

Game changer of 3-D printing: Dentistry is a trendsetter

■ New treatment modalities, new forms of teamwork, new business models—when it comes to 3-D printing, dentistry is one of the pioneers. According to a recent analysis, the global market for 3-D printing products will grow by an annual average of between 13 and 23 per cent to reach a total volume of €22.6 billion by 2030. Regarding medical technology in particular, the volume will grow to €5.59 billion by 2030. According to experts, this development will occur in two phases: until 2020, there will be a prevailing focus on the reinvention of already existing products; after that, the focus will turn to the development of innovative materials and optimised printing processes. The printing of frames through laser-assisted processes is already established, whereas new dental frames made of plastic materials are being developed. According to market analysts, however, the possibilities regarding orthodontic appliances, prostheses, crowns, bridges, aligners and models are most promising. In terms of prophylaxis, an individualised 3-D printed dental floss holder is considered to be among the most advanced developments. When it comes to communication,

real-time images have already proven themselves. In this context, a digitally modelled smile of a patient serves as the basis for a 3-D printed silicone model. Furthermore, a robot has already successfully implanted two 3-D printed teeth into a patient. Apart from that, in order to reconstruct the original form of a patient's jaw after oral tumour removal, it is already possible to scan the defect and manufacture a template by means of 3-D printing. This template then guides the extraction of a bone block from a different area of the body (for instance, the fibula), which is subsequently transplanted into the oral cavity.

Today, there are a wide range of different processes. These include stereolithography, which is ideal for manufacturing surgical guides owing to its precision down to the lower double-digit micrometre range. There is also the digital light processing technique, which is characterised by its high speed: owing to a one-time exposure instead of a moving laser beam, each layer of the object polymerises almost instantly. Apart from that, the Polyjet process, which closely resembles the functionalities of an office printer, can

achieve extremely high precision. Within the context of both plastic and metal printing, there is the selective laser melting technique, the selective laser sintering technique and LaserCUSING. At IDS 2019, the entire spectrum of these processes will be on display with a view to their already existing clinical applications. In this regard, the exhibitors will be happy to elaborate on the properties of printable materials, software solutions and services, which are tailored to the needs of dental practices and laboratories.

“Within the field of 3-D printing technologies, many great things have already been achieved that were not yet foreseeable to their full extent some years ago. It is now clear that 3-D printing is going to significantly change digital workflows in the long run,” said Mark Stephen Pace, Chairman of the Board of the Association of the German Dental Industry, ahead of IDS 2019. “Constant developments in the field result in new clinical, technological and economic possibilities, which in turn lead to innovative business models. There is no better place than IDS 2019 to comprehensively experience the resultant possibilities for one's own dental practice or laboratory.” ◀



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Focus on long-term outcomes of periodontal therapy

■ As the top event for the dental industry globally, IDS will present the entire range of products available on the market worldwide, with a focus on periodontology. As such, the upcoming IDS will offer an overview of both established and new methods in periodontitis prevention and therapy, specifically emphasising follow-up care through biofilm and recall management as integral to long-term success.

“The coming IDS offers attractive innovations in many areas, from the diagnostic process to the supporting periodontal therapy, through to periodontal surgery,” emphasised Mark Stephen Pace, Chairman of the Board of the Asso-

ciation of the German Dental Industry. With the growing need for care, there are increasingly more effective options for the prevention and treatment of periodontitis, he said. “At the International Dental Show in Cologne this progress can be experienced close up. With tangible product innovations and direct contact with the respective manufacturers, IDS offers all visitors real added value.”

IDS will showcase the entire range of periodontal treatment products, including manual tools, ultrasonic and powder jet systems, periodontal probes and pressure-calibrated alternatives, software solutions and adjuvant therapies. The last include

laser-controlled methods, immune modulation and the application of antimicrobial substances. Beyond the minimally invasive methods, surgical options, such as lobe operation and soft-tissue grafts, will also be covered. In addition, visitors will be able to learn more about bacteria, DNA tests and modifications, such as leukocyte telomere length attrition, as well as assessment methods for genetic periodontitis and tissue destruction processes for accurate treatment planning. Because regular follow-up care is key to success in periodontal treatment, particular attention will be given to recall and supportive periodontal therapy and monitoring. ◀

Digital endodontics: IDS to showcase wealth of possibilities

■ The success of endodontic therapy depends on many factors, including the detection of all root canals, their hermetic seal and the nature of subsequent coronal care. How the latest innovations for the individual treatment steps can be optimally put to use will be shown at the 2019 IDS in Cologne.

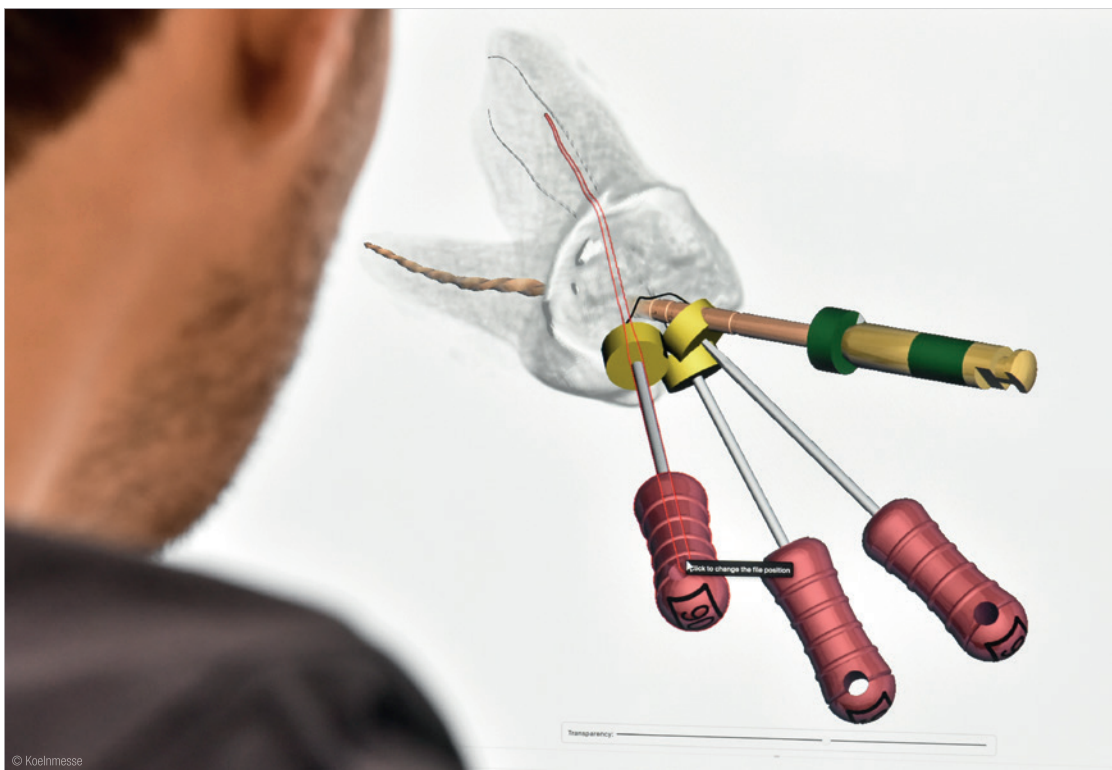
Today, the success rates of endodontic treatments over a period of ten years are typically more than 90 per cent. In order to optimise treatment outcomes even further, dental practitioners seek to use and benefit from the best technologies on the market. Digitally supported endodontics has given rise to new

Now, development is moving in the direction of virtually pre-planned root canal therapy and guided endodontics (similar to implantation guided by a surgical template).

Despite the digitalisation process, many proven products and processes will, of course, retain their importance. Therefore, they are being progressively developed and improved. Partially heat-treated files, for example, are even more flexible, which is an advantage in anatomically complex cases. Furthermore, the use of lasers could potentially make the disinfection of prepared root canals even safer in the future, such as PIPS (pho-

filling of the canals and, if necessary, the creation of space for a root post.

With the support of software and 3-D radiographs, planning for procedures is continuously becoming easier. This boosts the safety of treatment and improves long-term outcomes. On the monitor, the dentist can now visualise the root canals from top to bottom. The software proposes files of the right sizes, matching gutta-percha points and much more. This technology also offers the possibility to virtually simulate the treatment in advance. There is also the possibility of a division of labour, with the



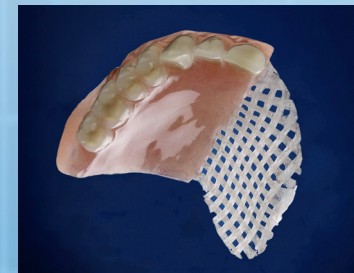
possibilities, having already replaced analogue radiographs with digital 2-D radiographs. For several years, practitioners have had access to endodontic motors that can be controlled from a tablet, offering advantages in documentation and patient communication, for example.

ton-induced photoacoustic streaming) or SWEEPS (shock wave enhanced emission photoacoustic streaming). During obturation, motor-driven extruders can simplify the dental procedure by combining all the necessary functionalities: the introduction of gutta-percha, the

planning done by the specialist and the treatment implemented by the principal dentist. The next area of advancement is guided endodontics, which will, for example, provide a template for introducing the glide path file into the canal at the optimal angle. ◀

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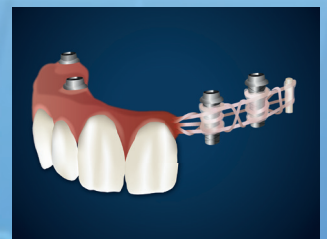
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Dynamic digitalisation: The laboratory of the future at IDS 2019

■ There are stable long-term trends and fast-paced ones when it comes to digital dental technologies, and dental technicians who combine these two profit the most. A visit to IDS 2019 will definitely help to gain a comprehensive overview and make unerring decisions with an eye to the future. A number of innovations in the area

of digital technologies have made the processing of specific materials possible or economically attractive. Today, it is possible to manufacture crown and bridge frameworks that are made from zirconia, lithium disilicate, hybrid ceramics, high-performance plastics, and alloys that either contain gold or are free of precious metals.

In terms of manufacturing choices, dental laboratories have become very flexible: they can decide whether to produce in-house or outsource tasks to laboratory partners or external industrial services. Today, even custom abutments can be manufactured in-house or ordered from an external manufacturer or supplier. Regarding fixed dentures, CAD/CAM systems have become well established in the past several years, and new possibilities in CAM of removable dentures are constantly being created. For instance, complete, duplicate and immediate prostheses can be manufactured in the dental laboratory by means of computer-supported procedures, allowing the dentist to continue performing the work tasks with which he or she is most familiar.

Just like prosthetics, orthodontics is considered to be a relative newcomer to the digital playground, compared with other dental fields. These days, dental laboratories contribute to dental treatments by providing virtual set-ups. In doing so, bracket positions can be set, for instance. Subsequently, the dental technician fabricates the respective appliance and creates the transfer tray by means of a 3-D printer. This procedure brings a wide variety of creative possibilities to the dental laboratory: occlusal splints, surgical guides, custom trays, orthodontic appliances, or provisional crowns and bridges—virtually everything can be manufactured using 3-D printing technologies. If in accordance with the guidelines for Class IIa medical devices, the respective appliance can be used for printed short- and long-term provisionals. Furthermore, printed alloys, such as cobalt-chromium, give access to new applications, such as digital model casting prostheses. ◀

At-home tooth straightening boom raises concerns



■ To the unaware consumer, it almost sounds too good to be true: straighter teeth without a single dentist appointment through a method that is also quicker and more affordable than conventional orthodontic treatment.

Just recently, the US-based start-up SmileDirectClub, in which clear aligner maker Align Technology owns a 19 per cent stake, raised US\$380 million in a new funding round, valuing the company at US\$3.2 billion.

Competitors with similar business models can be found all around the world, such as EZ Smile (Australia), Your Smile Direct (Ireland) and Easy Smile (Hong Kong). All these companies follow a similar process: a potential patient fills out an online questionnaire to assess whether he or she is an eligible candidate for at-home treatment. Depending on the result, the customer can buy an impression kit, take the impressions at home and send them to a laboratory, which will then create a set of plastic aligners.

By eliminating the in-person visit to an orthodontist, remote tooth straightening services can be offered

at a cost that is up to 60 per cent cheaper than care provided via an orthodontist using a clear aligner system.

Despite the advantages of at-home treatment, dental professionals are worried about this trend. In an interview with the *Sydney Morning Herald*, Vice President of the Australian Society of Orthodontists Dr Howard Holmes said: “If there are gum issues, gum disease or broken fillings, they won’t be detected, and when you start moving teeth, those problems can become worse. Even if the immediate results seem good, the teeth and bite may not be in a stable position and move back, and there could also be muscular and jaw problems.”

Despite the possibility that failed at-home aligners may result in even more costly remedial treatment, EZ Smile founder Ed Ambrosius believes that dentists are scaremongering: “We are simply doing the most minor cases of teeth movement and would never consider treating anybody that requires complicated dental techniques. The risks are extremely low. We have rejected many more cases than we’ve taken on.” ◀



Upcoming IDS puts emphasis on technology and teamwork

■ Over the past 20 years, dentists and dental technicians have experienced the new possibilities continually being created by digitalisation. The key to success in exploiting these innovations has been and will continue to be the interaction between the members of the treating team. In this regard, IDS will offer comprehensive concepts, valuable tips and stimulating discussions.

The particular excitement of dentistry lies in the unique combination of medical, technological and aesthetic aspects in the discipline. The day-to-day work has become more diversified and sometimes challenging over the past decades, both in the practice and in the dental technician’s laboratory, owing to multifaceted requirements. A particularly effective means of meeting these demands has been the intensification of collaboration between dentists and dental technicians.

The conditions for collaboration are better than ever, because digitalisation allows spatial and time limits

to be overcome. Radiographs, model scans, and a wide range of different working and planning documents can be produced in the practice and the laboratory within seconds for evaluation and discussion purposes. At the same time, overlapping digital workflows in more and more areas are increasingly facilitating cooperation between dental professionals.

The sheer number of options and thus possible combinations is increasing further in terms of both materials and production. Especially in the case of digitally aided manufacture, 3-D printing is expanding the choices and opening up new possibilities for teamwork between dentists and dental technicians. The specific realisation of this depends on the practice’s clientele, the existing equipment, and the personalities and individual approach of the dental professionals concerned.

“The International Dental Show will comprehensively present the current state of development of materials and processing methods, as

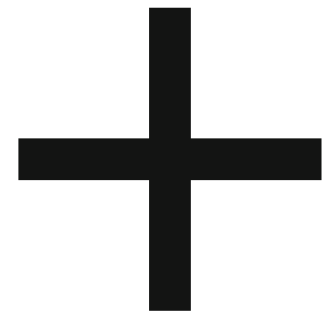
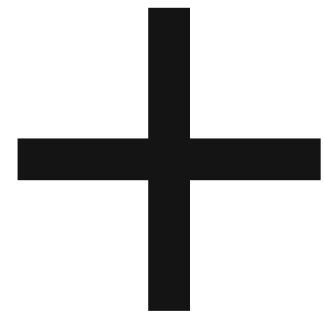


well as new opportunities for optimal collaboration between the dentist and dental technician,” said Dr Markus Heibach, Executive Director of the Association of the German

Dental Industry. “At IDS, digital systems, planning tools, and different production options and their application within the team can be experienced first-hand and in a diversity

that cannot be found anywhere else. My tip to all visitors is to talk to your dental technician or dentist in advance and visit the International Dental Show as a team!” ◀

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