

LOW DOSE X-RAY DETECTORS

for Dental Applications

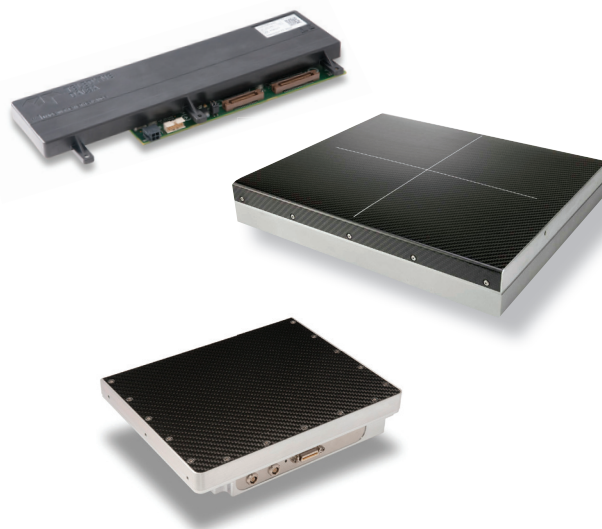


COMMITTED TO PEOPLE. DRIVEN BY INNOVATION.

Solutions for Demanding Applications

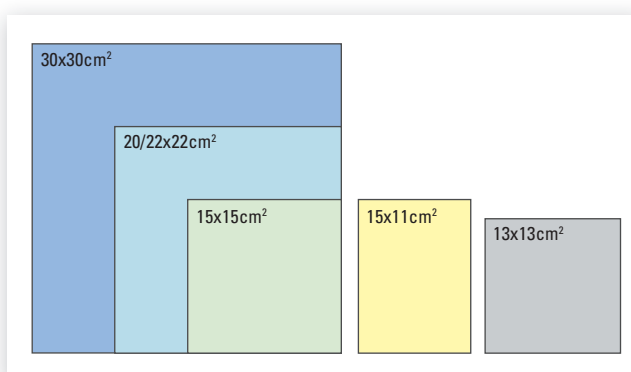
Teledyne DALSA offers a complete portfolio of innovative X-Ray detectors tailored specifically for dental imaging applications, like General Dentistry; Orthodontic Procedures; Oral Surgery; Ear, Nose and Throat (ENT) and Veterinary Dentistry.

Our innovative and reliable products offer solutions for all types of imaging modalities including 3D/CBCT, and Extra-Oral Scanning in cutting edge CMOS technology and CCD-TDI technology.



Xineos Family of CMOS X-Ray detectors spans the complete mid- and large size field-of-view (FOV) dimensions with pixel sizes down to 99 μ m: 13x13cm², 15x11cm², 15x15cm², 20x22cm², 22x22cm² and 30x30cm² with different pixel sizes ranging from 99 μ m to 152 μ m.

The Xineos family are the first commercially available detectors that combine and by far outperform the individual advantages of two established technologies in dynamic X Ray imaging: the low dose image quality of Image Intensified CCDs (IICCDs) and the multiple advantages of the amorphous-silicon flat panels, like slim form factor, lack of geometric distortions and the larger FOV.



XINEOS - Family for 3D/CBCT CMOS X-Ray detectors

- LOW DOSE AND HIGH IMAGE QUALITY**

The Xineos Family of detectors features high Image Quality (IQ) in terms of Modulation Transfer Function (MTF) and Detective Quantum Efficiency (DQE) at very low dose levels leaving behind the until-now unbeatable IQ performance of the IICCDs.

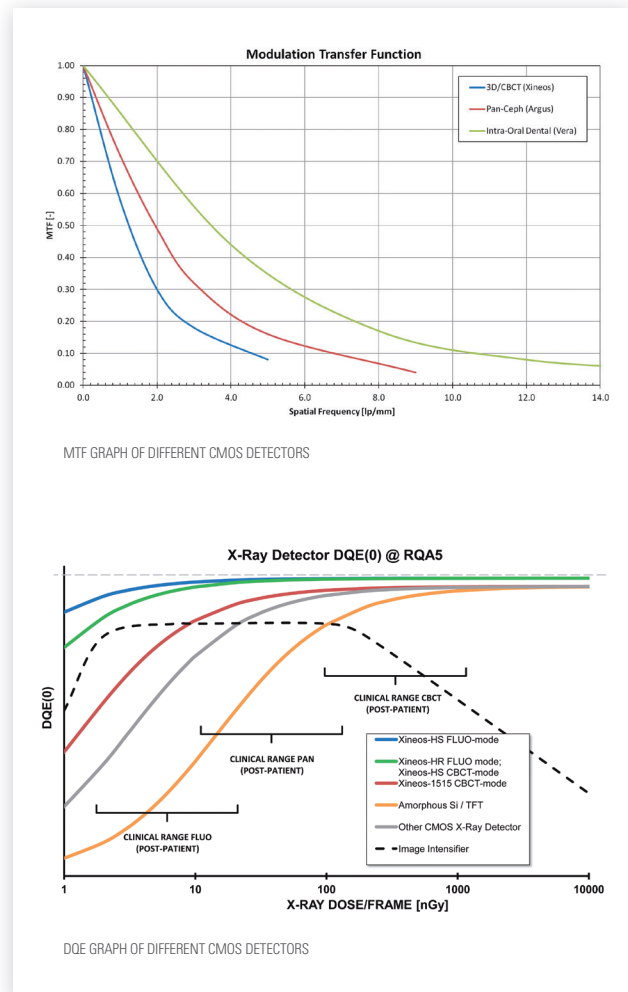
The very low noise of the CMOS material and the proprietary active pixel architecture of the Teledyne DALSA's CMOS detectors assure factors higher signal-to-noise ratio (SNR) with respect to the a-Si-based and even other CMOS-based competing products.

- HIGH RESOLUTION**

High spacial resolution is achieved in the Xineos family of detectors, what in most cases is related to the small pixel pitch of about 100µm. Teledyne DALSA's advanced pixel design is responsible for the very high fill factor of about 85% and higher, even at such small pixel sizes. The small pixel pitch together with proprietary scintillating process contributes also to high spatial resolution (or MTF) performance.

- HIGH SPEED IMAGING**

Enabled by high speed integrated circuits the Xineos family of dynamic X-ray detectors sets the industry benchmark for speed at full resolution and at full FOV, while always lag- and artifact-free, thanks to the high electron mobility of the crystalline silicon material.



• INNOVATIVE DESIGN

Utilizing the sixth- generation proprietary radiation-hard pixel design with switchable pixel capacitors which provide switchable saturation dose levels, the Xineos detectors family is extremely versatile and suitable for all types of dental applications with just a single detector.

The integrated on-chip analog-to-digital converter (ADC) assures additionally extremely low read out noise levels.

• INSTANT START-UP TIME AND STABLE OPERATION

The extremely low dark current of the Xineos family detectors is responsible for a very stable operation of the detectors right from the start, where the effect of warming up does not influence the operation of the detector. Teledyne DALSA's detectors are fully operationally running in 30s after switching on.

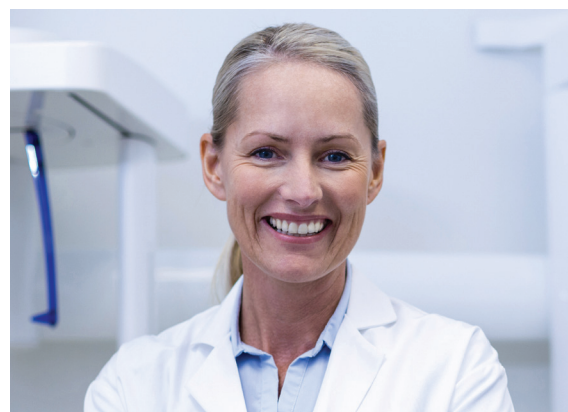
• LONG LIFETIME AND COST REDUCTION OPPORTUNITIES

The Xineos detector family utilizes a large integration level of peripheral electronic components, like the 14-bit ADC, into the pixel array. This drastically reduces the number of components and interconnects, which in turn reduces the detector cost and assembly complexity while improving the product reliability at the same time.

The proprietary pixel design of the Xineos detector family is radiation-hard, meaning that it is resistant to the performance degradation from X-Ray radiation. This enables long operating lifetime and less frequent calibration routines.

Additionally, the advantages of the Xineos technology and the chosen detectors parameters allow utilizing just one detector for all needed applications, saving significant costs for the dental practice.

BENEFITS



To the Dentist and the Dental Practice

- High image quality at very low dose
 - » Lower dose for patient and staff
 - » Higher success rate of procedures
 - » Higher throughput
- Efficient equipment – multiple applications with one detector
 - » Higher cash flow
- Reliable and stable detector operation – no calibration routines and loss of time, higher throughput
- Seamless mode switching – no loss of time, easy system operation
- Total cost of ownership minimization – increased utilization, less service cost



To the OEM

- Full portfolio of detectors – one stop shop
- Added value to the system due to:
 - » Excellent IQ at low dose performance
 - » Seamless mode switching
- Faster and easier detector integration
 - » Built-in real time image pre-processing
 - » Easy interface and support
- Reliable systems, less maintenance
- Possibilities for new applications thanks to high speed capabilities
- Aftersales support

Scanning Extraoral Dental X-Ray Detectors

Teledyne DALSA provides diverse solutions for scanning applications, like Panoramic and Cephalometric imaging.

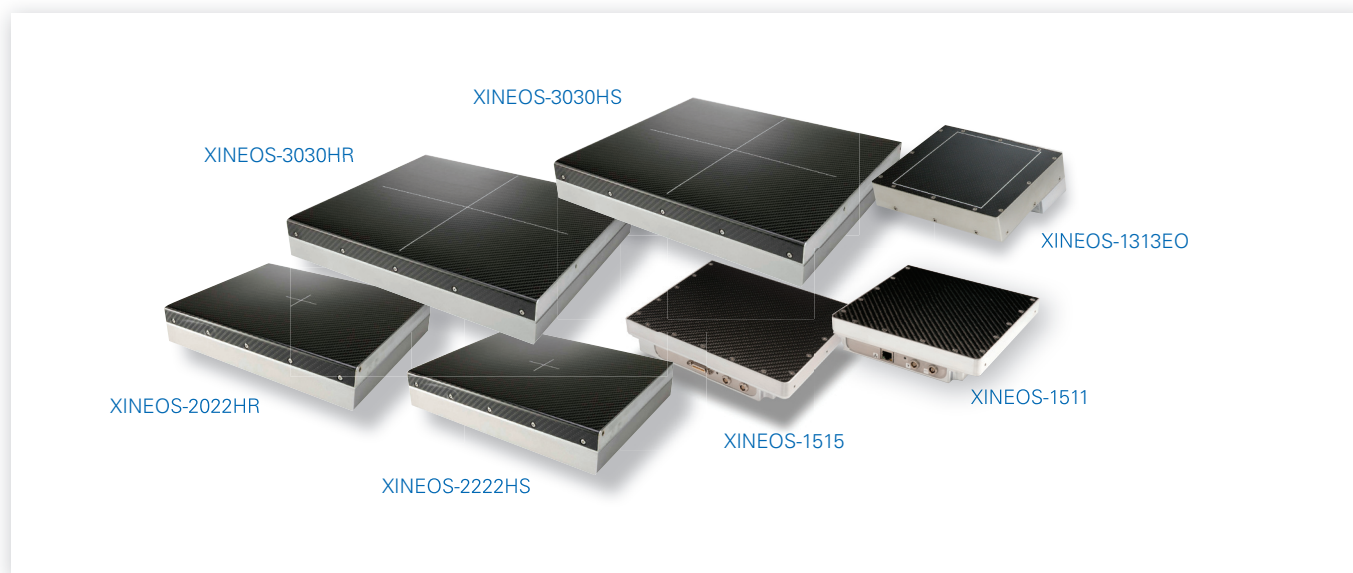
- » The **Argus-Pan** and **Argus-Ceph** detectors are based on analog CCD Time Delay Integration (TDI) line scanning technology. TDI line scan delivers an unmatched combination of sensitivity and speed by accumulating multiple exposures of the same (moving) object, effectively increasing the integration time available to capture the incident X-Ray quanta. The object motion must be synchronized with the exposures to ensure a crisp image. The 54µm effective pixel pitch assures extremely high resolution images.
- » **Xineos-1501** and **Xineos-2301** are the newest members of our CMOS detectors family, utilizing all the advantages of the latest CMOS technology and featuring at the same time a Digital TDI (DTDI) acquisition mode simulating the traditional CCD-TDI devices. The 6mm edge distance at the patient shoulder side enables improved patient access and compact enclosure designs.

XINEOS

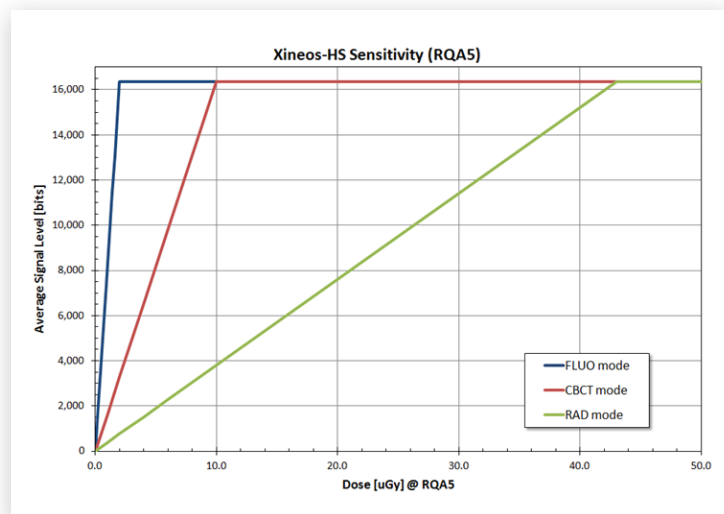
3D-CBCT FAMILY SPECIFICATIONS

PARAMETER	UNIT	XINEOS-1313-EO	XINEOS-1515	XINEOS-1511	XINEOS-2022HR	XINEOS-2222HS	XINEOS-3030HR	XINEOS-3030HS
GENERAL								
TECHNOLOGY		CMOS Active Pixel	CMOS Active Pixel	CMOS Active Pixel	CMOS Active Pixel	CMOS Active Pixel	CMOS Active Pixel	CMOS Active Pixel
PIXEL PITCH	[um]	100.1	99	99	99	151.8	99	151.8
PIXEL CAPACITY MODES	[#]	1	2	2	2	3	2	3
ACTIVE AREA	[mm]	131x131	153x153	147x114	204x221	215x215	296x296	295x295
RESOLUTION	[pxl]	1316x1312	1548x1548	1488X1148	2065x2237	1416x1420	2994x2997	1952x1952
IMAGE QUALITY								
SATURATION DOSE, RQA5 (per mode)	[uGy]	9	3 / 14	2 / 10	5 / 23	2 / 10 / 45	5 / 23	2 / 10 / 45
MTF @ 1LP/MM	[%]	60%	60%	60%	60%	60%	58%	58%
DQE @ 0LP/MM, RQA5	[%]	70%	70%	70%	72%	72%	66%	66%
RANDOM NOISE (HFW)	[DN]	4	5 / 3	5 / 3	5 / 3	5 / 3 / 2.5	5 / 3	5 / 3 / 2.5
DYNAMIC RANGE (HFW)	[dB]	72	71 / 74	71 / 75	70 / 75	70 / 75 / 77	70 / 75	70 / 75 / 77
IMAGE LAG, FIRST FRAME @ 30fps	[%]	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
BANDWIDTH								
DATA INTERFACE	[-]	GigE / CameraLink	GigE / CameraLink	GigE	GigE / CameraLink	GigE / CameraLink	GigE / CameraLink	GigE / CameraLink
IMAGE BIT DEPTH	[bits]	14	14	14	14	16	14	16
FRAME RATE - 1x1 (CamLink)	[fps]	45	30	-	31	27	31	14
FRAME RATE - 2x2 (CamLink)	[fps]	90	60	-	56	80	63	57
FRAME RATE - 1x1 (GigE)	[fps]	30	21	30	12	27	6	14
FRAME RATE - 2x2 (GigE)	[fps]	90	60	60	48	100	24	55
ROI READOUT	-	PAN width/position	(X,Y) flexible	(X,Y) flexible	(X,Y) flexible	(X,Y) flexible	(X,Y) flexible	(X,Y) flexible
POWER CONSUMPTION								
POWER SUPPLY	[Vdc]	12	11..26	11..26	11..26	11..26	11..26	11..26
POWER CONSUMPTION	[W]	11	8	8	15	15	18	18
ACTIVE COOLING	[-]	NO	NO	NO	NO	NO	NO	NO
INTERGRATION								
FOOTPRINT (WxH)	[mm]	188x150	224x176	178x176	292x235	292x235	377x327	377x327
THICKNESS (IN/OUTSIDE IO)	[mm]	58 / 35	45 / 36	45 / 36	56	56	58	58
WEIGHT	[kg]	2.5	3.0	2.5	6	6	9	9
EXTERNAL INTERFACE MODULE	[Y/N]	NO	NO	NO	NO	NO	NO	NO
ENVIRONMENTAL								
CERTIFICATION	-	-	CE / UL	CE	CE / UL	CE / UL	CE / UL	CE / UL
EMC (IEC 60601-1-2)	CLASS B	CLASS B	CLASS B	CLASS B	CLASS B	CLASS B	CLASS B	CLASS B
OPERATING TEMPERATURE	'+10..+40	'+10..+40	'+10..+40	'+10..+40	'+10..+40	'+10..+40	'+10..+40	'+10..+40
STORAGE TEMPERATURE	'-10..+55	'-10..+55	'-10..+55	'-10..+55	'-10..+55	'-10..+55	'-10..+55	'-10..+55
HUMIDITY (NON-CONDENSING)	20..80	20..80	20..80	20..80	20..80	20..80	20..80	20..80
X-RAY ENERGY RANGE	40..120	40..125	40..125	40..125	15..150	15..150	15..150	15..150

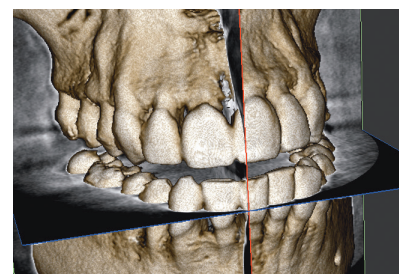
XINEOS - FAMILY FOR 3D/CBCT CMOS X-RAY DETECTORS



SWITCHABLE PIXEL SENSITIVITY



3D/CBCT



3D/CBCT

XINEOS

PANORAMIC-CEPHALOMETRIC FAMILY

PARAMETER	UNIT	XINEOS-1501	XINEOS-2301	ARGUS-PAN	ARGUS-CEPH
GENERAL					
TECHNOLOGY		CMOS Active Pixel	CMOS Active Pixel	CCD-TDI	CCD-TDI
PIXEL PITCH	[um]	99	99	27	27
PIXEL CAPACITY MODES	[#]	2	2	1	1
ACTIVE AREA	[mm]	152x7	228x7	151x7	221x7
RESOLUTION	[pxl]	1536x68	2305x68	5580x256	8160x256
IMAGE QUALITY					
SATURATION DOSE, RQA5 (per mode)	[uGy]	3 / 12	3 / 12	-	-
MTF @ 1LP/MM	[%]	60%	60%	75%	75%
MTF @ 2LP/MM	[%]	30%	30%	50%	50%
DQE @ 0LP/MM, RQA5	[%]	70%	70%	-	-
RANDOM NOISE (HFW)	[DN]	5 / 3	5 / 3	6	6
DYNAMIC RANGE (HFW)	[dB]	72 / 76	72 / 76	80	80
IMAGE LAG, FIRST FRAME @ 30fps	[%]	0.1%	0.1%	-	-
BANDWIDTH					
DATA INTERFACE	[-]	GigE	GigE	GigE	GigE
ADC CONVERSION	[bits]	14	14	16	16
FRAME RATE - 1x1 (GigE)	[fps]	300	200	-	-
FRAME RATE - 2x2 (GigE)	[fps]	1200	800	2000	2000
ROI READOUT		#rows	#rows	-	-
POWER CONSUMPTION					
POWER SUPPLY	[Vdc]	11..26	11..26	12	12
POWER CONSUMPTION	[W]	6	6	15	15
ACTIVE COOLING	[-]	NO	NO	NO	NO
INTERGRATION					
FOOTPRINT (WxH)	[mm]	188x150	188x150	224x176	292x237
THICKNESS (IN/OUTSIDE IO)	[mm]	58 / 35	58 / 35	45 / 36	50
WEIGHT	[kg]	2.5	2.5	3.0	5
EXTERNAL INTERFACE MODULE	[Y/N]	NO	NO	NO	NO
ENVIRONMENTAL					
CERTIFICATION		-	-	-	-
EMC (IEC 60601-1-2)		CLASS A	CLASS A	CLASS A	CLASS A
OPERATING TEMPERATURE	[°C]	+10..+40	+10..+40	+10..+40	+10..+40
STORAGE TEMPERATURE	[°C]	-10..+55	-10..+55	-10..+55	-10..+55
HUMIDITY (NON-CONDENSING)	[%RH]	20..80	20..80	20..80	20..80
X-RAY ENERGY RANGE	[kV]	40..125	40..125	40..125	40..125

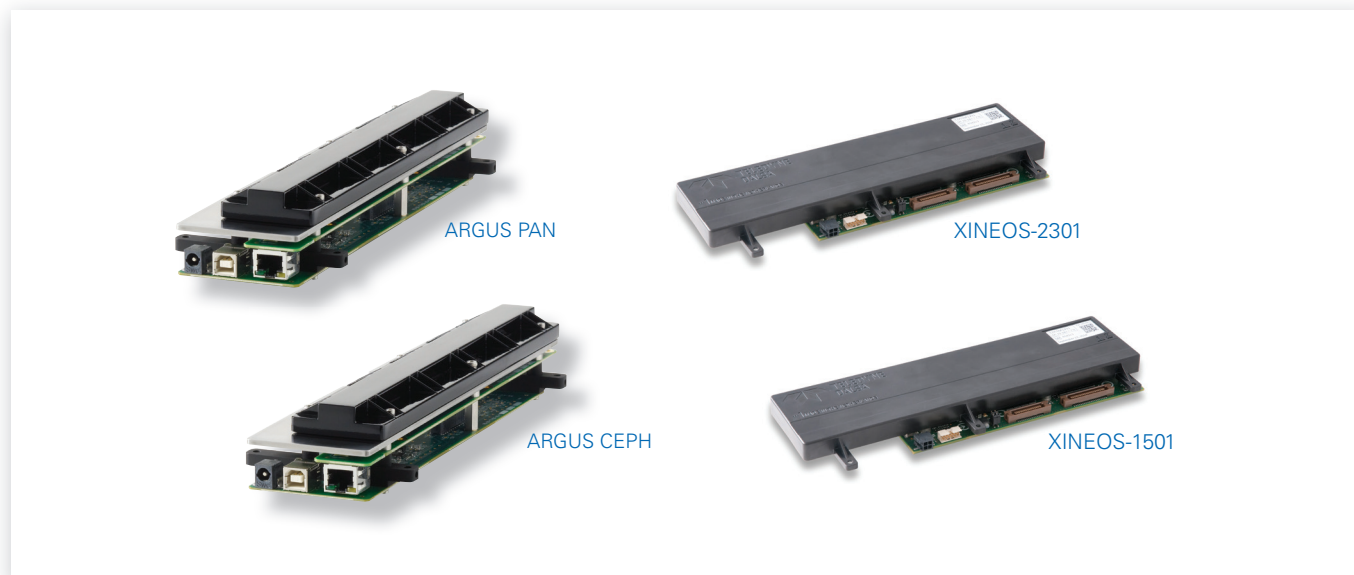


PANORAMIC

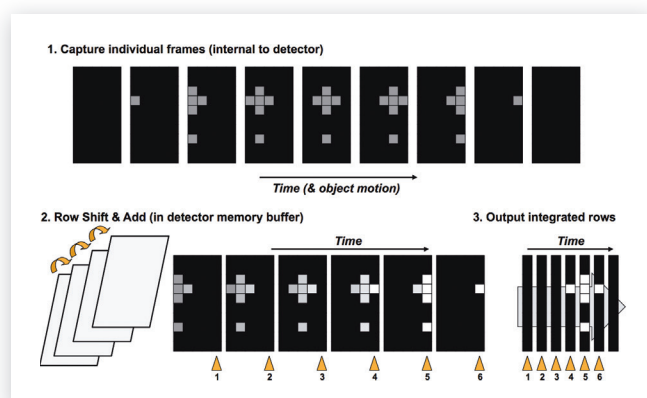


CEPHALOMETRIC

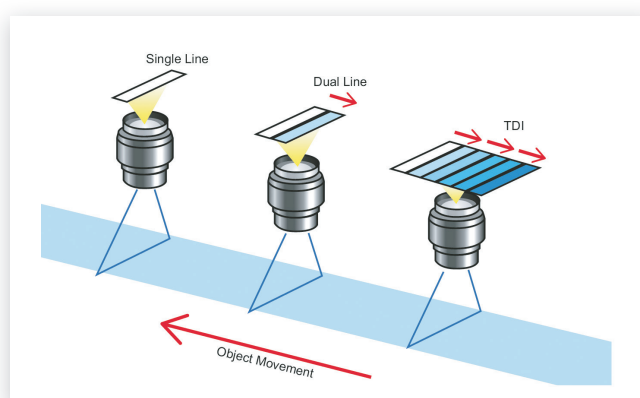
ARGUS PAN / XINEOS - FAMILY OF SCANNING X-RAY DETECTORS



CMOS DIGITAL TDI (DTDI) ACQUISITION MODE



CCD (ANALOG) TIME DELAYED INTEGRATION MODE (TDI)



Various line-scan technologies: single-line, dual-line and time delay integration (TDI). To achieve high responsivity, TDI uses multiple stages to capture multiple exposures. In these stages, photogenerated signal charges are transferred in sync with object motion. Dual-line scans are considered two-stage TDI's.

XINEOS X-RAY 2D IMAGE RECONSTRUCTION TECHNOLOGY

A Revolution in 2D Tomography Image Visualization

Teledyne DALSA introduces a revolutionary new reconstruction technology to deliver maximum sharpness to your daily panoramic and cephalometric images. By applying tomographic stack algorithms known from 3D reconstruction, the focal depth through the relevant patient anatomy is substantially enlarged.

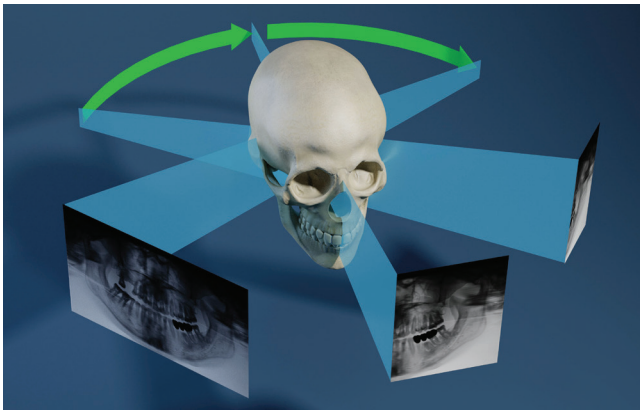
UNSURPASSED SHARPNESS

The x-ray image optimization algorithms automatically combine the sharpest regions from each tomographic plane to produce a fully optimized and enhanced visualization of the patient's anatomy. Unlike the conventional reconstruction methods where some regions of the reconstruction image might not be completely sharp, Xineos X-ray image reconstruction technology offers a sharper result at every position. The incredible fidelity of the Xineos CMOS detector combined with our proprietary x-ray image processing technology ensures that you get the highest image quality at the lowest dose. The result is an image of unsurpassed sharpness, enabling better diagnosis and improved patient treatment opportunities or same image quality at lower dose. It allows the dentist to benefit from improved image quality or for reducing patient dose at the same image quality.

COST SAVING AND EFFICIENT

Teledyne DALSA's x-Ray image reconstruction technology also improves the overall robustness of the reconstruction, helping to mitigate image quality issues caused by factors like poor patient alignment. Moreover, our new image reconstruction technology can lower the overall costs of a panoramic imaging system by simplifying the complex scan motion trajectory required by traditional methods. Allowing image reconstruction with higher magnification ratios, it can also create more compact cephalometric imaging systems by its improved geometric correction capability. There is no need for re-scan (re-taking scans), which reduces the average patient dose and increases the productivity in the dental practice (workflow).

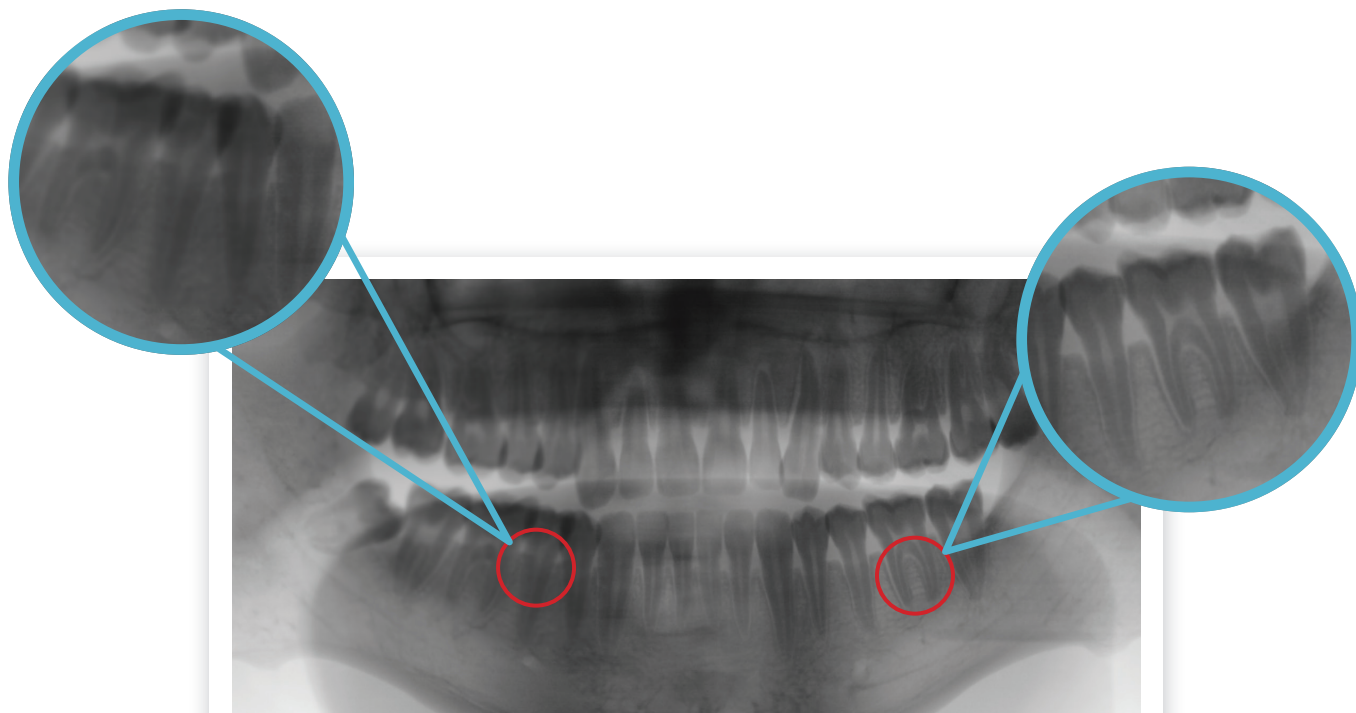
The Xineos software library can be integrated as part of the OEM's system software, while remaining recognizable within their interface, and allowing their customers to benefit from this advanced reconstruction technology within the comfort of a familiar system user interface.



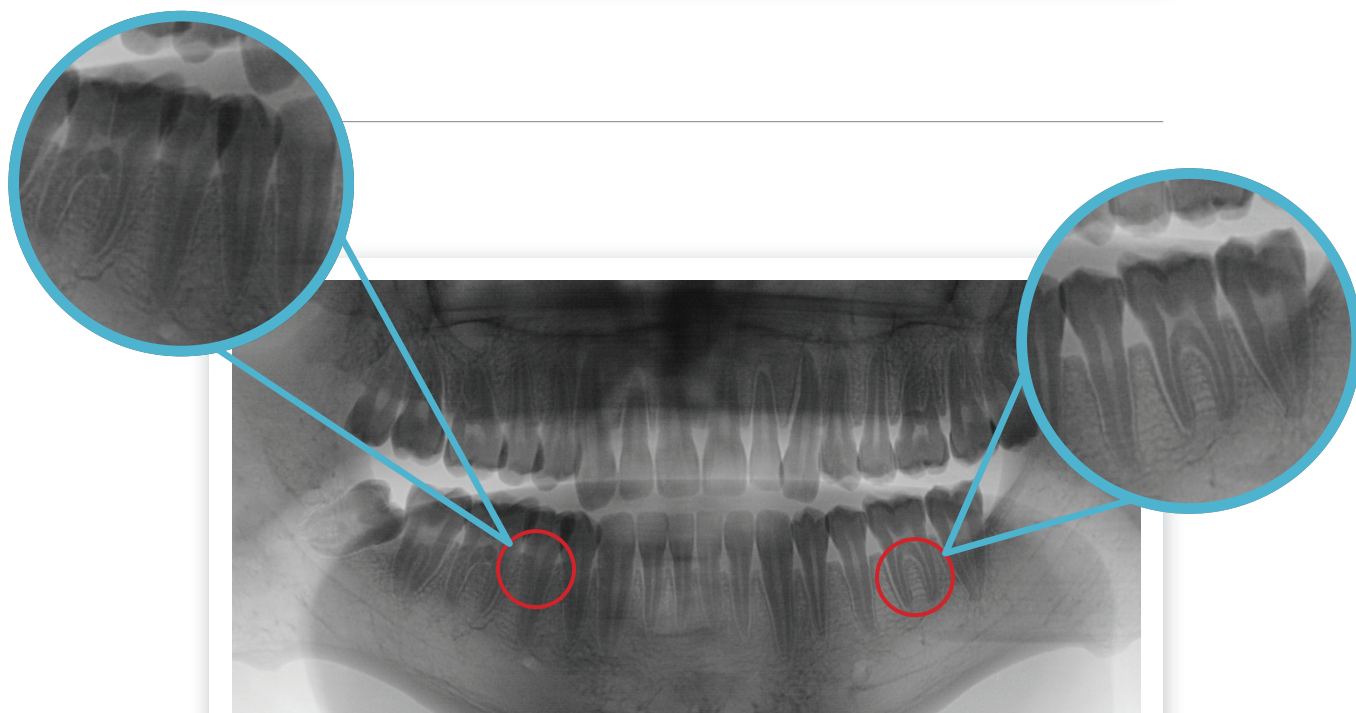
Panoramic X-ray scanning principle



Extra Oral Dental Imaging X-ray system



Without Xineos image reconstruction technology. Image not sharp in multiple places as indicated on the picture.



The image is sharp at every place of the image – with Xineos X-ray 2D image reconstruction technology.

World-Class Capability... Design, Engineering and Manufacture

LEADING PROVIDER AND PREFERRED PARTNER

Image Sensor Product Solutions in
Professional and Mid-Range segments

- Human Vision
- Medical/Dental X-Ray
- Non-Destructive Testing
- Industrial & Scientific X-Ray

35+ YEARS EXPERIENCE

Design, Development and Manufacturing

- CCD- & CMOS Image Sensors
- X-Ray Detectors
- Chipset & Application Reference Designs
- Customer Applications Support

A QUALITY CERTIFIED COMPANY

- ISO 9001-2008
- ISO 13485
- ISO 14001
- ISO 14971
- IEC 60601-1 third edition
- UL certification, CE certification
- RoHS compliancy

● Headquarters + Manufacturing ● Manufacturing ● Sales & Customer Support



www.teledynedalsa.com

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