according to a recent paper by Cana-
region are therefore expected to
interest by dentists in investing in
technology into their workflow.
starting to incorporate the new
established in Western markets
ance in dental practice in recent
has gained increased signifi-
Advanced information technology
SINGAPORE:
Digital dentistry event held for
the second time in Singapore
Global movers and shakers to gather at CAD/CAM and Digital Dentistry International Conference

"Dentistry is way behind in embracing new technologies"
An interview with SDA president Dr Kuan Chee Keong

What made you decide to sup-
port this event in the first place, and what in your opinion are its prospects?

When we were debating wheth-
er to collaborate with CAPP Asia, one argument was that CAD/CAM is a new and relatively unproven technology compared with conven-
tional prosthetics and therefore the Singapore Dental Association should not be involved in a CAD/
CAM event. Computerisation and advanced technologies however have become the future of dentistry.

What is the use of dental CAD/CAM, and for what clinical purposes is it needed to be evolving constantly too. Dental Tribune Asia Pacific: This year CAPP Asia’s CAD/CAM and Digital Dentistry International Conference will be held in Singapore for the second time. What was the response to the first event in 2012 from the dental community here?

Dr Kuan Chee Keong: The inaugural symposium was well at-
tended, which was a pleasant sur-
prise for all of us. When CAPP Asia first approached us with its proposal to organise a CAD/CAM symposium in Singapore jointly, there was un-
certainty among members of the council whether to proceed. A few of us however made a strong pitch for it and fortunately we made a com-
mitment to collaborate. Feedback from dentists so far has been mostly positive and encouraging. However, we shall also be looking for areas that need improvement.

Shouldn’t we face up to CAD/
CAM? In fact, dentistry is way behind in embracing new technologies. High-tech industries are using 3D printing and we are still struggling with digital impressions. Dentistry needs to be evolving constantly too.

When I was in dental school, I never imagined that CAD/CAM, CEREC 3D for fabricating crowns chairside and many other advances are just one argument was that CAD/CAM is a new and relatively unproven technology compared with conven-
tional prosthetics and therefore the Singapore Dental Association should not be involved in a CAD/
CAM event. Computerisation and advanced technologies however have become the future of dentistry.

In your opinion, what are the benefits of using dental CAD/CAM in clinical practice?

Less time is needed for the pro-
duction of fixed prostheses. In ad-
dition, we do not need to fabricate customised trays or use impression materials, so waste can be reduced. This is a step in the right direction to be more environmentally friendly.

Singapore is poised to become an important hub for dental tourism. Will the use of dental CAD/
CAM help to support this develop-
ment in the long run?

Providing excellent dental care in shorter treatment time holds sig-
nificant appeal to dental tourists. With travelling costs going down constantly, more people from over-
seas will be able to fly to Singapore in the morning, have some porcelain prostheses fabricated using CAD/CAM and fitted almost imme-
diately, then do some shopping or travel before taking the late flight back home. Singapore is not alone how-
ever. Other countries in the region are catching up and it is a mistake to assume that Singapore will al-
ways be the leader in health care. We have to make an effort to stay abreast of the latest technologies.

Companies, such as rapid prototyp-
ing specialist Roland DG, have also an-
ounced their participation in the
case study, which will host over 50 companies from around the world. In between sessions, atten-
dees will have the opportunity to interact with the speakers directly and try out the latest digital gadgets and tools, CAPP Asia said.

Dental professionals interest-
ed in attending the event can still register in advance on the event website (www.capp-asia.com) or on-site once the event has begun. Discounts are available to mem-
ers of the SDA, as well as dental auxiliaries and students, according to the organiser.

The CAD/CAM and Digital Den-
tistry International Conference organised by CAPP Asia will again be held in collaboration with the Singapore Dental Association this year.

"Dentistry is way behind in embracing new technologies”
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DT Asia Pacific

How have you responded to the first event in 2012 from the dental community here?

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An interview with SDA president Dr Kuan Chee Keong
Taking guided implantology to the next level

Dr Lutz Ritter

Germany

Exciting times are indeed ahead for digital dentistry, as was evident from the firework of innovations present - ed again in all fields of dentistry at the latest International Dental Show in Germany. As professionals, we have to keep up to date, but also be cautious of new technologies.

Despite all the improvements in different technologies, it has not necessarily become easier to stay abreast of developments. The ongoing expansion of possibilities and updates in the field of CAD/CAM dentistry has increased the need for qualified education and professional exchange at peer level.

Particularly in guided implantology, new opportunities for treatment planning and therapy are becoming available through the combination of existing 3-D technologies. The use of new 3-D diagnostics with the help of CBCT has not only improved pre-treatment diagnostics in general, but has also opened up new possibilities in the planning phase: an innovation that is intended to make the transition to implant-supported prostheses much easier.

By now, dentists are able to perform many of the steps themselves, including digital planning, manufacturing drilling templates chairside and fabricating CAD/CAM prostheses.

In considering its many advantages, it should not be forgotten that technology has to remain comprehensible, transparent and usable for the dentist. The aim of my presentation at this year’s CAPP Asia conference in Singapore is to place the emphasis on the practice-relevant aspects of the latest technologies and to provide perspectives on the advantages they have to offer.

Along with the latest tips and tricks, I want to communicate the possibilities and limits of current technology, such as manufacturing drilling templates chairside and many others.

I hope that you draw something of interest from the presentation. Personally, I want to invite newcomers to become acquainted better with the often-difficult first steps with the help of experienced users. Even from a surgical perspective, I can say it is worth the effort.

Dr Lutz Ritter is currently a maxillofacial and plastic surgeon at the University Hospital of Cologne’s Centre for Dental, Oral and Maxillofacial Surgery. On Saturday, 5 October 2013, he will be presenting a paper titled “Taking guided implantology to the next level: Integrating CAD/CAM and CBCT” as part of the second Asia Pacific CAD/CAM and Digital Dentistry International Conference scientific programme in Singapore.

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CAD/CAM and growth factors
Key areas of dental innovation

Dr Nilesh R. Parmar

Dentistry has come a long way since our forefathers were forced to use foot powered drills and mix amalgam from its bare components. Modern day dental equipment and materials are at the cutting edge of medical and dental innovation, and it’s trade shows such as the International Dental Show (IDS) where the developments of the future are announced. Modern dentists no longer have merely a straight probe and a dental drill at their disposal. We now have scans, 3-D images, growth factors and an almost unlimited choice of materials available to use.

In writing this piece, I made a tough decision to focus on what I believe to be key areas of dental innovation. It is in those areas of imaging, CAD/CAM technology and growth factors that I believe are going to be important in the dental surgery of the future.

CAD/CAM
Computer-aided design/computer-aided manufacturing has had a presence in dentistry for nearly 20 years. However, it is only in the last ten years that developments have really made a difference in the reliability, ease of use and functionality of these devices. We now have CAD/CAM machines (e.g., CEREC, iTero, Lava) that can scan an entire arch, design and fabricate all-ceramic restorations in the practice. The popularity of chairside CAD/CAM units has never been greater. The materials that we are able to use in conjunction with CAD/CAM scanners have gone from monolithic, one shade blocks to multi-layered, all-ceramic, lithium-disilicate constructions that can be sintered and finalised in as little as 15 minutes.

The appearance of these restorations, although still needing a well-trained (and artistic) dentist, could be said to be on par with certain lab-based fabrications whilst maintaining the advantages of being a chairside single visit restoration. CAD/CAM technology is now almost universally used in the fabrication of dental implant abutments and bars, reducing construction times, designs and fit. Dentists are now beginning to use chairside CAD/CAM devices to restore dental implants without the need for any impressions.

CBCT 3-D scanners and CAD/CAM integration
 Cone beam computed tomography (CBCT) scans are now commonplace in dentistry, particularly in implant dentistry where Grundahl (2007) found that 40 percent of all CBCT scans were taken for implant treatment. Where 3-D scans were reaching a shortfall was in actually relaying the information obtained into the mouth during the surgical procedure. One recent innovation has been to overlay scans of the patient’s own teeth and soft tissues onto the CBCT scan data. This gives an accurate representation of the hard and soft tissues and their relationship with CAD/CAM units has never been greater.”

“The popularity of chairside CAD/CAM units has never been greater.”

I have been fortunate to see a prototype facial scanner from Siromau and even managed to have my face scanned (Figs. 1 & 2). The detail achievable with these units is impressive. Once this information is combined with 3-D scans, teeth scans and jaw articulation, a fully working and movable representation of the patient’s head can be compiled on the computer screen. Allowing for treatment planning and assessment to be carried out without any need to see the patient. One application of this may be in developing countries, where various experts from around the world can examine complicated facial reconstructions cases without them actually seeing the patient. As already mentioned, the opportunities for patient education are huge, and with procedures such as plastic surgery and orthognathic surgery being so difficult to properly consent for, facial scanners will greatly aid clinicians.

Growth factors
Available for a long time in medicine and dentistry, growth factors have been the reserve of PhD students and professors until recently. The resurgence of the usage of platelet rich plasma (PRP) has come about with added research showing that using PRP can greatly improve osteoblast proliferation (Parmar 2009) and accelerate soft-tissue healing. Companies are now offering clinical courses for dentists to make, produce and use PRP in their own surgeries within 15 to 50 minutes. The main advantage of PRP is that it’s free; is obtained from the patients’ own blood, thus removing the risk of rejection; and can be made in vast quantities. As more research is published, coupled with simpler production kits, PRP use will increase in all aspects of invasive dental surgery.

The above is just a short description of what is being developed for the future. Dentistry has never been so intertwined with technology. The next ten years will prove to be exciting and I eagerly await to hear, see and use the new technologies that are being developed today.

Dr Nilesh R. Parmar runs a successful full surgury practice close to London and is a visiting implant dentist to a central London practice. His main area of interest is in dental implants and CEREC/CAD/CAM technology. He can be contacted at drnileshparmar@gmail.com. More information can be found on his website, www.drnileshparmar.com; Twitter: @NileshRParmar; or Facebook: Dr Nilesh R. Parmar.
Computer-aided crown design—Fabrication of CAD/CAM crowns chairside

Dr Andreas Bindl
Switzerland

CAD/CAM technology allows dental professionals to manufacture solid all-ceramic crowns chairside. A digital image of the preparation is captured with an intra-oral camera and the crown is designed accordingly.

IPS e.max CAD (Ivoclar Vivadent), which has been on the market for some time, is a lithium disilicate glass-ceramic that demonstrates a flexural strength of 560 MPa. This ceramic is machined to the desired shape while it is still in its metastable or blue state (approximately 150 MPa). Subsequently, the ceramic is crystallised for 20 minutes. During this process, the material attains its final state and obtains its excellent mechanical and aesthetic properties. IPS e.max CAD is available in a low translucency (LT) version, which is suitable for the fabrication of crowns and implant-retained crowns. The high translucency form is intended for the construction of inlays and partial crowns. The stains...
Immediate implant placement and immediate loading.

Contribution of 3D imaging and CAD/CAM to guided surgery

Dr. Nicolas Boutin, France & Dr. Bernard Cannas, France

Performance is Our Passion - A survey on CAD/CAM today

“Performance is Our Passion” - A survey on CAD/CAM today

Dr. Bernd v/d Heyd & Werner Gosch, MDT, Germany

The maxillary and mandibular teeth were matched semi-automatically (Fig. 3).

The Version 5.8 of the CEREC software generates a visual image of the antagonists, which replaces the centric bite record. In order to match the maxillary and mandibular teeth, an image of the centric situation was captured from the buccal aspect (Fig. 2).

Clinical case report

Tooth 25 of a 52-year-old female patient was restored with a crown owing to extensive destruction of the dental hard tissue (Fig. 1). First, the tooth was prepared with a shoulder of approximately 1 mm in width (epigingivally). Subsequently, the preparation was dusted with IPS Contrast Spray (Ivoclar Vivadent) and a digital impression was taken with the CEREC Bluecam camera (Sirona).

The Version 5.8 of the CEREC software generates a visual image of the antagonists, which replaces the centric bite record. In order to match the maxillary and mandibular teeth, an image of the centric situation was captured from the buccal aspect (Fig. 2). The maxillary and mandibular teeth were matched semi-automatically (Fig. 3).

The Version 5.8 is capable of designing biogenic occlusal surfaces for full crowns. The software provides a design proposal for the tooth morphology, which is based on the occlusal surface of the distal neighbouring tooth and the antagonist (Fig. 4). The image of the bucco-oral cross-section of the crown allows the user to check the minimum occlusal thickness of 1.5 mm (Fig. 3). The minimal densification of the ceramic (0.2 vol.%) during the crystallisation process is taken into account by the software and adjusted accordingly.
After the crown had been milled, the proximal and occlusal contacts were adjusted on the patient (Figs. 6 & 7). In this case, the white and creme materials from the corresponding stain assortment (IPS e.max CAD Crystall./Stains, Ivoclar Vivadent) were sparingly applied to the cusp tips and the sunset material to the tooth neck and in the fissures.

Immediately afterwards, a glaze in spray form (IPS e.max CAD Crystall./Glaze Spray) was applied to the outer surfaces of the crown. The spray was applied several times. Once the restoration had been fully coated with a white-opaque glaze layer, the crown was fired in a combined crystallisation and firing process in the Programat CS furnace (Figs. 8 & 9).

Before the restoration was cemented in place, the inner surface of the crown was etched with 4.9 per cent hydrofluoric acid (IPS Ceramic Etching Gel, Ivoclar Vivadent) for 20 seconds. Subsequently it was silanised for 60 seconds (Monobond Plus, Ivoclar Vivadent). The crown lumen was filled with the self-adhesive SpeedCEM. Next, the crown was securely seated on the prepared tooth by applying even pressure (Fig. 10).

The cement residue was polymerised for one second per surface (mesio-oral, disto-oral, mesio-buccal, distobuccal) with a curing light (blue-phase in the low power mode, Ivoclar Vivadent) at a distance of about 5 mm. In this cured state, the cement was removed with great care using a scaler and a probe. The cement was fully cured with the bluephase in the high power mode. Subsequently, the cement margin was polished.

The final inspection revealed the restoration to be in harmony with the overall situation (Figs. 11 & 12).