



DÜRR DIGITAL DIAGNOSTIC RADIOGRAPHY

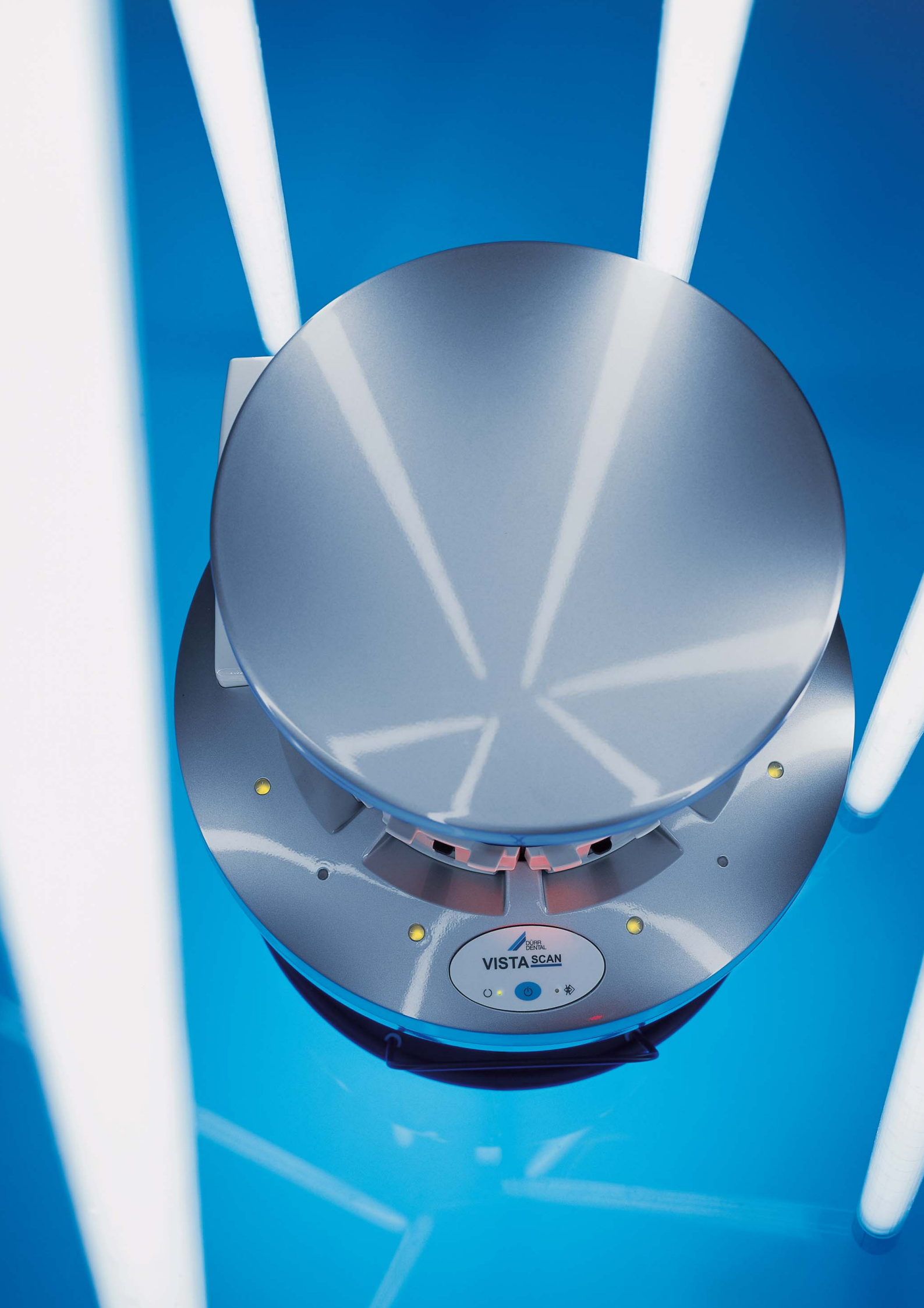


The time is right for a change in diagnostic radiography

IMAGE PLATE SCANNER DÜRR VISTASCAN

VISTASCAN

**DÜRR
DENTAL**



DUPR
DENTAL
VISTA SCAN



***For more than 30 years Dürr Dental
has been developing radiographs of
outstanding diagnostic quality for you.***

***With the new Dürr VistaScan
we now give you the opportunity
of modernizing your diagnostic
radiography quickly and simply:
with perfect image quality
and the great potential
of digital image processing.***

***The time is right for a
change in diagnostic radiography.***

VISTA**SCAN**



You have developed your diagnostics and Dürr Dental has developed the radiograph

EXCELLENCE IN DIAGNOSTIC RADIOGRAPHY

Dürr Dental leads the way in the development of dental radiographs

Since the 1970's Dürr X-ray film developing machines have played an indispensable role in dental practices throughout the world. The very good reason for this is the requirement for an extremely high quality diagnostic image. Intra-oral and extra-oral radiographs have been continually taken to the next level of quality by Dürr Dental's continuous development program for its processors and chemistry. Practice teams have been brought up and trained on machines such as Periomat and XR 24.

Changes in the way practices operate

Whilst the development of dental X-ray film processing is also a success story, there has at the same time been a change in the way diagnostic practice is carried out. Previously patients were still accustomed to going to the dentist only when they had problems, and not questioning the dentist's diagnostic methods or waiting for the findings before beginning their treatment. Today they are fully included in the diagnosis, prophylaxis and therapy processes which place a greater requirement on the practice teams to work more efficiently and quickly and with a greater focus on the patient's needs. Diagnostic processes must therefore keep up with these changes.



OPG standard panorama radiograph with accompanying single radiograph showing serious problems



**These radiographs
by a periomat**

**And a re
in the exp
of up to**

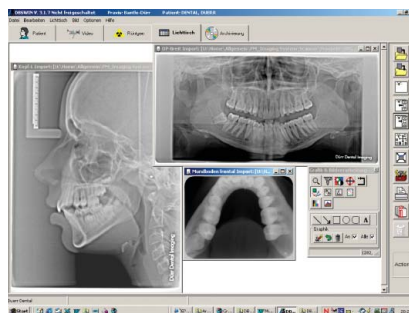
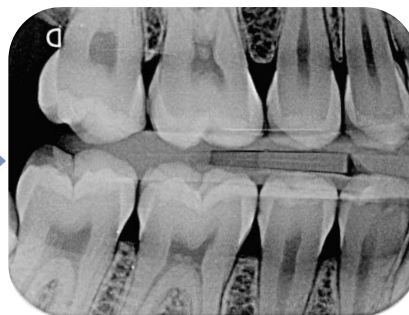
In the dim and distant past radiographs served as a basis for deciding whether teeth should be extracted or treated. The patient waited patiently for the results from the darkroom.



OPG standard panorama radiograph with accompanying bite-wing radiograph
(after image processing – caries filter)

hs are separated
d of years.

reduction
posure dose
50 %!



**Today the dentist
and the patient complement each other,
with diagnostic results being communi-
cated directly to the patient to guaran-
tee aesthetic treatment and keep them
continuously updated.**

The time is now right to change from conventional to digital radiographs

There are developments which are logical. These include the increasing use of digital images in dental diagnostics. Yet not every new technology is a success: A technology will only be successful in practice if it can deliver convincing answers to all the expectations it has raised. It is against this background that Dürr Dental imposed rigorous standards on itself when it launched digital imaging onto the market.

Dürr VistaScan meets high practice standards

The solution aimed for had not to impose any restrictions on the range of applications, an aim which clearly says a great deal in favour of digital image plate technology. Then a diagnostic image quality had to be attained that matches conventional film, but accompanied by a reduction in the exposure dose. A new scanner technology was clearly required to meet this objective. The final requirement was that operation of the practice had to be maintained, but the elimination of the dark-room and protection of the investments already made in panorama X-ray apparatus had to be continued. The new Dürr VistaScan meets these requirements image by image.

From film to plate – stepping into the future

DIGITAL IMAGE PLATE DIAGNOSTICS

Image plate technology in dentistry

The time is right in medicine radiology image plates are in standard use as the X-ray image media. The potential advantages the Dürr VistaScan and image plate technology can give are easy to see:

- Latitude of exposure
- High grey scale range
- High resolution
- Reduced radiation dose

These advantages make this technology even more attractive in comparison with current sensor technologies.

Changing over is simple for the practice



Only minimal retraining is necessary when using image plates for intra-oral radiographs because the handling, placing and variety of formats is exactly the same as for analogue film. A situation which is not the same when using CCD/CMOS sensors as not all formats are available. Normal commercially available film holders that are used for analogue films can continue to be used unlike with sensor systems where special holding devices are absolutely necessary. Positioning on sensor systems can also be a problem with even the thinnest of sensors.



Image plates from Dürr Dental are available in all current dental formats until 24 x 30



Panorama and Ceph radiographs

With panorama and Ceph radiographs the analogue film and the film cassette, if applicable, is simply replaced by the image plate. The X-ray apparatus is ready for immediate use for digital images without conversion.

Justifiable investment need for moving into digital diagnostics

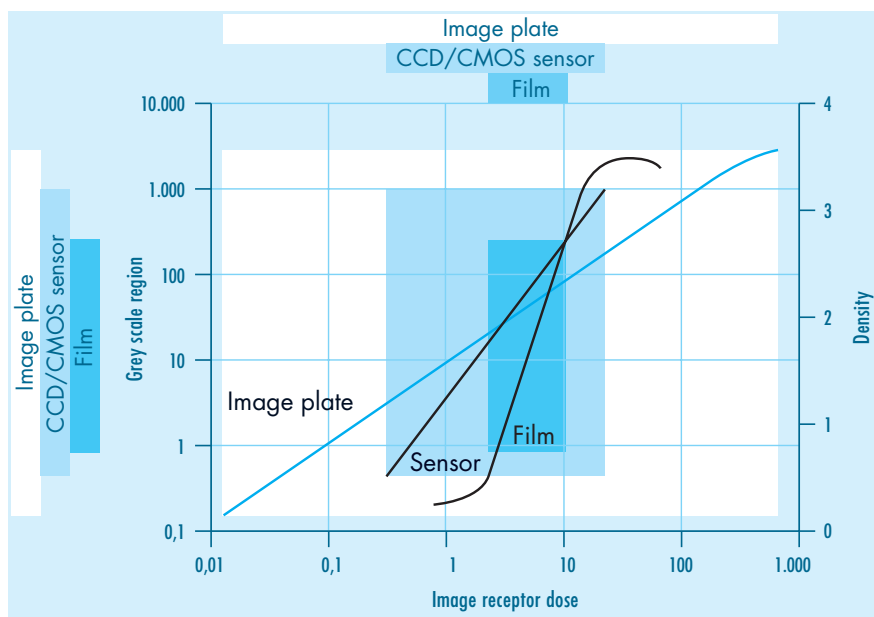
Existing X-ray installations can usually continue to be used. A single VistaScan digitizes the image plates for the whole practice with all current formats. However, when changing over to CCD/CMOS sensor technology it is only seldom possible to convert the equipment. As a rule there is a need to invest in new panorama

X-ray systems. Additional image plates are also markedly more economical than additional CCD/CMOS sensors and this has a positive effect on expansion or replacement needs.

Economical and environmentally-friendly

The image plates can be exposed several hundred times and repeatedly erased, thus dispensing with the need to use or keep stocks of development chemicals and the problem of waste disposal.





Sample density curves of the X-ray detector systems demonstrate the comprehensive latitude of exposure and grey scale region of image plates compared with other detector technologies. The latitudes of exposure and grey scale value regions can be seen from the horizontal or vertical extensions of the coloured areas for each of the detector technologies.
(Data from: Dental radiology/imaging processes, Friedrich A. Pasler/Heiko Visser)

Latitude of exposure and sensitivity

Image plates have greater latitude of exposure than CCD/CMOS sensors and conventional X-ray films. Usable

images can be obtained even at very low radiation doses because of this. Moreover, the image plate has the highest tolerance to under- or overexposure. Thus all areas of the image

are always optimally exposed.

Grey level region

The grey scale region of a film lies usually around 30 to 100. Semiconductor sensors today attain between 1000 and 10,000. However, the image plate covers the largest region, with up to 100 million storable grey levels. Source: M. Thoms, Nuclear Instruments and Methods a (389), pages 437 to 440 (1997).

Spatial resolution

Because of the fine scanning of the laser with a beam focused to 12.5 µm in combination with the high light gathering efficiency of the Dürr PCS technology, VistaScan achieves with the image plates currently available on the market a detectable spatial resolution of over 15 line pairs/mm (LP/mm), which outclasses many other systems. That, however, does not yet exhaust the limits of efficiency of VistaScan. With a maximum theoretical resolution of 40 LP/mm, today VistaScan is already equipped for the future since the development of image plates with higher resolutions is continuing.

Radiation dosage

In comparison with conventional D, E and F films, a radiation reduction of around 20 % to 50 % of the useful radiation can be achieved with image plates.

Image plate

Advantages

- As flexible and thin as film, making positioning simple
- Conventional holding devices can be used
- No cable connection required
- All current formats
- Wide latitude of exposure
- High grey level region
- One system for the whole practice
- Existing X-ray installations can mostly be used

Disadvantages

- Slightly delayed image availability

CCD/CMOS-Sensor

Disadvantages

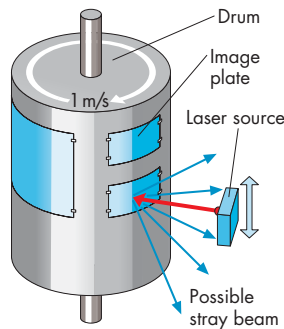
- Rigid and relatively bulky, thereby imposing restrictions on positioning
- Special holding devices are required
- Cable connection
- Only limited formats
- Narrower latitude of exposure and grey level region
- Higher costs with multi workstation systems

Advantages

- Immediate image availability

VistaScan revolutionizes dental image plate diagnostics

DÜRR VISTASCAN WITH PCS TECHNOLOGY



Principle of a conventional drum scanner

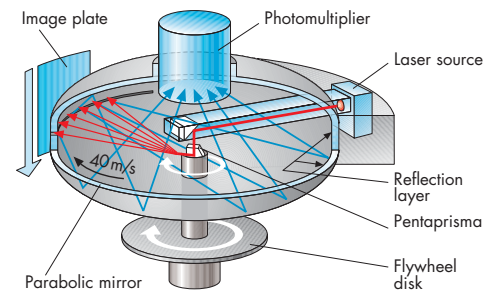
Disadvantages of drum scanner

- Equipment which is in part cumbersome
- High inertia which causes slow speeds, vibration and intrusive running noises
- Low resolution with max. 9 LP/mm for intra-oral radiographs and 4LP/mm for extra-oral radiographs
- Loading of the image plates advisable in darkened rooms only.

With VistaScan the laser beam rotates and not the plate

The Dürr PCS technology redefines the scanning of X-ray image plates. With PCS (Photon Collection System) the scanning laser beam rotates, unlike in conventional technologies where the scanner drum rotates with the plates fixed in place. The effects of inertia which can impair precision and speed are thereby excluded. The transmission of light via a pentaprism ensures that the scanning size of the laser beam is kept to 12 μm . The useful rays pass via a specially coated high efficiency parabolic mirror to the receiver (photomultiplier) which increases the signal to noise ratio, thus reducing interference that would spoil the image quality.

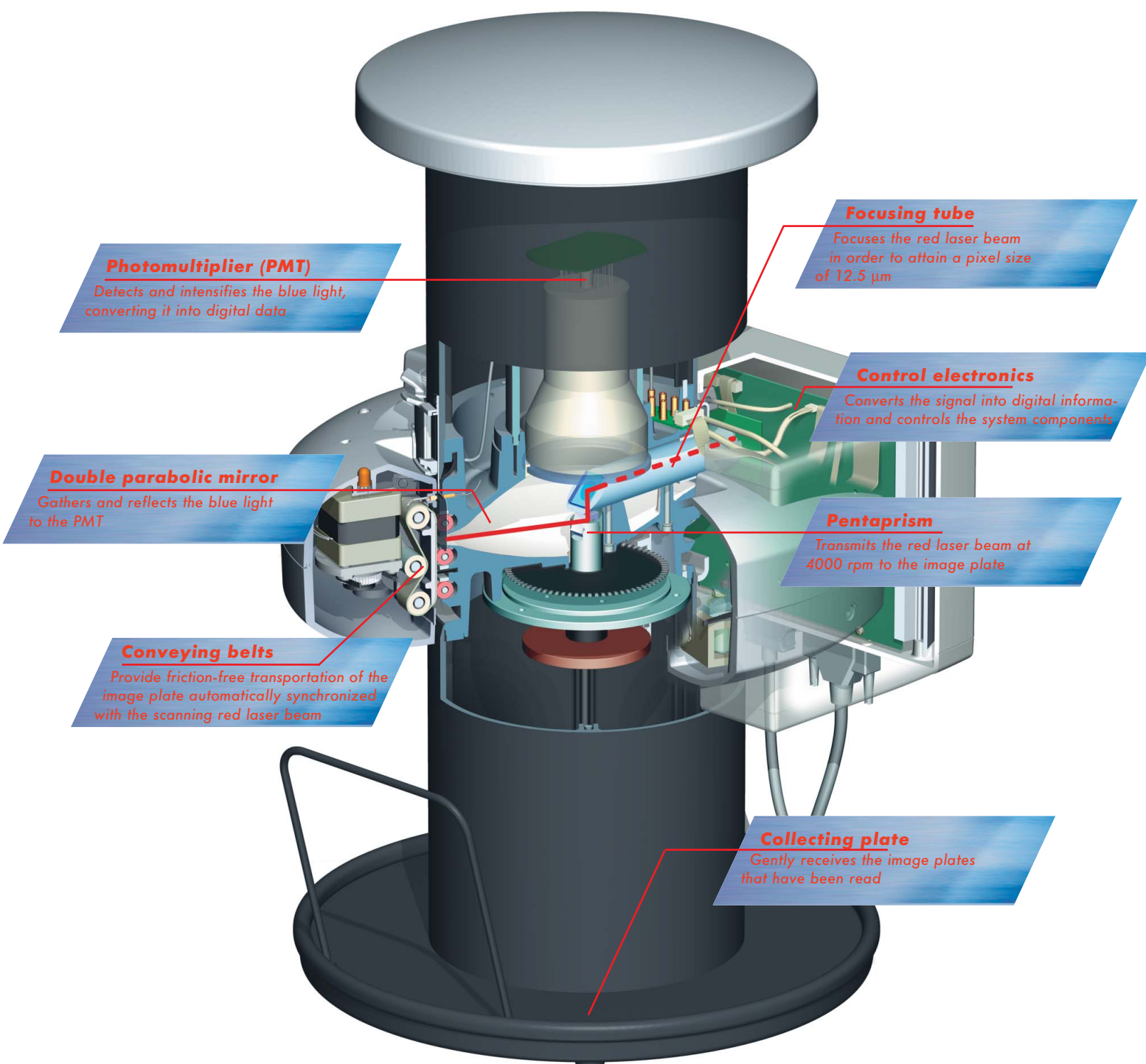
This technology leads to outstanding results: firstly, to an incredibly short read time of only around 30 seconds for 4 intra-oral radiographs (20 LP/mm) or from 21/29 seconds for panorama/Ceph radiographs (5 LP/mm). Secondly, diagnostic possibilities at least equal to that of conventional films.



Structure of the VistaScan with PCS technology

Advantages of VistaScan with PCS

- Simple handling because of semi-automatic plate insertion
- High scanning speeds resulting in images being produced quickly
- Small laser spot of 12.5 μm giving a max. theoretical resolution of 40 LP/mm
- Almost complete detection efficiency for absorbed X-ray quanta (96.3 %) thus minimizing interference that would spoil the image quality
- Complete utilization of the resolution of image plates available today and in future generations up to 40 LP/mm
- Operation under normal lighting conditions
- High dynamics (16 bit raw data)



Scanning times

Extra-oral formats

		Standard scanning 5 LP/mm	Fine scanning 6.7 LP/mm
OPG	12.7 x 30.5	21 sec.	28 sec.
OPG	15 x 30	24 sec.	32 sec.
CEPH	18 x 24	29 sec.	38 sec.
CEPH	24 x 30	38 sec.	50 sec.

Intra-oral formats

		Standard scanning 10 LP/mm	Fine scanning 20 LP/mm
Child	2 x 3	14 sec.	27 sec.
Child bite-wing	2 x 4	15 sec.	30 sec.
Standard	3 x 4	15 sec.	30 sec.
Bite-wing	2.7 x 5.4	20 sec.	39 sec.
Occlusal	5.7 x 7.6	26 sec.	51 sec.



The requirement we have set out to meet: diagnostic quality without limitations of formats

COMPREHENSIVE RANGE OF APPLICATION

Extra-oral radiograph techniques

Areas of application of Dürr VistaScan

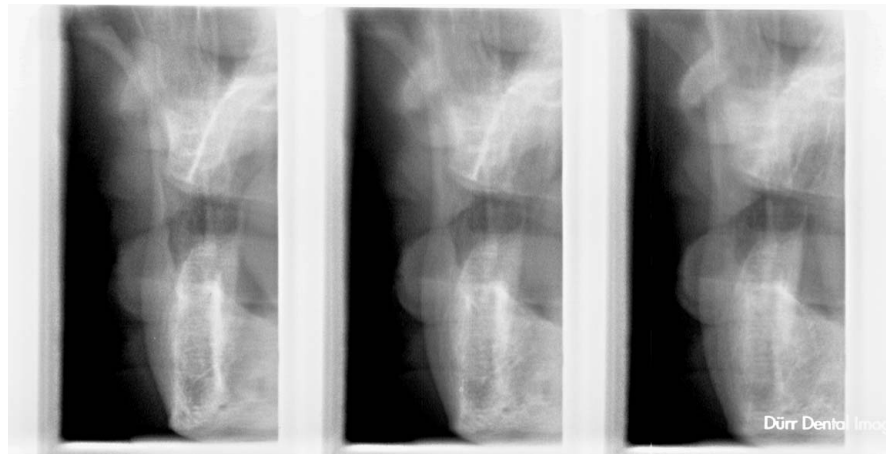
The new dental X-ray image plate diagnostics using Dürr VistaScan meets a comprehensive range of requirements. All current dental formats up to orthodontic cranial radiographs are available. VistaScan is able to accomplish what the digital sensor technology can presently do only with certain limitations or not at all. And it does that with a read speed which is only marginally slower than that of sensor technology.

Examples from practice

In addition to the technological advances that Dürr VistaScan demonstrates in practice, radiographs of high diagnostic quality are of course of central importance to dentistry. The examples illustrated of extra and intra-oral radiograph techniques can give you merely an indication of the range of possible applications. Compare the range with your daily requirements in diagnostic radiography!



OPG – Standard panorama radiograph for basic examination and planning of treatment.



OPG – Transverse sectional image of the maxilla and mandible for implantology and dental surgery.



Intra-oral imaging techniques

The intra-oral images produced are of high diagnostic quality with an image quality and spatial resolution that at least matches the standard of intra-oral films and are available for all current dental formats. This is where

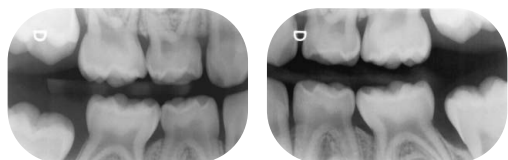
the superiority of the image plate fully comes into its own since as far we know there are as yet no digital CCD/CMOS sensors able to perform occlusal radiographs. In your practice you can use the process to check

cases requiring prosthetic treatment with a single radiograph, thereby enabling you to check for remnants of roots or residual cysts in the jaw with the exposure dose reduced to an extremely low level.

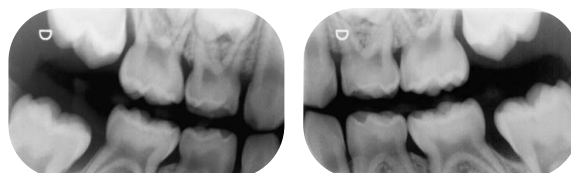
1 Bite-wing radiographs

Children

Format: 2 x 3 (size 0)



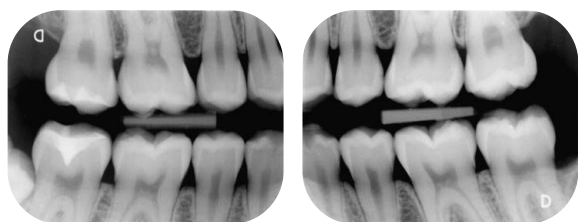
Format: 2 x 4 (size 1)



Typical high quality bite-wing radiographs of children with transitional dentition

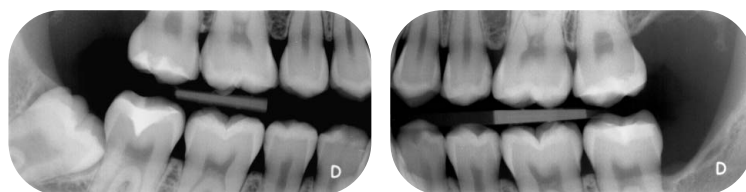
Adults

Format: 3 x 4 (size 2)

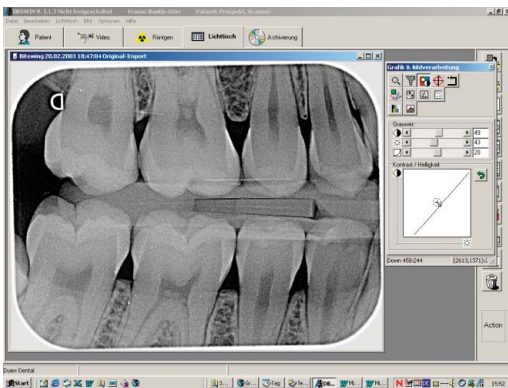


Standard bite-wing radiographs of high quality

Format: 2.7 x 5.6 (size 3)



Same situation with "classical" bite-wing format



Caries filter

Visualization of the bite-wing radiograph "Adult (right)" with diagnosis supporting caries filter with Dürre DBSWIN image processing software

2. Single radiographs

Format: 2 x 3 (size 0)



Control radiograph:
Visualization of implant
and peri-implanted bone in
comparison with the natural
tooth

Format: 3 x 4 (size 2)



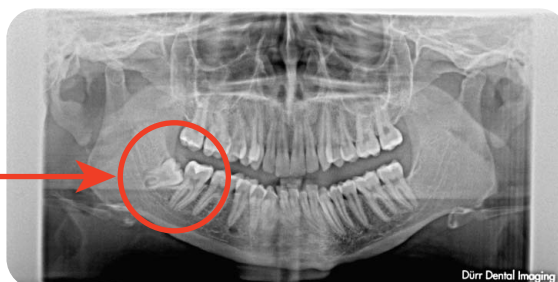
Control radiograph:
visualization of overfilled
material

3. Occlusal radiograph

Format: 5.7 x 7.6 (size 4)



Visualization of the third dimension of the plane of projection.
Differential diagnosis orthograde vestibular or oral position
of the crown of the wisdom tooth





FRS-Lateral cranial radiograph

Orthodontics and dental surgery

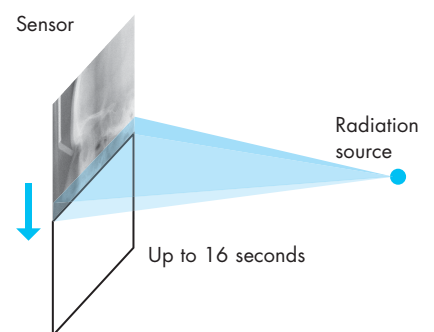
The diagnosis of dysgnathia or the planning of dental surgical operations are just two examples of applications

where VistaScan comes into its own. The image making process corresponds to that of the film with a simultaneous short exposure (≤ 0.4 sec.) of the area, thereby avoiding the danger

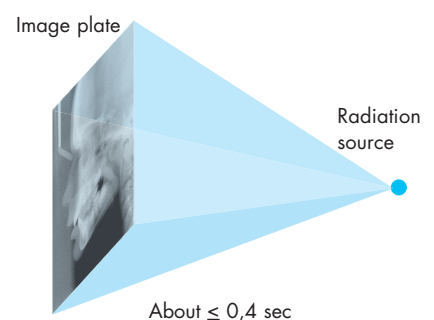
of blurring. This is in contrast to digital sensor technology where the digital sensor needs up to 16 seconds to take a cranial radiograph because of the linear building up of the image. The functional differences can be made clear by a diagram.

Principle of Ceph in comparison

In sensor technology the picture is built up in lines whereas the X-ray detector is exposed immediately with a film or plate.



Principle of digital ceph with sensor



Principle of digital Ceph with image plate

Digital diagnostic radiography – on the right road with VistaScan

INTELLIGENT PRACTICE INTEGRATION

VistaScan is so easy to integrate into your practice

The Dürr VistaScan workstation fits in everywhere within the practice. The process is operated under normal lighting conditions (up to 1000 Lux), thus dispensing with the need for a darkroom. Ideally, you should site the workstation near the X-ray room with access for all staff. The workstation itself can be set up flexibly on a table with the monitor. The VistaScan can also be fitted on the wall if required. The system is extremely quiet in operation so that the operation of the practice is not disturbed.

If you can develop, you can scan as well!

Changing to digital X-ray technology with the Dürr VistaScan is a logical step. This is because the process is simple to operate: the practice team members carry out the work steps familiar to them from their training in film processing, but this time without needing to use chemicals. The intra-



Diagnostic workplace with VistaScan, PC and Display

oral positioning of the image plate is carried out in the same way as for a film, positioning is easy for all patients with no troublesome cables or bulky sensor casings to get in the way. After the image has been taken,

the reading process is carried out on the scanner and the image is examined on the monitor. The image is thus available for all subsequent image processing needs.

Intra-oral



1. Insert the image plate into the foil cassette



2. Place the foil cassette



3. Start the reading process

Panorama/Ceph



1. Foil cassette has been put in place



2. Start the reading process

VistaScan Intra

We present this intra-oral scanner as a "small solution" for practices that carry out intra-oral X-rays only. It meets the highest diagnostic requirements in all intra-oral radiograph formats.

VistaScan

In addition to the intra-oral area of application, VistaScan also opens up the areas of panorama radiographs (OPG) and Ceph 18 x 24 respectively 24 x 30.



VistaScan Intra – the smaller solution for producing intra-oral radiographs only.

VistaScan with a comprehensive range of applications for all dental areas of use Intra-oral, Panorama and Ceph (Combi until 18 x 24 cm, Omni until 24 x 30 cm).

Installation information

- Existing X-ray installations can usually remain in operation
- Can be set up flexibly on tables or on the wall
- Can be set up in a central position – no darkroom
- Can be operated as a stand-alone (workstation with PC, monitor, VistaScan) or as a network solution
- Connection to current patient management software systems, e.g. for orthodontics and additional image analysis systems (visit "www.duerr.de" for an up to date overview)
- No additional equipment costs on extending the practice or with increased use (with VistaScan)

Read-out format VistaScan Combi/Omni and VistaScan Intra

Intra-oral (both models)

- 2 x 3 • 2.7 x 5.4
- 2 x 4 • 5.7 x 7.6
- 3 x 4

Extra-oral (VistaScan Combi/Omni only)

- OPG 15 x 30
- OPG 12.7 x 30.5
- CEPH 18 x 24

Extraoral (VistaScan Omni only)

- CEPH 24 x 30

System properties

- High scanning speed
- Maximum theoretical resolution of 40 LP/mm
- Operation under normal lighting conditions
- Extremely quiet
- No vibrations
- Modern functional design
- Image processing and archiving with Dürr DBSWIN from version 3.2 upwards

Digital Practice with System- Dürr DBSWIN Software

IMAGE PROCESSING AND ARCHIVING

Diagnosis: pointing the way to the future

The latest version of Dürr DBSWIN with the extended X-ray module for VistaScan offers a big plus for user functions. This now comprises image recording, image processing and archiving for all current dental radiograph formats as well as video recordings with the intra-oral camera. The

entire peripheral equipment of Dürr Dental digital diagnostics can thus be operated with only one piece of software whether standalone or networked.

Interfaces to patient management software, measurement software, etc.

Dürr DBSWIN

- Image recording of all digital dental images
- Modular construction –video/ X-ray module
- Modular extension with intra-oral X-ray sensor VistaRay for endodontology and surgery
- Compatibility with current practice administration programs
- Interfaces to orthodontic measuring programs
- Comprehensive image processing and measurement tools
- Diagnostic support filter functions (e.g. caries filter)
- Data exchange via e-mail
- Import and export function for the most frequently used image formats (TIFF, BMP, PCX, JPG, RAW, JPEG2000 and others)
- Connection to external equipment such as microscopes, flatbed scanners, video cameras
- Archiving in accordance with RÖV [German regulation relating to X-rays]
- Data compression rate 4 (OPG approx. 1.8 MB, 3 x 4 approx. 0.8 MB) from version 3.2.2

**Dürr VistaRay
Intra-oral sensor**

Printer

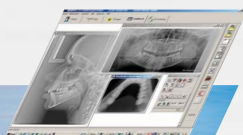
Dürr DB

**Data exchange:
Internet, e-mail, server,
back-up, network**

**Flatbed
scanner**



**Dürr VistaScan
Image plate scanner**

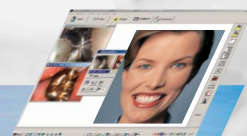


SWIN

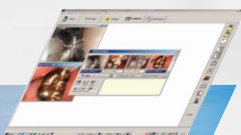
Microscope



**Video camera,
Digital camera**



**Dürr VistaCam
Intra-oral camera**



Overview of the new X-Ray Image Plate technology

IMAGE PLATE SCANNER DÜRR VISTASCAN

Technical data:

Measurements (HxWxD):

Weight:

Setup:

Noise level:

PC connection:

Mains connection:

Mains power rating:

Laser protection class:

Smallest pixel size:

Resolution:

Software:

PC requirements and interfaces to external software:

VistaScan Omni

72 cm x 38 cm x 38 cm

22 kg

Wall mounting or on a table

approx. 49 dB (A)

LPT in EPP-Mode,
USB (from 1.1)

100-240 V/50-60 Hz

70 W

I (EN60825-1)

12.5 µm

dependant on the image
plate max. 40 line pairs
per mm (LP/mm)

DBSWIN 3.2.x

Visit www.duerr.de

for an up-to-date overview

VistaScan Combi

61 cm x 38 cm x 38 cm

21 kg

Wall mounting or on a table

approx. 49 dB (A)

LPT in EPP mode,
USB (from 1.1)

100-240 V/50-60 Hz

70 W

I (EN60825-1)

12.5 µm

dependant on the image
plate max. 40 line pairs
per mm (LP/mm)

DBSWIN 3.2.x

Visit www.duerr.de

for an up-to-date overview

VistaScan Intra

54 cm x 38 cm x 38 cm

20 kg

Wall mounting or on a table

approx. 49 dB (A)

LPT in EPP mode,
USB (from 1.1)

100-240 V/50-60 Hz

70 W

I (EN60825-1)

12.5 µm

dependant on the image
plate max. 40 line pairs
per mm (LP/mm)

DBSWIN 3.2.x

Visit www.duerr.de

for an up-to-date overview

Conforms with directive 93/42/EEC

Formats:

Intra-oral:

Extraoral:

Ceph:

VistaScan Omni

2 x 3 / 2 x 4 / 3 x 4 / 2.7 x 5.4

5.7 x 7.6 / 15 x 30 / 12.7 x 30.5

18 x 24 / **24 x 30**

VistaScan

2 x 3 / 2 x 4 / 3 x 4 / 2.7 x 5.4

5.7 x 7.6 / 15 x 30 / 12.7 x 30.5

18 x 24

VistaScan Intra

2 x 3 / 2 x 4 / 3 x 4 / 2.7 x 5.4

5.7 x 7.6

Accessories:

Dürr image plates



Image plates in all current dental formats

Dürr plate cassettes



Foil cassettes in a foil cassettes holder

Dürr resetter



Consistent and gentle erasure of
the image plates

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