



Orthoproof | ULTRA 3D Printer

3D printing is an extremely valuable tool in the product development process for a wide range of applications.

A key industry sector is orthodontics as exemplified by Orthoproof, a company that uses two EnvisionTEC Ultra 3D printers to produce patterns and tools. CNC-Consult supplied the equipment and also provides maintenance and support

3D printing provides a way of creating parts that just a decade ago, were considered impossible. For some time after it first emerged at the end of the 1980's, 3D printing was really only suitable for making fragile prototypes. However, the evolution of 3D printers and materials in recent years has led to improved technology, which in turn has resulted in a considerable increase of applications. Today, 3D printing is commonly used in the development of patterns and tools, and in some cases, final production.

Introducing 3D Digital Technology

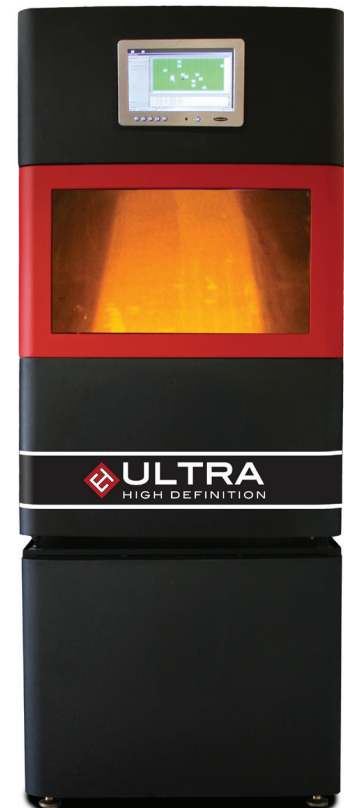
Prior to the formation of Orthoproof, Ortholab's processes were labor intensive and time consuming and it was believed that emerging 'digital' techniques could address these issues. The result was Orthoproof, which is led by Roelant Seijger, son of Ortholab's owner and director, who explained what Orthoproof can do: "We now offer two specific 3D services - scanning and printing. First, we 3D scan teeth that we receive via Ortholab. These are obviously not real teeth, but copies made from alginate - so-called negatives. Orthoproof scans the copies to produce a 3D model that enables the specialist to look at the teeth from all angles. And even though the information is not tangible, the scan data enables a treatment plan to be set. The digital representation of teeth also offers better access to information as, for example, distances are easier to measure. We therefore speak of 'digital 3D study models'. Moreover, the specialist can save the information easily on a hard drive making it readily accessible to closely follow and assess ongoing development and reduce storage requirements."



CNC-Consult and Orthoproof

CNC-Consult, based in The Netherlands, is one company that has recognised and embraced the power of 3D printing. The organisation was founded in 1995 as a supplier of solutions in the fields of CAD and CAM, providing software and small CNC machines together with training and support. From here, the leap to scanning in 3D and then 3D printing was small in respect of the technologies complementing the existing portfolio at CNC-Consult and as a result the company became a reseller for EnvisionTEC 3D printers. This expansion has proven successful and increasing demand dominates the company's activities and turnover.

CNC-Consult's client base includes pioneers in a number of industry sectors that have realized new ways of working and new business models with 3D printers. One such organization is Orthoproof, which was founded seven years ago as an Ortholab spin-off. Ortholab is one of the six large Dutch providers of orthodontic 'equipment' for checking human teeth.



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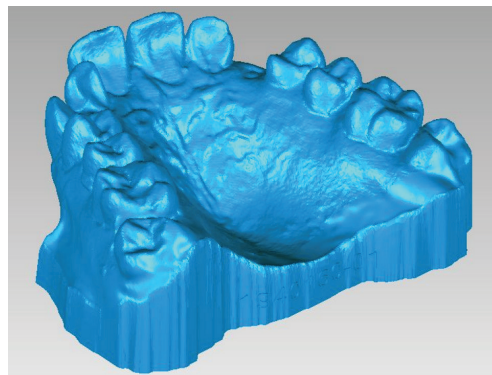
"For this application, we use two identical EnvisionTEC Ultra printers with the standard EnvisionTEC RC31 material. These systems offer the superior accuracy and reliability that we need"

Case Study



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For some orthodontic treatments - it is necessary to produce a physical model of the teeth. Prior to introducing digital techniques, the dentist or orthodontist had to make the alginate model 'manageable' by using it as a casting mould, in order to then return it into its original shape in plaster, the so-called positive.

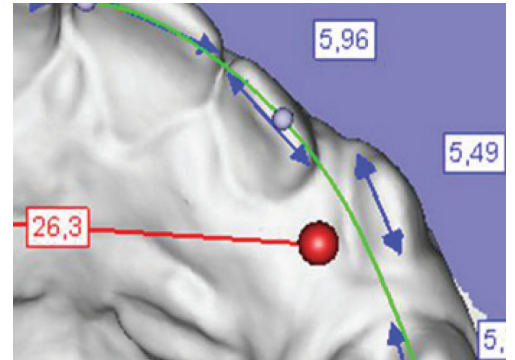


The scanning process at Orthoproof utilizes a CT scanner. As Seijger says: *"This may seem much more expensive than a laser scanner, and the purchase and maintenance of such a scanner is indeed costly, but the benefits of a CT scanner are significant - most notably its speed and the fact that it is not hindered by undercuts or shadows from other pieces. You can therefore accurately digitize a shape in a single attempt, even when different shapes are placed together. With laser scanning, various objects cover each other and you always have to make multiple scans at different angles. With the CT scanner, we now perform approximately 200 scans a day, and this costly scanner has proven very rewarding."*

The second service that Orthoproof offers, and has done for almost two years, is physical copies of teeth. According to Seijger: *"The digital model is unsuitable for making an 'instrument', for example a brace, for dental correction. This instrument is still made manually in the traditional manner but it requires an exact, tangible copy of the teeth - a 'working model' - to allow precise development of*

the instrument for the actual teeth. This is where 3D printing comes into its own, because compared with the traditional methods for producing physical models of teeth it produces superior results, faster. We now produce about 25 complete sets of teeth a day - fifty prints as the lower and upper jaws are printed separately. For this application, we use two identical EnvisionTEC Ultra printers with the standard EnvisionTEC RC31 material. These systems offer the superior accuracy and reliability that we need. Originally, we purchased the second printer to ensure that we could always deliver reliability - it was an emergency backup. However, we now also use this printer regularly and consistently as production has increased."

Usually, eight teeth sets are printed simultaneously, which takes about 2.5 hours. As the number of prints is steadily increasing, Orthoproof is currently considering purchasing two more EnvisionTEC 3D printers to meet demand.



As Seijger concludes: *"The possibilities are extending all the time, along with the opportunities. As soon as possible we want to start printing our final product - the instruments for tooth correction - on EnvisionTEC machines, which would make the printed working model redundant. There is also an increase in interest from the dental sector itself for 3D printing crowns, either indirectly or directly, in ceramic material."*

He expects that scanning and 3D printing will bring the domains of orthodontics and dentistry closer together.

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