Tel: (662) 5171326, 9199873 Fax: (662) 5171328</p>	<p>Laser Cutting machines from Mitsubishi</p>	<p>CO2 laser</p>
<p><b>Loxley Intergraph (Thailand) Limited</b> Gypsum Metropolitan Tower 9th Floor/D &amp; F, 539/2 Sri Ayuthaya Road, Rajdhavee Bangkok 10400 Thailand Tel : 248-8274, 248-3392 Fax : 248-8278</p>	<p>Laser Range-finder and applications Distance Measurement GPS Mapping Area Computation</p>	<p>Nd: YAG laser</p>

<p><b>National Electronics and Computer Technology Center (NECTEC)</b>  <b>National Science and Technology Development Agency (NSTDA)</b>          Yothee Research Building, Ministry of Science          73/1 Rama VI Rd., Rajdhevee, Bangkok 10400,          THAILAND          Tel: (662) 6448150-99</p> <p><b>Laser Technology Research and Development Laboratory, Optics and Laser Device Research and Development Division</b></p>	<p>Laser material processing          Laser cutting machine          3-D laser scanner          Laser Barcode Reader</p>	<p>He-Ne lasers          Diode lasers          Nd:YAG lasers          CO2 lasers</p>
<p><b>ESRI (THAILAND) Co., Ltd.</b>          Thailand          Tel (662)678-0707 Ext. 1628          Fax (662)678-0321-3</p>	<p>Laser range finder</p>	<p>Pulsed Nd:YAG laser</p>

III. Laser applications in hospitals

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>Thonburi Hospital</b> Department of Ophthalmology Thailand</p>	<p>Laser eye surgery: Ophthalmoscopy and refraction and refractive surgery</p>	<p>Excimer lasers</p>
<p><b>Bangkok Bumrungrad Hospital</b> 33 Sukhumvit 3 (Soi Nana Nua), Wattana, Bangkok 10110 Thailand Tel: (66 2) 667-1000 Fax: (66 2) 667-2525</p> <p><b>The Eye Laser Refraction Center</b> <b>Ophthalmology Procedures (Eye Surgery)</b></p>	<p>Laser Refraction Surgery LASIK PRK</p>	<p>Excimer lasers</p>
<p><b>Bangkok Bumrungrad Hospital</b> 33 Sukhumvit 3 (Soi Nana Nua), Wattana, Bangkok 10110 Thailand Tel: (66 2) 667-1000 Fax: (66 2) 667-2525</p> <p><b>Skin Laser Centre</b></p>	<p>Esthetic laser procedures, including: Skin resurfacing Removal of age spots, moles &amp; warts Treatment of port-wine stains/birthmarks Eradication of unsightly blood vessels Removal of tattoos Removal of sunspots and other skin discoloration</p>	<p>CO2 Laser Q-switched Nd: YAG Laser Pulsed dye laser (PDL)</p>



<p><b>Mahidol University</b> Rama 6 Road, Rachathaevee, Bangkok 10400, Thailand Tel./Fax. 66-2-246 1381</p> <p><b>Department of Ophthalmology</b> Faculty of Medicine Ramathibodi Hospital</p>	<p>Laser eye surgery Laser photokeratectomy. Laser wound healing, Laser dermatosurgery</p>	<p>Diode Laser Nd:YAG Laser Excimer lasers</p>
<p><b>Mahidol University</b> Rama 6 Road, Rachathaevee, Bangkok 10400, THAILAND. Tel./Fax. 66-2-246 1381.</p> <p><b>Department of Otolaryngology</b> Faculty of Medicine Ramathibodi Hospital</p>	<p>Laser applications in medicine- Early cancer diagnosis for lung, head, neck, etc.</p>	<p>He-Cd Laser LIFE system</p>
<p><b>Laser vision Technology</b> 18 SCB Park Plaza, West building 2, floor 2, Ratchadapisek Rd., Ladyaw Jatujak, Bangkok 10900, Thailand Tel: 937-6020, Fax: 937-6021</p>	<p>Laser Refractive Surgery for Myopia (Nearsightedness), Myopia with Astigmatism Hyperopia (Farsightedness), Hyperopia with Astigmatism Astigmatism</p>	<p>Excimer lasers</p>
<p><b>Ramathibodee Hospital Thailand</b></p>	<p>Laser eye sight correction and surgical operations Lasers in Ophthalmology</p>	<p>Excimer laser CO2 laser Nd:YAG laser Nd:YAG lasers CO2 lasers</p>
<p><b>Naval Hospital Thailand</b></p> <p><b>King Mongkud Hospital Thailand</b></p>	<p>Laser surgery</p> <p>Lasers in ophthalmology and surgical operations</p>	<p>Argon ion lasers Nd:YAG lasers CO2 lasers</p>

IV. Laser applications in defense/military

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>Military R&amp;D Center</b>                      Klongtouy,                      Bangkok 10110                      Thailand</p>	<p>For military/defense applications:                      Laser range-finder                      Tank LRF, 10 Hz Nd:YAG laser                      Ship LRF, 10 Hz, liquid cool Nd:YAG laser</p>	<p>Air cooled Nd:YAG laser                      Liquid cooled Nd:YAG laser                      Pulsed Nd:YAG laser</p>

## Laser Applications in Vietnam

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>Academy of Sciences of Vietnam</b> Institute of Physics Hanoi, Vietnam</p>	<p>Generation of spectrally adjustable picosecond pulses using STS dye laser, Solid state lasers</p>	<p>Nd:YAG laser Dye laser</p>
<p><b>National Centre for Sciences &amp; Technology (NCST)</b> Institute of Material Science P.O. Box 607 Hanoi, Vietnam</p>	<p>Construction and applications of lasers, fiber optic sensors and sensors applications Advanced Materials in optoelectronics. Laser Diodes and LEDs in industrial, measurement, imaging, and sensors applications Dye laser pico-second convertor Use of visible laser diode: fiber optic sensors in the beverage industry and environmental controls The fiber-optic refractometer for the liquid refractive-index measurement Fibre optic sensor system Semiconductor Thin films Optics and Spectroscopy</p>	<p>Diode Lasers Mode-locked erbium-doped fiber laser Nitrogen laser Excimer laser Dye laser</p>
<p><b>The Hue College of Sciences</b> (The University of Hue) 27 NGUYEN HUE ST HUE, VIETNAM TEL: +84 (54) 823290 - 823293 FAX: +84 (54) 824901 Department of Physics</p>	<p>Laser physics Solid-state physics Optical - spectroscopic physics</p>	<p>He-Ne laser Nd:YAG laser Dye laser</p>

<p><b>Institute of Applied Physics</b> Vietnam</p>	<p>Laser applications in Photonics systems for defense and manufacturing Nonlinear Optics (Harmonic generations)</p>	<p>Nd: YAG laser Diode-pumped solid state laser He-Ne laser</p>
<p><b>University of Ho Chi Minh City</b> Faculty of Physics 227 Nguyen Van Cu, District 5, Ho Chi Minh City Vietnam Tel : + 84 8 353193, + 84 8 353437 Fax : + 84 8 354009</p>	<p>Laser Physics Laser optics and spectroscopy</p>	<p>He-Ne lasers Argon ion laser</p>
<p><b>The University of Technology of Ho Chi Minh City</b> Lab of laser technology 268 Ly Thuong Kiet Street, District 10, Ho Chi Minh City, Vietnam Tel: 848 652 442 Fax: 848 653 823</p>	<p>Laser technology Laser Physics</p>	<p>He-Ne lasers Nd: YAG laser Argon ion laser</p>

## Laser Applications in the Philippines

### I. Research, Development and Engineering in Academy/University

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>University of the Philippines</b>                      Laser Physics Group                      National Institute of Physics                      College of Science                      1101 Diliman, Quezon City                      Philippines                      Tel: +632-434-4232                      Fax: +632-920-5474</p>	<p>Laser Physics (Linear and Nonlinear Optics)                      Spectroscopy/nonlinear optical studies/optical signal processing                      Optical fiber applications                      Laser plasma physics                      LIDAR for atmospheric monitoring                      Laser Marking in Semiconductor Packaging Industry                      Pulsed laser deposition (PLD) in thin film preparations                      Holography                      Laser cooling and trapping                      Semiconductor laser with optical feedback (SLOF) Pulsed laser                      Laser design and development:                      Development of a flashlamp-pumped dye laser                      Laser applications in Optoelectronics</p>	<p>Nd:YAG (Rofin-Sinar) laser                      Nd:YAG (Spectra-Physics) laser                      Optical Parameter Oscillators (Spectra-Physics)                      Argon ion laser (Spectra-Physics)                      Semiconductor laser                      Lasers below built up in the university lab                      N2 laser                      CO2 laser                      Excimer laser                      Dye laser</p>
<p><b>Ateneo de Manila University</b>  <b>Ateneo Physics</b>                      School of Arts and Sciences                      P.O. Box 154, Manila                      Philippines</p>	<p>Laser physics                      Laser holography                      Laser applications in remote sensing</p>	<p>He-Ne lasers                      Argon ion laser                      Pulsed Nd:YAG laser</p>

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<p><b>De La Salle University</b> Philippines</p>	<p>Laser physics laser spectroscopy laser applications in medicine</p>	<p>He-Ne lasers Argon ion laser Nd:YAG laser</p>
<p><b>University of Southeastern Philippines</b> College of Engineering Bo. Obrero, Davao City 8000 Philippines</p>	<p>Laser applications in Optoelectronics</p>	<p>He-Ne lasers Argon ion laser Nd:YAG lasers</p>

II. Laser applications in industry

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>LASER BARCODE SOLUTIONS INC.</b>                      667 Sgt. Bumatay St., Mandaluyong City                      Metro Manila, Philippines 1550                      Tel. Nos. (632) 532-3061 to 69                      Fax. No. (632) 532-3070</p>	<p>PSC Laser Barcode Scanners</p>	<p>He-Ne lasers                      Diode lasers</p>
<p><b>Hilti International Ltd, Hilti Centre</b>                      2326 Pasong Tamo Extension RP -                      Makati City Philippines                      Tel: +63-2-843 0066                      Fax: +63-2-843 0061</p>	<p>Laser technology                      Laser positioning, levelling and alignment tools                      Laser printing</p>	<p>Products:                      PD 10 laser range meter                      PD 10 Data laser range meter                      PL 10 laser level                      PM 10 multi direction laser                      PR 10, PR 15 and PR 50 rotating lasers                      Laser 635nm class 2 (IEC825-1) / class II                      (FDA21 CFR)</p>

<p><b>Scanning Technologies of the Philippines, Inc.</b>          10/F Agustin I Bldg.          Emerald Ave., Ortigas Center          Pasig City, Metro Manila  <b>Tel: 634-8083,634-8084</b>  <b>Fax: 631-7933 (+63 2)</b></p>	<p>Portable Laser/Contact Scanner Bar Code Reader/Decoder</p>	<p>Diode lasers          He-Ne lasers</p>
<p><b>Wavetek Wandel Goltermann Asia Pacific Pty. Ltd.</b>  <b>Philippines Representative Office</b>          9/F Metrobank Plaza          Sen. Gil Puyat Avenue          Makati City          Philippines, Tel. No.s +(632) 840-4258 to 60 Fax No. +(632) 840-4261</p>	<p>Fiber Optical communications</p>	<p>OLS-6 Optical Laser Source</p>



III. Laser applications in hospitals

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>The American Eye Correction Centre</b>  <b>Ophthalmic laser center</b>                      4/F, The Medical City                      San Miguel Avenue, Mandaluyong City                      Philippines                      Tel: (632) 636-0762</p> <p>The clinics are located at:  <b>The Medical City</b> - Medico Bldg. Rm 601                      San Miguel Ave., cor. Lourdes Rd.                      Pasig City, Philippines                      Tel: (632) 635-3202, (632) 631-6961 loc. 601  <b>Makati Medical Center</b> - Rm 353                      #2 Amoroso Street, corner De la Rosa St.,                      Makati City, Philippines                      Tel: (632) 817-4286  <b>Capitol Medical Center</b> - Suite 211                      Scout Magbanaa, corner Quezon Avenue,                      Quezon City, Philippines                      Tel: (632) 371-2112  <b>Manila Doctors Hospital</b> - Suite 207                      United Nations Ave.,                      Manila, Philippines                      Tel: (632) 525-2260  <b>Metropolitan Hospital</b> - Rm 3                      Masangkay corner Mayhaligue Sts., Manila                      Tel: (632) 251-6848</p>	<p>Laser Eye Surgery                      Laser Refractive Surgery                      Photorefractive keratectomy (PRK)                      -Correct myopia and astigmatism                      Laser-assisted in situ keratomileusis (LASIK)                      -Correct nearsightedness and astigmatism</p>	<p>Excimer lasers                      CO2 lasers                      He-Ne lasers</p>

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<p><b>The Manila Doctors Hospital</b>          The Department of Ophthalmology Philippines          Philippines  <i>The Laser Room</i></p>	<p>Laser cosmetic plastic surgery          Laser Surgery for Laryngeal tumors and voice disorders          Laser diagnosing and treating the eye ailments          PRK          LASIK          REFRACTIVE SURGERY          Photocoagulator</p>	<p>Excimer lasers          Nd:YAG laser          The Alcon YAG 3000LE          ENT laser</p>
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IV. Laser applications in environmental monitoring

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>Ateneo de Manila University</b>  <b>Ateneo Physics</b>                      School of Arts and Sciences                      P.O. Box 154, Manila                      Philippines</p> <p><b>MANILA OBSERVATORY</b></p> <p><b>University of the Philippines</b>  <b>Laser Physics Group</b>                      National Institute of Physics                      College of Science                      1101 Diliman, Quezon City                      Philippines</p>	<p>MIE LIDAR (Light Detection and Ranging) System for monitoring urban air pollution and studying of the physical and optical properties of clouds.</p> <p>Pollution monitoring and meteorological instruments designing</p> <p>Sensing of the atmospheric boundary layer</p> <p>DOAS (Differential Optical Absorption Spectroscopy) monitoring of air pollution</p>	<p>Nd:YAG lasers (linearly-polarized 532 nm)</p>

## Laser Applications in Brunei

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>Universiti Brunei Darussalam</b>            (University of Brunei)            PHYSICS DEPARTMENT            Bandar Seri Begawan 2028            Brunei Darussalam            Tel: +673-2-249001            Fax: +673-2-249003</p>	<p>Laser Physics            Nonlinear optics and laser spectroscopy            Raman spectroscopy            Fibre-optic sensors            Holographic Interferometry            UV-Visible spectroscopy of discharge lamps</p>	<p>Tunable diode laser (SDC)            He-Cd ion laser            Argon ion laser</p>
<p>Institut Teknologi Brunei            (Brunei Institute of Technology)</p>	<p>NIL</p>	<p>NIL</p>
<p>Maktab Kejuruteraan Jefri Bolkiah            (Jefri Bolkiah College of Engineering)</p>	<p>NIL</p>	<p>NIL</p>
<p>Maktab Teknik Sultan Saiful Rijal            (Sultan Saiful Rizal Technical College)</p>	<p>NIL</p>	<p>NIL</p>
<p>Sekolah Vokasional Lambak Kanan</p>	<p>NIL</p>	<p>NIL</p>

**Laser Applications in Cambodia**

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
NIL	NIL	NIL

**Laser Applications in Laos**

<b>Company/Institution/Hospital/Military</b>	<b>Major Projects and Applications</b>	<b>Laser Systems</b>
The National University of Laos Laos	NIL	NIL

Laser Applications in Myanmar

Company/Institution/Hospital/Military	Major Projects and Applications	Laser Systems
<p><b>Yangon Technological University</b>                      (Yangon Institute of Technology)                      Gyogone, Insein P.O.                      Yangon 11011                      Myanmar                      Tel: (95-1)665678, (95-1)663357</p>	<p>N.A.</p>	<p>N.A.</p>