

Case Study RaySafe X2

Public Dental Care Benefits from Facilitated X-ray QA-testing

Results

- Easy and versatile testing with high accuracy
- Quick procedures
- Convenient access to measurement data when presented in one view on base unit

Application

Quality Assurance (QA) Testing of dental X-ray machines.

Customer

Jimmy Börjesson, Medical Physicist, is testing all dental X-ray machines within the Public Dental Care (Folk tandvården), in the Halland region.

There are 19 dental clinics in the public sector of this region, with approximately 160 intraoral X-ray machines. Some of these clinics also have more advanced equipment, such as panoramic machines. Additionally, the Department of Advanced Dental Care at Halland Hospital is equipped with intraoral, panoramic, cephalometric, and cone-beam CT (CBCT) machines.

All machines undergo testing upon installation. Intraoral machines are tested annually by a dental nurse using a robust, simple instrument and a protocol designed by Jimmy. Data is stored, and the nurse contacts him only if a machine fails to pass the tests. Local personnel also perform annual checks on various devices and parameters. In addition, Jimmy conducts more detailed tests of the systems, such as verifying the alignment of the light and radiation fields.

There are 17 panoramic, cephalometric, and CBCT machines in total, which Jimmy tests annually. These tests follow national guidelines,



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We really enjoy working with it. It's robust, sensitive, easy to understand, versatile, with all data in one window ”

Jimmy Börjesson, Medical Physicist, MTH (Medicinsk Teknik Halland), Department of Biomedical Engineering, Sweden

with some local adjustments. For CBCT machines, additional maintenance tests are carried out annually by the supplier's technician.

Challenge

As with all X-ray machine QA testing, time is limited when machines are not in clinical use and available for testing, making it highly valuable to have easy-to-use devices and quick, efficient measurement procedures.

When testing panoramic machines, it can be challenging to perform accurate dose measurements due to the narrow beam. Additionally, the beam has a transverse intensity profile, meaning that even a small positional variation can lead to differences in the absorbed dose value. Constancy tests can therefore be challenging to perform.

Solution

Jimmy says, “We used to use products from another manufacturer—they worked, but they weren’t as versatile or easy to use.”

For over 10 years, Jimmy has used the RaySafe Xi/X2 with the R/F sensor. Recently, he added the panoramic holder, which speeds up the pre-work, helping him to position the sensor in the radiation field center. He also uses the Survey Sensor for radiation protection measurements of walls, windows, and other surfaces.

“With the RaySafe X2, we can perform all the tests needed to meet Sweden’s national requirements. Tests are fast, robust, and effective—most require just one attempt, and it’s rare to have to repeat a measurement due to issues like a ‘low signal.’ All parameters are displayed in one window, which I appreciate.”

Tests Performed

A traditional test for a panoramic X-ray machine includes sound and mechanical checks (such as rotation and exposure handle functionality), beam positioning, X-ray generator settings, and Dose Area Product measurement for predefined patient categories. Jimmy also evaluates image quality, and resolution of both low- and high-contrast objects. He makes sure all edges are visible in the image, and that no radiation extends beyond the detector.

“We use the R/F sensor to measure kVp, Dose, Dose Rate, Exposure Time, HVL, and Total Filtration to assess the machine’s accuracy, precision, linearity, and consistency over time.”

Test 1: Is conducted using five different kVp settings. Each measurement is compared with the corresponding machine setting to ensure deviation is not exceeding specified limits. Results are also compared to last year’s data.

Test 2: A specific time and kVp are set for several exposures to ensure the machine consistently generates the same dose. Results are also compared to last year’s measurements.

Test 3: A DAP meter is used to measure the dose area product generated by the machine.

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It solves essentially all problems we have.”

Jimmy Börjesson



The RaySafe X2 Panoramic Holder is a convenient tool to help position the sensor in the center of the narrow radiation field.



All measurement parameters shown in one window.

Gränsvärden	Nivå	Avvikelse	Repetierbarhet
Action		± 5 % från angivet värde	saknas
Suspension		± 10 % från angivet värde/saknas	

Mätvärden & Utvärdering	Inställt på panel	Gräns under (-5%)	Gräns över (+5%)	Uppmätt	**OK/EJ OK**
	73	69,4	76,7	72,9	OK
	50	47,5	52,5	50,4	OK
	60	57,0	63,0	60,3	OK
	80	76,0	84,0	80,5	OK
	90	85,5	94,5	91,4	OK

Mätvärden & Utvärdering	Exp nr	kV	kV: Av från mv %	Exptid (ms)	Exp tid: Av från mv %	Dos (mCy)	Dos: Av från mv %
	1	72,7	0,2	13,45	0,0	19,66	2,1
	2	72,8	0,0	13,45	0,0	19,64	2,0
	3	73	0,2	13,45	0,0	19,68	4,0
		Medelvärde	72,8	13,5		19,3	
		Standardavvikelse	0,2	0,0		0,7	
		Variationskoefficient %	0,2	0,0		3,5	
		Tolerans*			10%*		10%
		Godkända värden?			JA		JA

Dental QA-test procedures performed for panoramic machines: Top image shows Test 1, and bottom image shows Test 2 (see description to the left)

RaySafe

We empower our everyday heroes to focus only on protecting lives.

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10/2024 22824a-en

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