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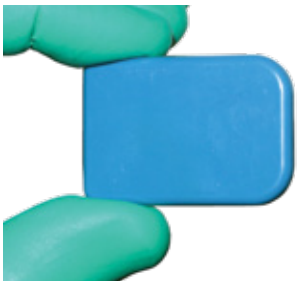
DC-Air: Wireless Intraoral Sensor with Improved Image Quality



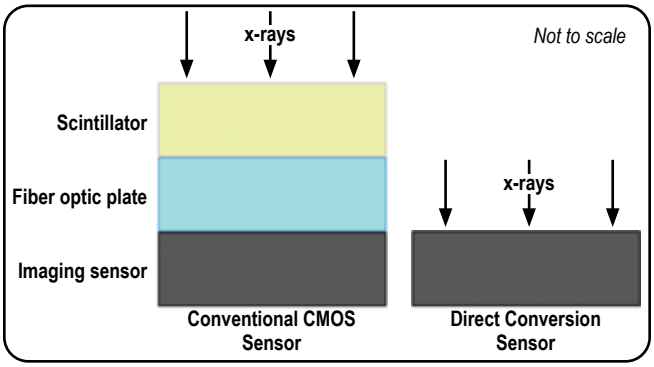
DC-Air wireless x-ray sensor

Gordon's Clinical Observations: There is no question that digital radiographs need to be improved. CR's preliminary evaluation of DC-Air was positive, and this issue provides a more complete review of the new system. Readers will understand the advantages and limitations of this wireless direct-conversion-sensor technology. CR Scientists and Clinicians have compared radiographs from numerous sensors. *As you read this report and view the DC-Air images, you be the judge!*

DC-Air by Freedom Technologies Group *(FTG)* is a wireless Bluetooth CMOS sensor for intraoral radiography. Developed in Finland by Athlos Oy, it uses direct conversion technology to achieve impressive image clarity and detail without requiring digital enhancements. **This report provides an overview of direct conversion technology and shows the results of CR's evaluation of the DC-Air radiography system.**

Direct Conversion

Rigid x-ray sensors typically consist of three layers: 1) scintillator layer which converts x-rays to light, 2) glass fiber optic plate which channels light to the imaging sensor, and 3) CMOS imaging sensor.
"Direct Conversion" uses an imaging sensor which directly detects the x-rays, eliminating both the scintillator and glass fiber optic plate. **Advantages include higher native resolution, improved durability, a thinner package, and lower energy requirements suitable for cordless battery operation.**



DC-Air

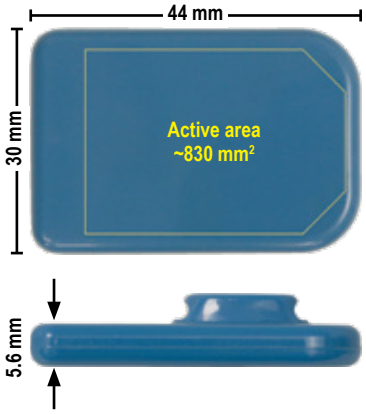
DC-Air is the first sensor to introduce this new direct conversion technology and couple it with high-speed Bluetooth wireless transmission. Its unique engineering resulted in noticeably improved image quality and convenient cordless use.

DC-Air by **FTG** *(Freedom Technologies Group)*, ftgimaging.com

$12,999 Includes one sensor, two docking stations, sensor positioning system, software, and technical support. Docking stations for additional operatories cost $1,000 each. 2-year warranty with options for extension and replacement of lost/damaged sensor. Battery replacement, when necessary, is done by manufacturer and costs about $200.

Installation and use: The capture software integrates with clinic's existing imaging software and patient database. A remote technician logs in to the computer and installs the software. The USB-C Bluetooth docking station is placed on a convenient surface within 9 feet of the chair.

Sensor on docking station



To make radiographs:

1. Select a radiographic series *(4 bitewings, for example)*
2. Remove sensor from docking station and apply barrier sheath
3. Using positioner of choice, make radiographs
4. After dismissing patient, unsheath sensor and replace on docking station

Clinical Tip: Avoid accidentally discarding sensor by always keeping it in a positioner or on the docking station. Do not place the loose sensor among other instruments and disposable items. Bluetooth sensor can be tracked if misplaced.

Advantages:

- **Diagnostic image quality:** Clinical images were sharp and detailed for improved patient care. Density sensitivity and spatial resolution were among the highest tested.
- **Exposure latitude *(dynamic range):*** High image quality across a broad range of exposure times with superior definition of oral structures.
- **Cordless convenience:** Bluetooth connection was fast and reliable. Placement and positioning was easier. Life of sensor is extended by eliminating cord and plug damage. Lithium-ion batteries recharge when sensor is placed on docking station between patients.
- **5.6 mm thin sensor:** Rounded corners and reduced thickness improved intraoral access and comfort.

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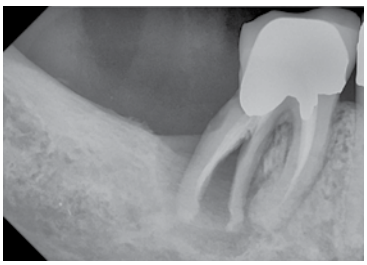
DC-Air: Wireless Intraoral Sensor with Improved Image Quality (Continued from page 2)

DC-Air (Continued)

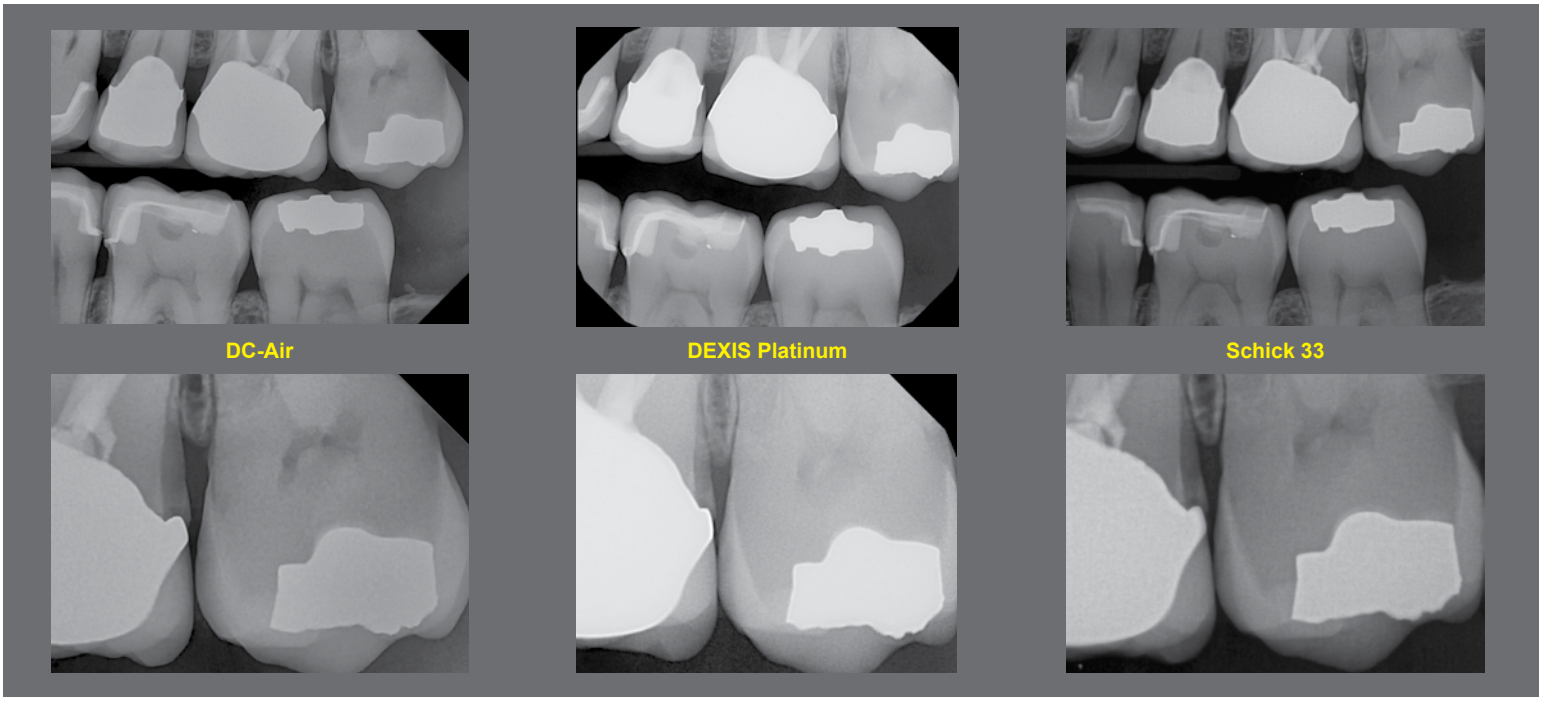
Limitations:

- **Relatively high cost** for a single sensor, but long-term value is expected to be high.
- **Currently available only in size 2.**
- **Size, thickness, and rigidity,** similar to other rigid x-ray sensors, made use difficult with some patients with limited opening, small oral cavities, boney structures, etc.
- **Clinical validation is ongoing** to establish long-term durability, battery service life, and potential hardware and software technical issues.



Example DC-Air radiograph: Note excellent visualization of bone loss and root damage to the first molar

Diagnostic Image Quality: The examples below illustrate the native sharpness of DC-Air direct conversion images. Conventional sensors often use sharpening filters to enhance native images which can create artifacts. To compare radiographs produced by numerous systems, please visit Complimentary Information at CliniciansReport.org.



Clinicians and researchers who compared radiographs observed that images produced by DC-Air exhibited greater clarity and detail than other systems previously evaluated, especially when magnified.

CR CONCLUSIONS: DC-Air direct conversion technology represents an observable improvement in digital radiograph quality, helpful for the accurate detection and monitoring of caries, and for the visualization of oral structures. This system should be strongly considered when planning the purchase of new sensors. Clinicians and patients noted the ease of use and positioning of the wireless sensor. Wireless image transfer was fast and reliable in CR testing. High cost of a single sensor was noted, but long-term value is expected to be high with improved patient care and sensor longevity due to elimination of cords and connectors which have been a weak point for digital sensors. ***The observed image quality produced by direct conversion technology is a significant improvement in the ongoing development of digital radiography.***

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