SOKKIA WORLD

SOKKIA

SOKKIA Communication Magazine

2008 SUMMER

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Topcon and Sokkia Take Steps Toward Business Integration

TOPCON CORP.

President
Takashi Yokokura

SOKKIA CO.,LTD.

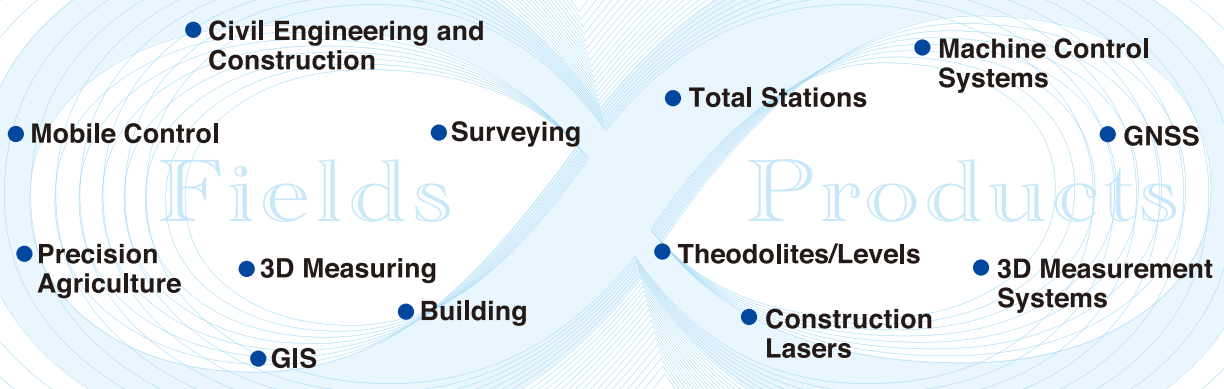
President and Representative Director,
Hitoshi Ito

Topcon and Sokkia have independently developed, manufactured and serviced precision measurement instruments, with both companies providing innovative products and systems that improve work efficiency and accuracy. Together with their customers, both companies have improved surveying and positioning technology, contributing to improved societal infrastructure and the development of countries. Now the time has come for Topcon and Sokkia to take their first steps toward business integration. After the integration, we aim to combine the technological, manufacturing and sales expertise of both companies to speed up product development, blend our individual technological strengths to develop high value-added products, and to create a detailed support system that will maintain current customer trust and provide new high-value solutions. This friendly combination of Topcon and Sokkia will provide greater opportunities for growth while maximizing our customer satisfaction. You can expect new positioning products to join our product lineup soon.

Information About the Topcon/Sokkia Merger

- Sokkia Co., Ltd., will change its company name to “Sokkia Topcon” at a share holders meeting in 2008. The “Sokkia” brand will remain.
- Both headquarters will remain in their current locations
- Topcon and Sokkia products can be purchased through their respective dealers.

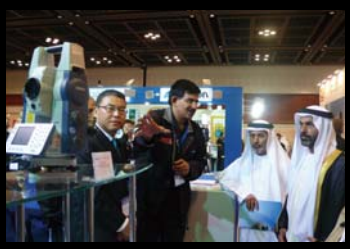
Expansion in the Business Fields and the Range of Products



Map Middle East 2008

Dubai, UAE 8 (Tue) – 10 (Thurs) April

Map Middle East is the single regional forum for Geospatial Information, Technology and Applications in the Middle East. The 4th annual conference was held at the Dubai International Convention and Exhibition Center in Dubai, UAE.



SOKKIA participated as a Gold sponsor and presented an impressive 48 square meter booth. The booth adopted an open design concept that was divided into three different areas: Industrial Measurement & Monitoring, Surveying & Construction, and GPS & GIS. The objectives of the exhibition were to reinforce SOKKIA's presence in the Middle Eastern market and to raise our brand status to new heights.

The SOKKIA booth featured the SRX and SET X total stations, NET1 Automated 3D Station, GNSS solutions GSR2700 ISX and GSR2700 RSX, and the GIR1600 DGPS receiver. A team of product specialists from SOKKIA CO., LTD, SOKKIA Singapore, SOKKIA Gulf, SOKKIA Alexandria as well as our international partners GLM Lasermessteknik, Satel Oy and Point Inc gave product demonstrations and handled queries from visitors.

SOKKIA Singapore Managing Director Mr. Norikazu Watanabe was invited as a plenary speaker and delivered a speech on geospatial technology trends and his vision of the future. His presentation provided an insight into the available and commonly used surveying and positioning technologies in the ever changing geospatial market and covered their use in a wide range of applications. With the theme "Safety Engineering" and "Productive Engineering," specific emphasis was placed on precision structural monitoring and its application in tunnels, dams, and record-breaking masterpieces such as the Singapore Flyer.

The exhibition came to an exciting finish with the SOKKIA booth having been the most visited booth and placing 3rd overall for the Best Exhibitor Award. SOKKIA has a strong presence in the Middle East and we have reaffirmed our commitment to our distributors and users throughout the region.

Denise Chua
Marketing Executive
Technical Section
SOKKIA SINGAPORE PTE LTD

UNESCO World Heritage Conservation
Return of the Riverbank Dynasty

Institute of UNESCO World Heritage, Comprehensive Research Organization, Waseda University

UNESCO World Heritage Site - Complex of Hue Monuments

SOKKIA GPS Helps to Advance Cultural Foreign Policy in the International Effort to Survey and Restore a World Heritage Site

The Complex of Hue Monuments was registered as Vietnam's first UNESCO World Heritage site in 1993. This historical palace complex was almost completely destroyed during Vietnam's war-torn past. The Institute of UNESCO World Heritage at Waseda University was asked by the Vietnamese Government to survey the monuments for restoration. Waseda in turn asked SOKKIA to provide the technology to efficiently organize the tremendous amount of survey and photo data collected using GPS and GIS. In response to this request SOKKIA sent technicians to the site to help with the training and introduction of the new technology. We asked the Institute of UNESCO World Heritage about the use of GPS and GIS in measuring monuments.

The Institute of UNESCO World Heritage Contributing to the protection and conservation of World Heritage

The city of Hue is located in central Vietnam and was the capital of the Nguyen Dynasty. The Institute of UNESCO World Heritage is working to restore the complex of monuments and we caught up with institute director Dr. Takeshi Nakagawa to ask him about the institute's involvement with the project. "Restoration began on the Ngo Mon (Noon Gate) which is the main gate of the Imperial City in 1991 as a part of a campaign petitioning for registration as a World Heritage Site. I participated as a consultant which began my involvement with Hue." Nakagawa went on to explain the activities by saying, "The surveying, conservation and practical use of monuments is an extremely comprehensive field and in order to promote those activities, Waseda University had specialists from all fields participate in founding the Institute of UNESCO World Heritage. Our focus isn't limited to just Hue, we also assist in the restoration of Asian cultural properties."

Investigational Survey of the Complex of Hue Monuments

The entire complex of Hue monuments became the subject of surveys starting in 1994, followed by the restoration of the Can Chanh Dien (Palace of Audiences), which lies at the center of the Imperial City, with the cooperation of Vietnam's Hue Monuments Conservation Center. The Palace of Audiences lies at the center of the Imperial City and is where the Emperor held court. The Imperial City is surrounded by four castle walls each measuring 600 meters in length, with the entire complex occupying an area more than 2 square kilometers. This area is partitioned by a grid of roads and arranged into a political district, residential district, and ancestral tombs and temples. The first survey in 1994 began by drawing a site plan of the Nguyen Palace.

Le Vinh An
Research Student
Creative Engineering Department
Waseda University Graduate School

DGPS receiver GIR1600 (left) was used in addition to other GPS receivers (right).

According to Mr. Shin-ichiro Nakazawa, lecturer and program officer, “Waseda University uses SOKKIA surveying instruments for practical survey training. We used these instruments to create a site plan of the palace. We mapped the basic layout of the palace buildings using total stations. The palace has a history of reorganization and it is believed that the column foundations may have been moved, requiring a cautious survey. We visited Hue twice a year to survey, once in spring and once in summer. We purchased a SOKKIA GPS receiver in 2002 and were finally able to introduce RTK to our survey. To smooth the transition to GIS in our current survey, we purchased the GIS market oriented DGPS receiver GIR1600 and GIS data management software with the goal of efficiently collecting both positioning information and pictures.

Le Vinh An, a technician and conservationist with Vietnam’s Hue Monuments Conservation Center expressed his goals for the future. “Before Waseda University came we didn’t know about SOKKIA total stations or GPS. I would like to raise the level of survey research by studying techniques to take them back to Vietnam.”

No Accurate Map Information Available SOKKIA GPS makes its mark in Vietnam

The Vietnamese government considers map information to be a military secret, which makes it difficult to obtain accurate and detailed maps.

Nakagawa explained his expectations for GPS and GIS, “At first we only realized that GPS was necessary for making drawings. Now we know that it is a valuable tool to comprehensively organize survey data. By interfacing GPS with GIS we can integratedly manage satellite images, monument diagrams, digital pictures and text-based survey records. In the future, I want to be able to organize this data while sharing it between offices in Tokyo and Hue.”

Mr. Kenta Kitani, a participant in the current field investigation, explained the reason behind his joining the research team, “I originally specialized in Western architectural research, but my interest in the possibilities of GPS and GIS led me to join the survey of Hue monuments.”

Kenta Kitani
Research Student
Creative Engineering Department
Waseda University Graduate School

SOKKIA’s Kazuhisa Okamoto visited Hue to head GPS technology training. He expressed his high hopes for the students in saying, “The students are highly dedicated and our technological cooperation is meaningful. I hope that the students are able to improve their skills and can someday teach the researchers from the Hue Monuments Conservation Center.”

The Complex of Monuments at Hue from the last Vietnamese Dynasty was heavily influenced by China.

Royal Tomb of Khai Dinh

Thien Mu Temple

The city of Hue was founded in 1802 by Emperor Nguyen, the last Emperor of Vietnam, on the banks of the Huong River which empties into the South China Sea. It was the location of intense fighting during the Vietnam War which resulted in many of the buildings being demolished. The main feature of Hue architecture is its unique interpretation of Chinese influences seen in the Imperial tombs upstream, the defensive installations downstream, and a large number of yet to be discovered monuments. More than 600 Vietnamese staff members of the Hue Monuments Conservation Center are working on the survey and restoration of Hue with the cooperation of the Institute of UNESCO World Heritage

Right: The Hue Monuments Conservation Center, Waseda University and the Institute of Technologies work together in dismantling Long Duc Dien palace.
Left: Restoration continues with help from local Vietnamese members.

Sorting Pictures and Data using Positioning Information Greatly Improves Work Efficiency

We continued by asking some of the people who used SOKKIA GPS on-site for their impressions.
Mr. Takuto Fukuyama, a research student, remarked about how easy it is to use the equipment. “In the current survey, we predicted that old military monuments may remain along the Huong River based on information from old pictorial diagrams. We used GPS and a digital camera to perform surveys along the riverbanks. As we collected positioning information we were able to quickly organize pictures which could then be easily mapped out using Google Earth when we returned to the office. It is great that they can be easily viewed. Also, because it is lighter than previous GPS receivers, I didn’t get tired in the field even after walking long distances.”

Takuto Fukuyama
Research Student
Creative Engineering Department
Waseda University Graduate School

Mr. Hideaki Hayashi, who is managing the on-site survey, also gave SOKKIA GPS high marks. “The work is done by students, so we really appreciate the high accuracy and the fact that you can use it after only a short amount of training. We wanted an overlap with our previous GPS receivers, but GIR1600 is easier to use because it is so lightweight that you can mount it on your shoulder while you’re working. Vietnam is hot during the daytime which makes it difficult to carry heavy equipment for long periods of time.”

There were, however, some concerns about maintenance. To address these concerns, Okamoto explained the enhancements to the support system. “Maintenance and support will be taken care of by SOKKIA Singapore. SOKKIA will provide full support.”

It has taken the members of both research organizations more than 10 years to build the cooperative framework between the Hue Monuments Conservation Center and Waseda University. Nakazawa remarked, “Our goal is to have the results from our research available to those using GIS in the next five years.”

Hideaki Hayashi
Research Associate
Waseda University Graduate School

*Information regarding Waseda University participants is current as of December 2007.

Local development through monument survey and restoration

World Heritage Sites are regarded as symbolic and it is usually considered to be a good thing if survey research and restoration is carried out. However, Nakagawa has set his sight on the entire region. “We’re not just restoring a palace. We need to think about what kind of impact it will have on the entire complex, the city of Hue and central Vietnam itself. The idea is that the conservation of this World Heritage Site can help in not only developing tourism but the local area itself. Basically I want to get the local people involved to pursue cultural property conservation that contributes to the local area.” He went on to consider the possibilities of using GIS in collecting information at the Complex of Hue Monuments. “We are gradually getting organized, but because Hue is frequently flooded, I wonder if we can comprehensively use GIS to include information on flood-prone areas in addition to the monuments.”

In recent years progress has been made in the survey of the complex of monuments that spreads throughout Hue and its value as a World Heritage Site is widely recognized. SOKKIA is proud of its behind-the-scenes contribution and is aiming to further expand the field for positioning information technology and better contribute to society.

We will continue with a follow-up report on the survey and restoration of the Complex of Hue Monuments in a later issue.

Kazuhisa Okamoto
Manager
Geospatial Information Technology
SOKKIA CO., LTD

USER REPORT File.1

"I want to promote goodwill and contribute to the development of the area through the transfer of monument surveying techniques."

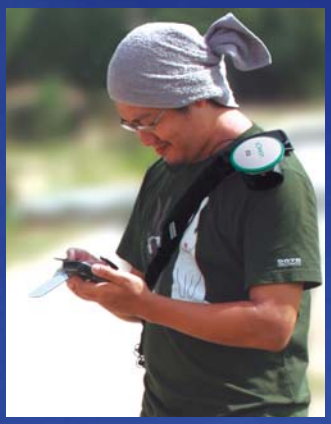
Dr. Takeshi Nakagawa
Professor, Waseda University Faculty of Science and Engineering
Director, Institute of UNESCO World Heritage

Dr. Nakagawa has been in his current position since 1984. A specialist in Asian and Japanese architectural history, Dr. Nakagawa has served as the director of the Japanese Team for Safeguarding Angkor Wat (JSA) since 1994. In 1995, he became a Hue UNESCO International Specialist and has acted as an international leader in the restoration efforts. For his work as JSA field director he was awarded the Order of Sahametrei from the Kingdom of Cambodia in 1998. In 2001 Dr. Nakagawa founded the Waseda University Institute of UNESCO World Heritage and has served as the director since its foundation.

"Vietnam is developing at an extremely fast rate and the protection of cultural heritage is already a race against development."

Shin-ichiro Nakazawa
Lecturer, Waseda University Institute of UNESCO World Heritage

Mr. Nakazawa has been at his current position since 2002 after experience as a Waseda University Department of Architecture Research Associate and Fellow (PD) of the Japan Society for the Promotion of Science.
He is contributing to the advancement of the academic survey in the conservation and restoration of the Complex of Monuments at Hue. Mr. Nakazawa has been a participant since the first field survey was conducted in 1994 and is striving to introduce research methods using the possibilities of GPS and GIS in the near future.



Top: Pictures are easily organized and quickly mapped using Google Earth.
Bottom: The popular lightweight and compact "wearable" GIR1600. This DGPS unit achieves sub-meter accuracy using correction information. A cable-free connection with a PDA and digital camera is possible using *Bluetooth*® wireless technology.

Differential GPS Receiver

GIR1600

- Compact size and detachable antenna
- High accuracy measurement using correction information
- Cable-free connection using *Bluetooth*® wireless technology
- Multi-faceted positioning solution

SOKKIA SCHOOL – Committed to Improving Surveying Techniques around the World

In March of 2008, nine people from around the globe visited the SOKKIA Training Center located in Kanagawa Prefecture, Japan. These nine individuals were participants in the “Planning and Management of National Mapping and Surveying” course at the Japanese Geographical Survey Institute (GSI) invited by the Japan International Cooperation Agency (JICA). The participants visited SOKKIA School to attend the GPS training portion of the course. Beginning in 2005, this year was the third time that the training was held at SOKKIA School. Blessed with good weather, the practical training and factory tour went according to plan and each of the nine participants had a rewarding training experience. We interviewed the participants of the training program and the staff of SOKKIA School to bring you this report.

Partnership with JICA

SOKKIA School was founded in 2000 to respond to the changes in surveying technology brought about by advances in digital technology and the demands of the times. The school provides diverse hands-on training using the latest surveying equipment. Included among its diverse activities is the support of the “Planning and Management of National Mapping and Surveying” course run by GSI.

Participants and staff take part in GIS training on the grounds of the SOKKIA Training Center. Good weather and enthusiastic participants made for an enjoyable time.

The “Planning and Management of National Mapping and Surveying” course is subsidized by the independent administrative institution “Japan International Cooperation Agency (JICA)”. The group training is held at the Geographical Survey Institute with the aim of teaching key people the general surveying and mapmaking skills necessary to plan and administer infrastructure development in emerging countries.

Nine members from Asia, Africa and South America joined the program in 2007 and are currently undergoing a 10 month training course from October 2007 until August 2008. Participants attend lectures and hands-on practice of management and general surveying techniques including methods for strengthening their respective organizations, information processing, map editing and electronic plane-table surveying at GSI and the College of Land, Infrastructure and Transport.

Practical GPS Training is the Result of Hard Work

SOKKIA School has been in charge of the RTK-GPS practical training section of the “Planning and Management of National Mapping and Surveying” course since 2005. The nine participants headed to the SOKKIA Training Center located in the scenic Kanagawa Prefecture countryside to attend a four day training

Participants eagerly pay attention during GIS training using the SOKKIA GIR1600. With a low student to instructor ratio, participants were able to master the instrument and achieve their training goals.

Ichiro Murata
Doctor of Science
Technical Consultant
SOKKIA CO., LTD.

session between February 12th and 15th 2008. The lectures and practical training at SOKKIA School are headed by Mr. Ichiro Murata, Technical consultant to SOKKIA; Mr. Akio Suzuki, Administrative Director; Mr. Mitsuo Inoue, Director; Mr. Keiji Chiba, Instructor and Mr. Kenji Shima, Instructor. Additional assistance and technical support is provided by SOKKIA staff. This training program was brought about mostly through the efforts of Mr. Murata who is an authority on surveying and has served as the chairman of the Geodetic Society of Japan in addition to having been in charge of the "Planning and Management of National Mapping and Surveying" course at the Geographical Survey Institute for the past eight years. Murata saw the need for a practical RTK-GPS training program and, after making a few contacts, the training came to be held by SOKKIA School. The participants of the program are managers in their mid-30's and 40's and the thrust of this program is to impart the skills necessary for them to strengthen their respective organizations from within. Murata explained the significance of training at SOKKIA School in saying, "The participants learn a wide range of skills from management to practical surveying. The practical training at SOKKIA School will be a valuable experience in learning how it is out in the field." Suzuki, who provided support developing the training program, said, "SOKKIA is happy to participate in the JICA program because it will make an international contribution. By experiencing the latest surveying instruments first-hand, we can help to raise the level of surveying techniques around the world. That is the main goal of this training program. We would like to help by assisting other training programs as well."

Akio Suzuki
Administrative
Director
SOKKIA School
SOKKIA CO., LTD.

GPS Training Went Smoothly Everyone was within the Tolerances

According to Inoue, "Thanks to a favorable evaluation of last year's training; the program for the current year was extended by a day for a total of three nights and four days of training. The curriculum includes a tour of the Hot Springs Research Institute of Kanagawa Prefecture to study the volcanic activity that led to the creation of the Hakone region of Japan and is further enhanced with outdoor practical training." The weather was great and the outdoor practical training went without a hitch.

Mitsuo Inoue
Director
SOKKIA School
SOKKIA CO., LTD.

The first day was spent attending a lecture by Murata on RTK-GPS followed by practical GPS training on the grounds of the SOKKIA Training Center the next day led by instructors Chiba and Shima. During the morning of the RTK-GPS training the participants used a SOKKIA GSR2600 GPS receiver to collect two sets of data for five points.

"At first a few participants were unsure of how to use the instruments, but the low student to instructor ratio meant that they soon were able to smoothly collect positioning information. Once the data was collected, the participants compared the results from the first and second data sets to check the amount of error. The tolerances called for them to be within 20mm, but everyone passed with flying colors by achieving results within 5mm," Shima said with a smile.

Keiji Chiba
Instructor
SOKKIA School
SOKKIA CO., LTD.

In the afternoon, the participants split into two groups for Network RTK-GPS (N. RTK-GPS) and GIS practical training. N. RTK-GPS training involved measuring eight points to calculate the area.

Chiba explained, "N. RTK-GPS is a type of RTK-GPS. There were a few points with no GPS signal reception due to the building and other obstacles blocking the signal. By experiencing these types of cases the participants learned what it is like actually working out in the field."

Network RTK-GPS training using a GSR2600. The goal of this session was to learn how to deal with points with no GPS signal reception due to buildings and obstacles.

Mohammad Haroon Samadi Afghanistan

"I was able to learn GPS theory and practice thanks to the experienced and versatile instructors. The food was delicious, too."

K. M. Abus Subhan
Bangladesh

"The training enriched our knowledge of the latest surveying techniques. The practical training was very important to understand the reality."

Mohammad Kamrul Ahsan
Bangladesh

"The training was well conducted and very educational. The instructors were very professional and experienced."

Lectures before the practical training on GPS and total stations were held in the SOKKIA Training Center. The Training Center has five lecture halls ranging in size to accommodate any class size.

GIS practical training used SOKKIA's differential GPS receiver GIR1600. Staff from SOKKIA's Geospatial Information Department were on-hand to provide technical support and instruction for GIS data collection and post-processing.

"The participants collected coordinate data while taking pictures of the points with a digital camera. The data and pictures were saved on a map using ArcGIS® software. Some of the participants use ArcGIS at their jobs and were interested in GIS information collection techniques" Shima said.

The third day involved a group visit to the Hot Springs Research Institute of Kanagawa Prefecture where they toured exhibitions of stratum and earthquakes. The afternoon was spent learning about the formation of Hakone which included a tour of the Crustal Movement Observation Facility.

Dorji Tshering
Bhutan

The training was very good and the instructors were professional. I was impressed with the range and capability of SOKKIA products. I want to keep in touch for the latest SOKKIA information.

Daniel Esteban Manzo Barrientos
Guatemala

Motorized total stations are new to me and the training was very helpful. I got a lot of new ideas during my time here.

Alberto Nota Combio
Mozambique

The training was very informative and I would have liked to have more time. I wanted to learn more about how to choose the best method for different types of surveys.

Experiencing New Heights Using Total Stations

The final day of the program was practical training using SOKKIA's flagship total station SRX. Participants used SRX to once again measure the eight points used for the N. RTK-GPS training to compare the differences in between surveying with a total station and GPS.

"By measuring with the high-precision total station SRX the participants were able to draw comparisons with their experiences using GPS. SRX has an auto-tracking function so it isn't necessary to have someone on the instrument side. It can be controlled by a single person using the on-demand remote control system. We wanted them to get a taste of the convenience and high accuracy," commented Chiba.

Afterwards, the participants took a tour of SOKKIA's factory in Matsuda where the SRX is made. They learned about the entire facility with special focus on the process involved in manufacturing the SRX.

Practical Training led by Experienced Instructors

SOKKIA School is distinguished by its practical training using the latest instruments and experienced instructors. A low student to instructor ratio meant that each participant received plenty of individual attention throughout the program and everyone surpassed the goals of the course. A questionnaire was handed out on the last day of the program and participants gave high marks to the experienced staff and rich curriculum.

There were, however, a few linguistic hurtles to overcome. The participants visited SOKKIA School having already spent three months in Japan and, while they could all speak English, they could only speak limited Japanese. An interpreter was present to help with communication and English materials were available, but a few of the latest instruments and software programs were only available in Japanese. Participants requested that all English materials be available for future training courses.

In the questionnaire, the participants remarked that they wanted more time during the practical training and that they wanted to gain more detailed knowledge about GPS. Some also commented that they wanted to be kept up-to-date with current product news. Overall, the program was a success, with many participants commenting that it was a "wonderful experience" on their surveys.

A One-of-a-Kind Experience

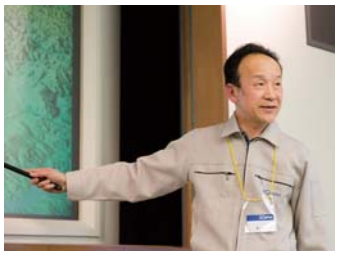
It wouldn't be an exaggeration to say that SOKKIA School is the only place in Japan to perform practical surveying training using the latest instruments. Behind this is a long history of SOKKIA support for practical surveying training.

Training at SOKKIA began 30 years ago with a program for sales staff and service technicians. Responding to outside requests, regular training was held for land and house investigators and high school instructors. In 1994 the SOKKIA training center was completed with facilities for 54 people. At that time surveying instrument accuracy and functionality were improving by leaps and bounds making it difficult to hold practical training that accurately reflected on-site conditions at schools. It was SOKKIA's use of cutting edge technology in real-life situations that drew attention to the training held by SOKKIA School.

Suzuki told us about the current SOKKIA School activities, "We hold all kinds of training using the latest surveying instruments. Our main focus is our regular training program for land and house investigators. We also hold practical surveying training for students from Tokyo University and the Tokyo Institute of Technology and this year we are going to include training for other universities from the Tokyo Metropolitan Area."

Kenji Shima
Instructor
SOKKIA School
SOKKIA CO., LTD.

SOKKIA School earned international recognition through its support of the "Planning and Management of National Mapping and Surveying" course and is focusing its on future programs. Inoue shared his vision for the future, "I want to create more opportunities to make an international contribution in addition to continuing with our current training programs. By focusing on these types of activities we can help to improve surveying techniques both at home and abroad and increase SOKKIA user confidence."



Murata draws on his experience as an international university lecturer during the GPS training.

Aung Moe
Myanmar

I learned to new techniques using the latest instruments and improved my RTK-GPS surveying skills. This training session will be helpful in the future improvement of my department.

Mbangutse Olivier
Rwanda

The training at SOKKIA School was rich with knowledge. If I could improve one thing it would be more practice time, especially with GIS.

Mohammed Abdulghani Abdulrab Moqbel
Yemen

It was good to see new technology and participate in a good training program. The training will be very beneficial for my organization right away.

SOKKIA School is working for the future of surveying

Advances in digital technology mean that now more than ever there is a need for practical surveying education.

In addition to SOKKIA providing cutting-edge surveying instruments, SOKKIA opened its own training center in 2000 with the goal of contributing to society by providing a place for continuing education courses on surveying instrument operation, surveying techniques and up-to-date information.

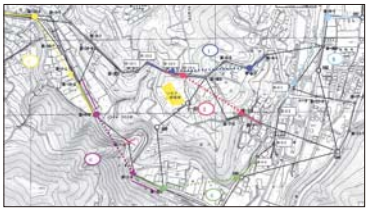
Training at SOKKIA School uses the latest surveying instruments including total stations and GPS and is visited by participants from all over the world. The yearly training schedule includes practical GPS and reference point surveying training for land and house investigators, distributors and users in addition to training sessions for high school and university students.

1, 2: Students at SOKKIA School learn surveying techniques by using the latest, cutting-edge surveying instruments.
3: The main lecture hall can accommodate 54 students. It provides a comfortable learning environment.
4: The lounge provides a relaxing atmosphere for students to relax during breaks between lectures and after meals.

Challenging Training Courses

SOKKIA School is home to a wide variety of training courses using public coordinates provided by nearby GPS-based control stations. Reference point survey training is practiced using the surrounding area.

One of the many reference points on the training center grounds.



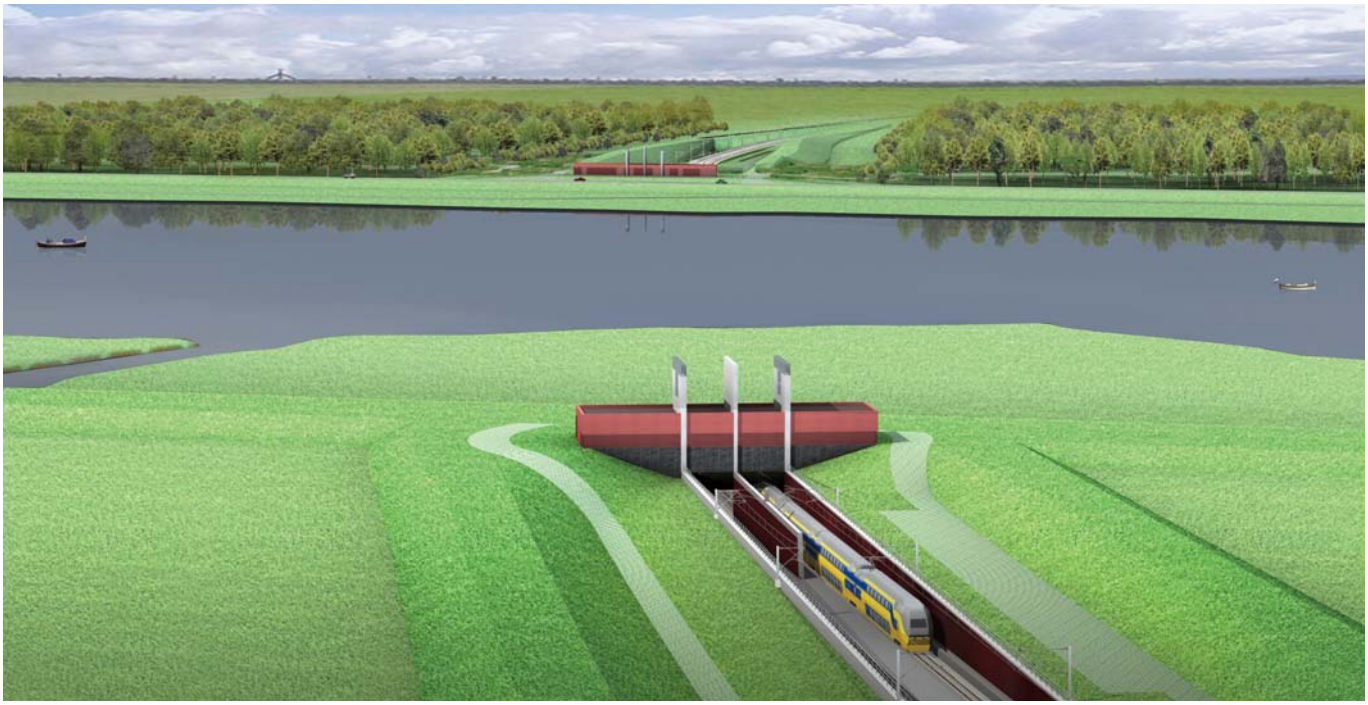
The training center is home to a number of training courses both on the center grounds (bottom right) and surrounding area (bottom left).

Making Tracks in Flevoland

Modern surveying instruments and procedures spearhead the creation of a new rail link in The Netherlands … one that promises to cut journey times and spur economic activity across several provinces

While the bicycle retains its popularity for urban journeys, many in The Netherlands are abandoning the roads and turning to the train for travel further afield. With nine out of 10 trains arriving on time, this mode of environmentally friendly travel is enjoying a high and rising level of customer satisfaction. The result: an unprecedented 13 per cent increase in passenger numbers over the past three years.

Maintaining and improving an infrastructure that carries a million passengers and 80,000 tons of freight a day over 6,500 kilometers of track poses no small challenge for ProRail, an organization that manages it on behalf of the Dutch government. Independent surveying company Prisma Meten en Uitzetten B.V. contracted to undertake the task of surveying for this ambitious project. We spoke with project manager Greg Burnett about using SOKKIA products on a project of this magnitude.



Artist's rendition of the 800-meter tunnel to be constructed under Lake Drontermeer

Missing Link

Although the national rail network as we see it today (Fig.4) was largely complete by 1900, the more recent drainage of the Zuiderzee to create the province of Flevoland brought with it the need for a high speed line connecting its thriving capital, Lelystad, with the provinces of Gelderland and Overijssel to the north and east and where further economic development is regarded as of national importance.

To provide the missing link, construction of the Hanzelijn, a 50-kilometer route between Lelystad and Zwolle, commenced early last year and is scheduled for completion by the end of 2012 at a cost of a billion euros.

The task for ProRail is many and varied: public consultation, land acquisition, archaeological excavation, environmental and geological assessment - all prior to the awarding of contracts and the overseeing of construction activity. A pre-requisite to many aspects of the project … and one critical to their timely completion against Hanzelijn's ambitious timescale … is accurate site surveying.

Experienced Team

Given this background, it is no accident that Nijkerk-based Prisma, one of the nation's most experienced surveying teams, was engaged by prime contractor BAM Civiel. Its task is twofold:

1. Perform a baseline survey for the 25 km stretch between Lelystad and Lake Drontermeer for which BAM is responsible under a design-and-build joint venture with Van Oord Nederland, and,
2. Conduct site surveys for all traffic crossings and concrete construction

One might imagine a small army of surveyors being deployed by Prisma but nothing could be further from the truth. "Tolerances are extremely tight, but thanks to the technology at our disposal, we've been able to perform the preliminary work with just one crew," notes the company's project manager Greg Burnett. Importantly, the activity is underpinned by quality procedures proven in earlier projects such as the HSL (High-Speed Train) line between Amsterdam and Rotterdam and which are now central to Prisma's modus operandi.

Taking Control

Establishing control networks for narrow but lengthy land corridors such as rail and highways can be particularly challenging. Here, Burnett has employed SOKKIA's advanced GPS/GLONASS receiver, the GSR2700 ISX, to obtain RTK measurements accurate to within 2cm.

Fig.1: Prisma's Greg Burnett (left) and Eelco Visser from MeetConsult discuss the finer points of the GSR2700 ISX GNSS receiver

"Achieving precision on a consistent basis in this preparatory phase is vital. Shortly, the bulk of the concrete construction will begin, requiring the support of our 35-strong workforce. The margin for error will then be wafer thin," he says, pointing to earlier delay in getting the Hanzerlijn project underway that must be made good if it is to be completed on time.

Coordinates gathered by the all-in-one GSR2700 (receiver, antenna, *Bluetooth*® wireless technology, memory, batteries and internal data link - Fig.1) were initially relayed over its GSM wireless link to a Network RTK subscription service for verification and error correction. This has since been superseded by use of Prisma's own reference station at its Nijkerk office and SOKKIA Europe's 40km baseline RSX reference station at its European headquarters in Almere. This densification of the control network means that operators can obtain RTK-level accuracy along the entire project route, from Lelystad to Lake Drontermeer, at zero cost.

Productive Working

With manpower at a premium and time of the essence, the baseline survey has made good use of another instrument from SOKKIA, the flagship total station SRX (Figs.2 & 3). Ideal for single-operator working, its auto-pointing, auto-tracking features have proved invaluable in gathering highly accurate measurements at distances of up to 1,000 meters. Burnett makes the point: "Like a lot of companies, Prisma has to work as efficiently as possible and using instruments such as the one-man station makes us much more productive without adding to the headcount."

Fig.2 (above left): Total Station SRX at work as a six-meter embankment takes shape near Dronten. In the background, fine sand dredged from the Zuiderzee is piped directly into a prepared profile. When settled, it will provide a firm track bed for Hanzelijn's double-decker trains. Fig.3 (above right): With the SRX continuously tracking the 360 degree prism and updating distance and angle values in real-time, measurements are obtained with a simple press of the trigger key

At shorter range and for day-to-day field work, SOKKIA's SET330 Total Station has proved itself a versatile and reliable workhorse. This compact unit employs the same proprietary RED-tech phase comparison technology as its SRX stable mate to yield ultra-accurate reflectorless measurements at distances of up to 500 meters.

Collected data are downloaded at Prisma's office for use in AutoCAD, GBuilder (a construction dimension tool from RAN Software), MOVE3 (a geodetic network adjustment correction package from Grontmij), the Spectrum Survey Suite from SOKKIA (for GPS post processing), and other specialist software. These are now being used by other surveying professionals to assist their own work on the project. For example, quantity surveyors have calculated the volume of material needed to construct the track bed. The latter utilizes no more than fine sand dredged from the bottom of the Zuiderzee lagoon. This is pumped directly via a pipeline into prepared profiles (as per Fig.2), eliminating the number of heavy truck movements that would otherwise be needed. Volumes are constantly monitored by GPS and everything is being measured twice.

Helping Hand

Fine sand, seawater and the rough terrain of construction sites inevitably take their toll on equipment, and with a large and growing inventory of SOKKIA products in daily use, Prisma relies on a rapid repair and replacement service.

In this respect, Burnett has nothing but praise for MeetConsult in Almere, the exclusive SOKKIA dealership in this part of The Netherlands and which is his first port of call when help is needed. Dedicated optical and electrical workshops located at SOKKIA Europe's nearby office are an added bonus. It adds up to an efficient after-sales service that will help Hanzelijn stay on track - and complete the missing link in one of the world's busiest rail networks.

SOKKIA User Spotlight

Prisma Meten en Uitzetten B.V., is an independent surveying company with a wide range of activities, from plan control in construction project to managing cadastral surveys, and from carrying out topographical measurements to industrial 3-D measurements. Founded in 1995, Prisma has steadily grown into a company with a staff of 35 professional and motivated employees. Conveniently located in Nijkerk, in the middle of The Netherlands, Prisma's working area covers the whole country.

In addition to the land survey, plan control and setting-out activities Prisma also offers their knowledge and experience in a number of other survey related fields such as:

- Boundary surveys
- Automated stake-out
- Geographical Information Systems
- Network adjustment including statistical testing
- Quality control and statistical testing
- Tolerance surveying
- Mapping of utility lines, cables and piping
- Land survey innovation projects

Fig.4: Main line network with the Hanzelijn route in yellow.

Artistic rendition of the km-long replacement rail bridge to be built over the River IJssel near Zwolle

NEW PRODUCT NEWS

SURVEYING INSTRUMENTS / TOTAL STATION

Series 20K

SET220K · SET320K · SET520K · SET620K

The Series20K total stations are compact, tough and versatile total stations featuring enhanced hardware for a wide range of applications from construction to surveying. A new laser distance meter measures up to 3,500m (11,480ft.) using a single prism, 30% further than former models. Series20K has a distance accuracy of (2+2ppm x D)mm, the ability to measure using reflective sheet targets, and IP66 dust and water protection, making it a reliable partner on any jobsite.
A backlit, 10-key alphanumeric keyboard on both faces of the instrument and pre-installed versatile survey programs enhance work efficiency in the field. Series20K features 10 hours (1,200 points) of battery life, a 25% increase in operating time. An optional SF14 wireless keyboard allows remote operation to perform a wide variety of surveying tasks with ease.

SURVEYING INSTRUMENTS / TOTAL STATION

Series 20

SET220 · SET320 · SET520 · SET620

The Series20 total stations are compact and tough total stations featuring enhanced hardware and user-friendly operation to meet your day-to-day surveying needs. A new laser distance meter measures up to 3,500m (11,480ft.) using a single prism, 30% further than former models. Series20 has a distance accuracy of (2+2ppm x D)mm, the ability to measure using reflective sheet targets, and IP66 dust and water protection. The SET520 “Low Temperature Model” operates as low as -30°C (-22°F) without losing high temperature performance.
Customizable “Softkeys” allow quick operation of the onboard software and optional SF14 wireless keyboard supports easy alphanumeric input (except SET620). Series20 features 10 hours (1,200 points) of battery life, a 25% increase in operating time.

STANDING TRUE

Through eight decades of experience SOKKIA has gained the expertise to produce a rich product lineup offering precision and reliability. The flagship SRX symbolizes our steadfast promise to provide the flexibility to get the job done right under any circumstance. SOKKIA, standing behind you all the way.

SOKKIA

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