THALES
Building a future we can all trust

THALES
X-RAY IMAGING

Cutting-edge technologies and innovations:
from X-Ray detectors to complete imaging solutions

Contents

01.

Trusted partner for radiology system manufacturers

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Radiology plays a more important role than ever in medical imaging opening up new possibilities for cardiovascular and neurological surgery as well as 3D displays and panoramic dental X-rays.

The key challenges today are to maximise image quality and reduce exposure to radiation. In the context of hospital saturation and increased demand, radiology system availability need to be ensured.

Digital detectors and imaging software are the eyes of the radiology system.

Finding the optimum combination of high-performance hardware and advanced image processing software calls for expertise and a long-term vision of the radiology market.

Pioneer
of flat panel detector technology.

Leadership
in digital detectors and imaging solutions.

State of the art
High image quality with minimum X-ray dose.

Worldwide
1 out of every 2 X-ray exams use Thales detectors.

Experience
More than 60 years serving radiology professionals.

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High-end technologies

Built around the Pixium® family of digital flat-panel detectors and advanced software solutions.

Reliable technologies and an extensive range of robust products and services for radiography, fluoroscopy and interventional radiology.

Our range of solutions is including all innovative technologies: CMOS, IGZO technology as well as aSi in order to cover all customers' needs.

Our complete imaging subsystems manage all image chain: image acquisition, delivery of digital images, and transmission of clinical imaging data.

High reliability

Most of the Thales detectors released in 2001 are still in operation.

Seamless integration

Same pre-processing software platform (PixRad for radiography, PixDyn for dynamic). CE, UL, MDSAP, FDA and WiFi certifications are included.

Cybersecurity

Products are “cyber secured” by design: risk analysis, coding rules, periodic penetration tests against cyber-attacks, vulnerability assessment and cyber security management process.

Life-long support

Customer support is guaranteed up to the end of the product lifecycle.

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High-end scintillator

We manufacture the cesium iodide (CsI) scintillator using an indirect deposition process that improves the efficiency of light transmission to the photodiode matrix.

Low noise electronics

The lowest image noise available on the market.

Optimised pixel size

Pixel size versus dose and diagnosis capability is optimised for each technology.

Extensive testing

A wide range of qualification tests to ensure they will withstand the rigorous day-to-day operations.

Protocols include drop testing, repeated battery insertion, abrasion and impact testing, and the ability to withstand pressure of more than 300 kg.

Our proprietary cesium iodide scintillator technology maintains the performance of Pixium® detectors throughout the product lifecycle.

Stringent quality policy

Regulatory requirements: 2 Certificates: ISO 13485 (2016) and CE Marking under the European Directory 93/42/CE (MDD). CE Marking transition from MDD to MDR on 2021 & 2022. UE Regulation 2017/745 dedicated to medical devices (MDR).

Successfully passed the initial audit MDSAP on December 2020 for five countries: Canada, Brazil, USA, Australia, Japan. MDSAP certificate has been released in May 2021 by the notified organism (GMED).

ISO 14001 certification endorses a company-wide effort to reduce our environmental impact.

Digital detectors and imaging software are the eyes of the radiology system.
Our solutions span a vast array of medical (X-Ray) applications.

- Angioscopy
- Arthroscopy
- Cardiovascular
- Electrophysiology
- Gastro-intestinal
- Musculoskeletal
- Neurology
- Oncology
- Orthopedics
- Pediatrics
- Urology
- Pulmonary

As well as a wide range of markets.

- Surgical
- Interventional x-ray
- Security
- Dental
- Non destructive testing
- Veterinary
- Radiography
- Fluoroscopy

02. A history of disruptive innovation

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More than 60 years of expertise acquired through image intensifiers and industrial digital products development.

Patent portfolio

More than
400 patents filed.

Focus on innovation

10% of revenues
invested in R&D.

A pioneering role in the field of Flat Panel Detectors

Interventional radiology, fluoroscopy and radiography

2003

1st

dedicated cardiology detector (70% of current installed base)

2004

1st

digital detector used in cardiology and fluoroscopy

2007

1st

large-format RF detector (60% of current installed base)

2012

Unique

dedicated fluoroscopy imaging solution (DUET DRF)

2016

1st

detector with embedded post-processing solution (ICS Imaging Chain Solution)

2018

1st

imaging solution for dynamic radiography (ArtPix)

2020

1st

predictive maintenance Platform to avoid any breakage

03. Extensive range of products

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Radiography

PIXIUM® RAD
4343

PIXIUM® PORTABLE
4343 EZ2 HD, 3543 EZ2 HD & 2430 EZ2 HD

PIXIUM® PORTABLE
3543 & 2430 EZ

PIXIUM® PORTABLE
3543 DR

ARTPIX™ EZ2GO
imaging solution

FIXED RADIOGRAPHY DETECTOR

- Format: 43x43 cm (17"x17")
- Pixel size: 148 µm

Data transmitted via Ethernet between detector and system.
Power supply: 24V

PORTABLE RADIOGRAPHY DETECTORS

PIXIUM EZ 2 HD	PIXIUM EZ
• Formats: 43x43 cm (17"x17"), 35x43 cm (14"x17"), 24x30 cm (10"x12") • Weight: 3.4 kg to 2 kg	• Formats: 35x43 cm (14"x17") and 24x30 cm (10"x12") • Weight: 2.6 kg to 1.4 kg

• Smallest Pixel pitch
  • 2430: 85 µm
  • 3543 & 4343: 100 µm
	• World best auto-detection
	• Pixel size: 148 µm

• Extended autonomy	• Up to 8 h. autonomy
• Wireless, NFC for easy sharing	• Wireless, fast infrared for multisharing
• New cost-effective design	• Licensing mode for pay-per-use
• Waterproof IPX6	• Waterproof IPX7 • Tomosynthesis mode

Trixell gold standard for image quality & dose reduction
Full image < 4 sec. and Preview < 1 sec.

IMAGING SOLUTION: ARTPIX™ EZ2GO

- Robust tablet PC control for all Pixium® portable detectors
- Easy multi-touch screen interface with in-room display and acquisition features
- 15' learning curve, fast installation, workflow optimisation

- Dose index calculation for quality check
- Reject analysis and export of detailed reports
- Bluetooth DAP interface for complete wireless system
- Multi-share between detectors
- 2D grid suppression
- Multi-lingual capability
- Automatic stitching option

PIXRAD: best-in-class pre-processing with a single software platform for all fixed and portable detectors

Dynamic Radiology

PIXIUM®
4343 FL

PIXIUM®
4343 RF

PIXIUM®
3040 F

PIXIUM® 4343 FL (MODEL 4)
Format: 43x43 cm (17"x17")

- Cost-effective solution
- High-quality image thanks to 22 modes up to 30 images/second (3 in radiography and 19 in fluoroscopy)
- Integrated in R&F tables to perform X-ray exam positioning or routine exams (arthroscopy, barium meal, musculoskeletal, etc.)

PIXIUM® 4343 RF (5th GENERATION)
Format: 43x43 cm (17"x17")

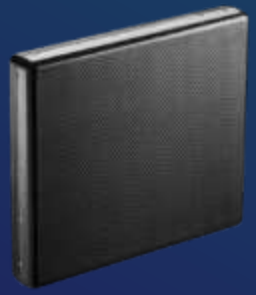
- Designed for easy installation in remote-controlled exam tables
- Speed: up to150 fps and Cold start: < 10 min after the power up
- Connectivity: 10 Gbit
- Optimisation: no Processing Unit
- More 20 modes allowing radiologists to generate high-quality images in real time for both fluoroscopy, angiography and radiography

PIXIUM® 3040 F
Format: 30x40 cm (12"x16")

- Superior image quality at low dose and high dose
- Pixel pitch of 154 µm, optimised for both high resolution and low dose
- Exclusive Trixell optical reset process for fast switching between DSA (Digital Subtraction Angiography) and low-dose fluoroscopy modes
- Advanced performances for superior 3D imaging: fast frame rate (up to 60 fps in 2x2), high spatial linearity and great dynamic range

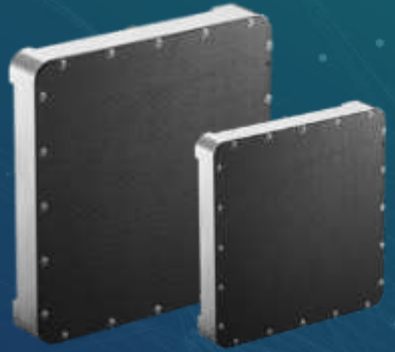
Combining high Detection Quantum Efficiency (DQE) to reveal even the smallest anatomical detail

Dynamic Radiology



PIXIUM®
2630 CBCT

PIXIUM®
2121 & 3030 S
Imaging Suite



PIXIUM®
2121 & 3030 S
Efficiency

SIXTEEN
1616

SiX
650 HD-E

PIXIUM® 2630 CBCT

Format: 26x30 cm
(10"x12")

- High DQE for a superior image quality
- Image frequency and quality (287 x 261 mm) fully compatible with 3D reconstruction
- Different modes to support speeds of 15, 25, 30 or up to 60 images/second
- Instant switching between modes
- No cooling system required: system ready to use in less than 1 minute

PIXIUM® 2121 and 3030 IMAGING SUITE

References: 2121 S-A, S-AP (PixDyn Lite)
Format: 21x21 cm (9"x9") and 30x30 cm (12"x12")

- 154 µm pixel pitch: best balance between dose & resolution
- Superior Image Quality at low dose: high DQE of 76% at 20nGy (0lp/mm)
- Excellent dynamic range and very low lag for low dose imaging & high dose DSA without saturation
- Full image performance in less than 1 min for an optimised workflow in the hospital
- Robust design for a long life time
- Combined with our Imaging Chain Solution (ICS), delivers high image quality and distortion-free images in real time

PIXIUM® 2121 and 3030 EFFICIENCY

References: 2121 S-AU (PixDyn Lite)
Formats: 21x21 cm (9"x9") and 30x30 cm (12"x12")

- 200 µm pixel pitch for high Signal to noise ratio and optimised sensitivity
- All-new design and innovative assembly procedure to keep cost down
- Video format pixel matrix (1024x1024 and 1536 x1536) to offer easy digitalisation
- High thermal stability thanks to a robust mechanical design

SiX 650 HD-E / HD-G
CMOS compact detector
Format: 12x15 cm image size (5"x6")

- Pixel pitch: 150 µm
  Scintillator: CsI or Gadox / Gadox+
- Technology CMOS
  CBCT and Pano (300 fps)
- Digital circuit integrated into the CMOS Chip design
- Interface: Camera link (SIX 650HD) or Ethernet (SIX 650HD-E)
- Cross Platform Software development Kit (SDK) to manage detector

SIXTEEN
IGZO detector
Format: 16x16 cm (6"x6")

- Active area size tailored to customer needs
- Very high resolution thanks to a small pixel pitch: 89 µm
- IGZO technology for a detector specifically adapted for mini C-ARM and dental applications
- Increased frame rate (up to 80 fps) & improved Noise performance compared to aSi
- Flex electronics for cost-effectiveness

Dynamic Imaging Solutions

ARTPIX™ DRF
imaging solution

ICS
Imaging Chain Solution

ARTPIX™ DRF
A single imaging platform for RF, angiographic and radiographic applications
FDA & CE marked

All adjustments made by physicians to obtain high image quality and advanced clinical options

Easy to configure and operate, with an intuitive user interface to control the generator and remote tables

Shorter integration and certification times for OEMs, and cost reductions through added flexibility and responsiveness

Smoother workflows and higher productivity

Unparalleled image quality to improve accuracy in diagnosis

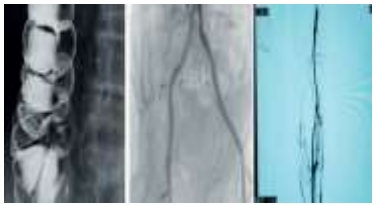
State-of-the-art cybersecurity package to guarantee privacy

State-of-the-art dynamic and static imaging

- A true 10-bit image and a set of unique algorithms to provide full HD images in real time
- Can be customised to suit user preferences: user interface, display configuration, image quality and room peripherals
- Proprietary image processing supports adjustments of the applications

Multiple advanced application options

- Extensive choice of clinical options: tomosynthesis, DSA (Digital Subtraction Angiography) stitching, radiation-less positioning, etc.
- Touchpad application to control system operation also available



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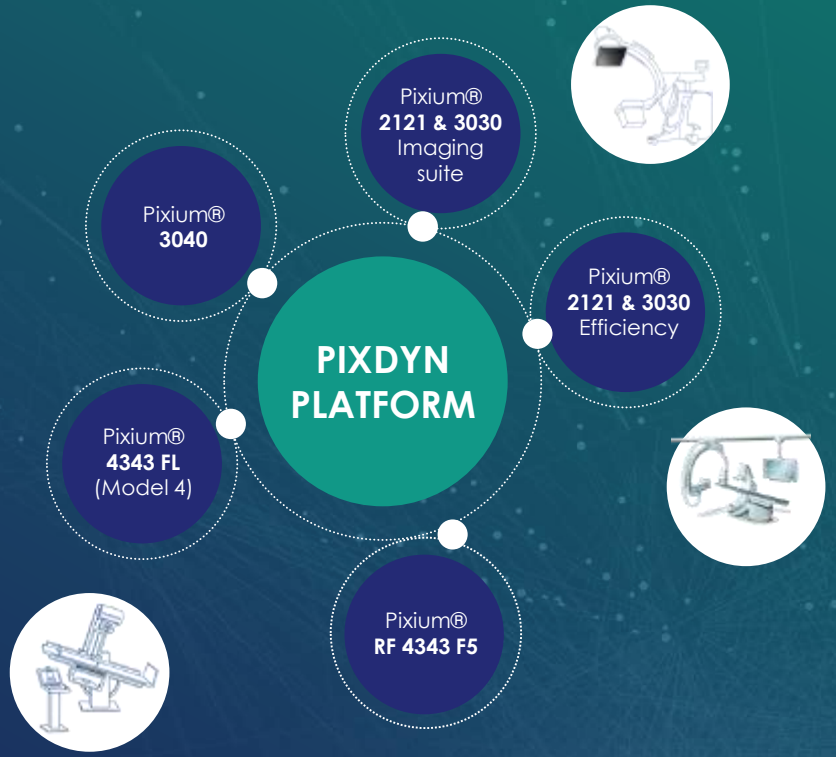
PixDyn universal software platform

Easy and quick integration of new detectors into your system.

Compatible with all Thales dynamic detectors.

Manage calibration and image acquisition settings, flat panel detector control, service information and noise filter operation.

Runs directly on the customer's PC and significantly enhances system flexibility and maneuverability.



04

The best technology inside radiology systems

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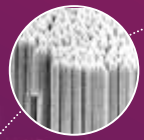
The excellent X-ray absorption and processing capabilities have made us the preferred partner for radiology system manufacturers around the world.

Based on technology developed by Trixell, the joint venture between Thales, Siemens and Philips, our Pixium® flat-panel detectors are available with amorphous silicon (glass or flexible) as well as CMOS and IGZO technology.

This expertise leads to many advanced clinical applications such as:

- Chest tomosynthesis
- 3D imaging (CBCT)
- Digital subtraction angiography (DSA)

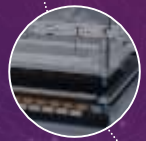
Trixell scintillator
Superior DQE



Customised electronics
Low noise & high frame rate

Tailored plate
aSi, CMOS, IGZO, flexible

In-house mechanics
Robustness & reliability



In-house Digital solution
Innovative & most advanced

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Optimised detection quantum efficiency (DQE)

A key indicator reflecting overall image performance in relation to radiation dose.

The most important information for diagnosis is obtained in spatial frequencies from 1 to 2 lp/mm.

Pixium® detectors generate high-quality images while reducing exposure by 30 to 50% versus the current average.

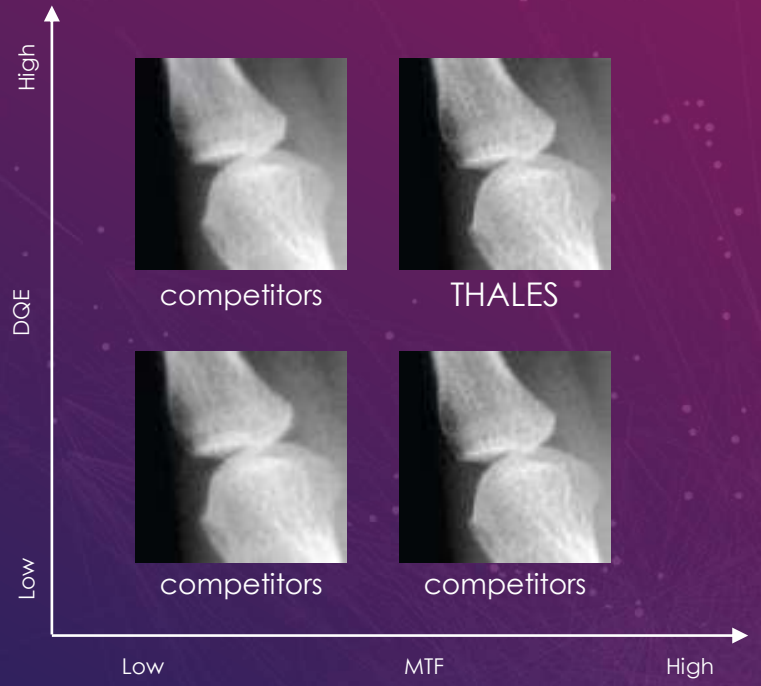
We offer the best DQE between 1 and 2 lp/mm

Modulation transfer function

Optimum image quality comes from high Detection Quantum Efficiency (DQE) combined with a high Modulation Transfer Function (MTF).

DQE reflects the capacity to detect information at low doses, while MTF determines how this information is structured.

DQE is the most critical factor: post-processing cannot compensate for low DQE performance.




05
Transforming
for the future
Ai
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Thales is fully engaged in the digital transformation, investing in the 4 key digital technologies and developing new solutions and digital services.

Health professionals can now deliver the best quality of care safely, efficiently and securely.

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Connectivity & Big data for predictive maintenance

Detectors, imaging systems and software can be connected easily to a network or a platform, offering new services.

A platform offering a high quality of service to our customers:

- **Monitor manufacturers' equipment and components** installed worldwide in real time
- **Optimise system maintenance**: quick detection & localisation of a possible failure, remotely, limiting the analysis and repair time
- **Analyse diagnosis data** from past failure events as well as the usage of systems to predict possible future events
- **Live alerts**, updates and options can be added simultaneously to all systems and software installed
- **Easily integrates with OEM systems**

Cybersecurity

Thousands of companies, government agencies, defence & security organisations rely on Thales to develop and deliver trusted digital services.

Thales is N°1 in the world for data protection and N°1 in Europe for cybersecurity.

Health information and patient data are highly sensitive. Thales is the world leader data protection and offer world-class solutions for the secure collection, distribution and storage of data.

All our products are facing a cyber-risk analysis, are compliant with FDA & MDR Cyber-Rules (US & CE). Our organisation is certified ISO27k. Ethic Hackers penetration tests are done on our static & dynamic products. We also provide an Incident Response Team.

Artificial Intelligence for the healthcare sector

Thales is investing heavily in AI. Under the Thales TrUE AI concept, we ensure it is Transparent, Understandable and Explainable to ease incorporation into critical workflows.

AI offers the potential for automated procedure recognition, processing and images analysis to help radiology professionals to make the right decisions at the right time.

AI is also helping in diagnosis so that healthcare professionals have more time to focus on patients. A wide AI project, supported by the French Ministry of Army, is proposing a first diagnosis of COVID-19 based on CT-Scan images. In a context of a sanitary crisis, this project is enhancing the efficiency of hospitals.

06. Close to our customers

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Local sales & marketing support

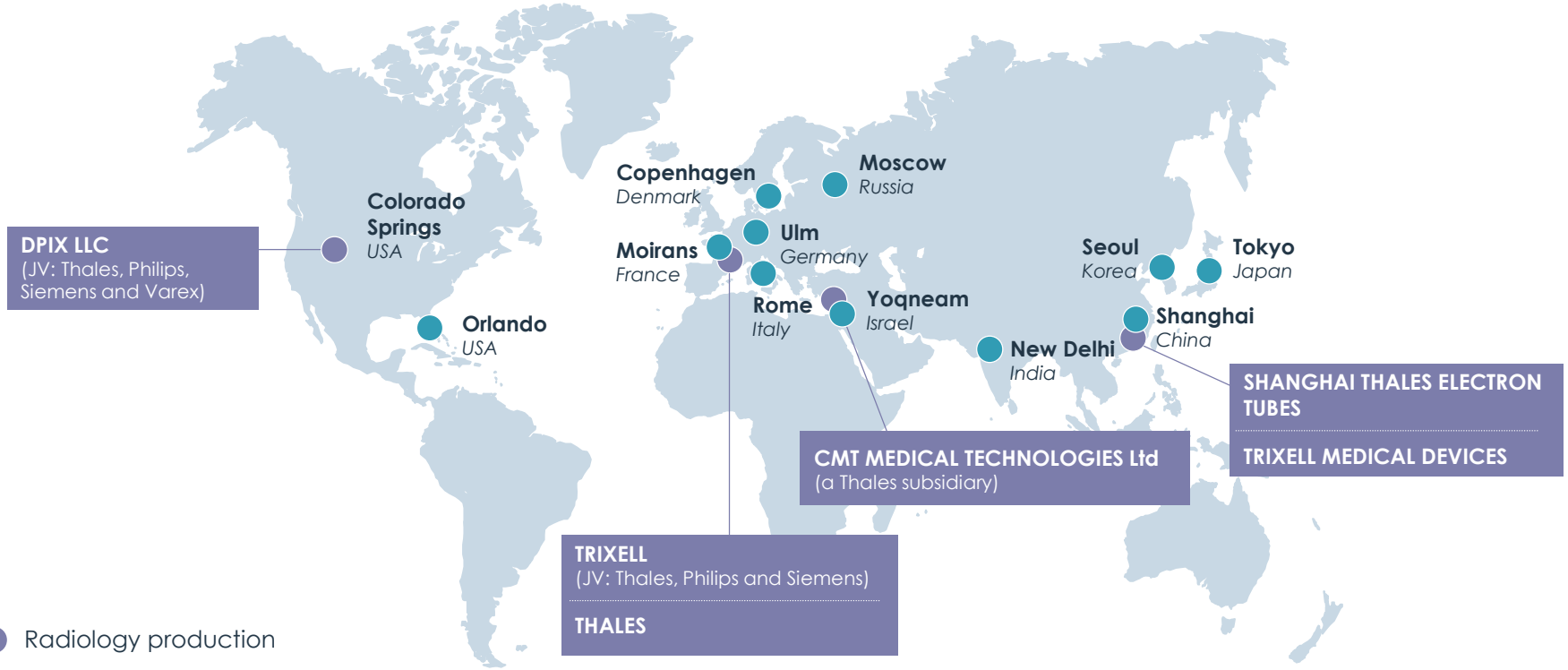
International sales & marketing network spanning a dozen countries.

Customer technical support

Dedicated team of specialists to answer your questions by email or phone.

Fully personalised services

Training, installation, personalised technical on-site assistance and numerous other services during warranty period.


DPIX LLC
(JV: Thales, Philips, Siemens and Varex)
Colorado Springs
USA
Orlando
USA
Copenhagen
Denmark
Moscow
Russia
Moirans
France
Ulm
Germany
Rome
Italy
Yoqneam
Israel
New Delhi
India
Seoul
Korea
Tokyo
Japan
Shanghai
China
SHANGHAI THALES ELECTRON TUBES
TRIXELL MEDICAL DEVICES
CMT MEDICAL TECHNOLOGIES Ltd
(a Thales subsidiary)
TRIXELL
(JV: Thales, Philips and Siemens)
THALES
Radiology production
Sales offices & customer support

Thales in Moirans (France)

The teams focus on the development, the delivery, the support and service of X-ray imaging subsystems around digital detectors.

The factory is also working on the development of new products based on carbon nano tubes sources. These patented compact sources are allowing to develop disruptive solutions for security and mobile radiology.

- Floorspace: 12,300 sq.m industrial surface
- 150 employees (40% engineers and technicians)

Thales is a shareholder in dpiX, a US-based manufacturer of amorphous silicon arrays, one of the key components of digital detectors.

Thales CMT in Yoqneam (Israel)

Following the integration of CMT Medical Technologies, a specialist in digital image processing, Thales has expanded its value proposition to include complete digital imaging solutions.

- 80 employees (more than 50% R&D engineers specialising in medical radiology hardware and software)

Subsystems developed with the teams in Moirans handle functions such as exam management, generation of clinical images, transmission to exam site networks, etc.

The factory is also developing flat panel detectors based on disruptive technologies as CMOS and IGZO for dental and NDT applications.

Trixell in Moirans (France) and Shanghai (China)

Jointly owned subsidiary of Thales (51%), Siemens Healthineers (24.5%) and Philips Healthcare (24.5%).

Leader in the design and manufacture of digital detectors.

- 13,000 sq.m, including 2,000 sq.m of clean rooms
- 410 employees (40% engineers and technicians)

Trixell equipment used in the majority of the world's X-ray exams: 100,000 Pixium® detectors in service worldwide.

Launched in 2018 in China, Trixell Medical Devices Co. Ltd. is now operational and ISO 13485 certified (audit passed successfully), it will provide repair services to our customers in China, and perform final assembly and test on selected products.

THANK YOU !

FOR MORE INFORMATION 

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