

Digital Radiography – A Brief

Digital Radiography is a form of X-ray imaging, where digital X-ray sensors are used instead of traditional photographic film. Advantages include time efficiency through eliminating chemical processing and the ability to digitally transfer and enhance images. Also, less radiation can be used to produce an image of similar contrast to conventional radiography.

Instead of X-ray film, digital radiography uses a digital image capture device. This gives advantages of immediate image preview and availability; elimination of costly film processing steps; a wider dynamic range, which makes it more forgiving for over- and under-exposure; as well as the ability to apply special image processing techniques that enhance overall display quality of the image.



Who Benefits from Digital Radiography and How?

1. The CEO's Perspective → Peace of Mind

There is recent aggressive trend of vehicle recalls and parts replacement for vehicles that have been on the road for even a decade. The vendors of these parts are then charged back. In this scenario, CEO or Business Owner can never be at peace, unless he/she can be sure of the quality of the products supplied by his/her company.

Digital Radiography is a convenience, fast and cost effective method to achieve 100% inspection of products. This ensures that only products without any internal defects are passed on to the OEM. The Result → Peace of Mind for the CEO / Business Owner.

2. The Production Head's Perspective → Higher Productivity

Using the **traditional film radiography has 2 major limitations** for the Production Manager:

1. Time for getting the feedback on whether the sample component is OK or not – typically runs into at least a day.
2. When the feedback comes, it can be used only to accept or reject a lot of production.

Digital radiography will give instantaneous results. So the feedback can be taken immediately for the following points which will greatly enhance the productivity:

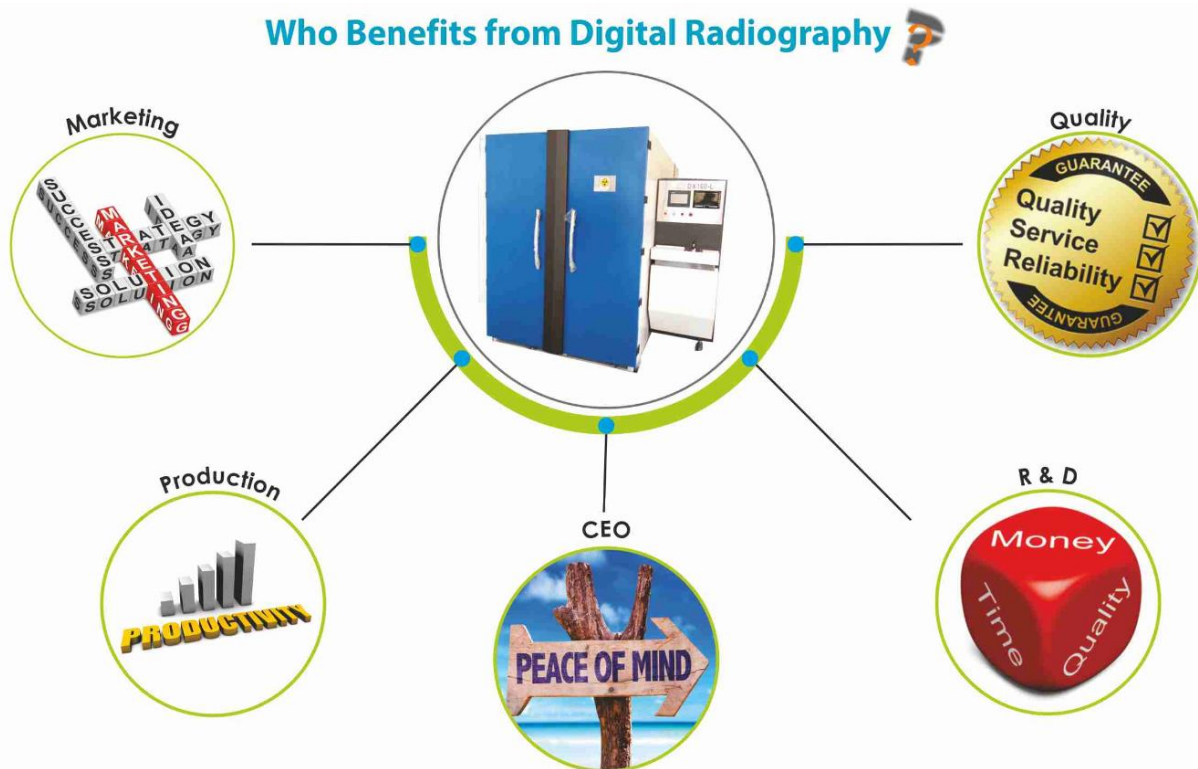
✓ **Faster Machine Setting Fine Tuning:**

The machine setting fine tuning can be done with feedback on internal quality (pores, blow holes, shrinkage) within minutes. This will ensure that the number of rejects is minimum. Thus increasing productivity.

✓ **Lesser Inventory & Lesser Rejects:**

The produced lots cannot be accepted or rejected without a sample radiographed. So the produced lot becomes inventory pending inspection. With digital radiography, the inspection is very fast and this inventory **can be brought down to ZERO**.

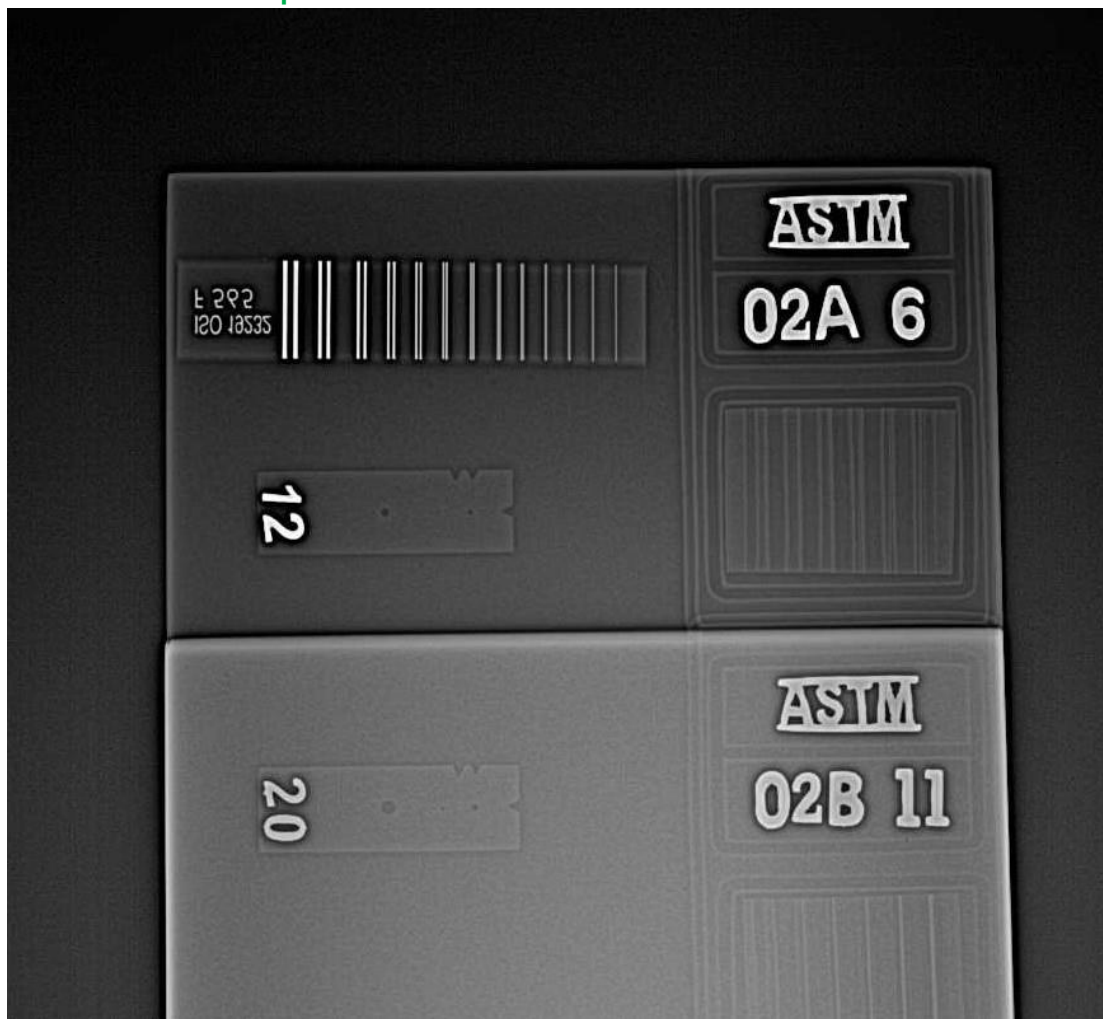
An added advantage is that, the rejection can be reduced by inspection of the components during a batch itself. Enabling any correction in settings to prevent rejects.



3. The Quality Head's Perspective → Best Quality Products

The Quality Head has the following benefits from Digital Radiography:

- ✓ With **100% inspection possible at low cost**, the quality head can be assured that only the best quality products are getting passed to the customer
- ✓ Karma Innovations' Equipment is **highly de-skilled for the operator**. **So the quality department does not have to appoint a costly resource person for the equipment.**
- ✓ Karma Innovations' Equipment is **very user friendly and convenient to use**. This eliminates chances for fatigue for the operator. **So False Negatives Rejection and False Positive Acceptance are eliminated.**





4. The Marketing Head's Perspective → Gain Customers' Confidence Easily

The presence of a Digital Radiography Equipment in the supplier's factory give a sense of confidence to the buyer. **This helps the Marketing Head to gain greater breadth and depth in the range of components being discussed for additional and new orders.**

5. The R&D Head's Perspective → Faster Product Development

Traditional product development involved the cutting of the sample component produced to check for any internal defects. **This technique is redundant for the following reasons:**

- ✗ Cutting blade itself may take away some defects. These defects cannot be detected.
- ✗ Since very thin sections cannot be made, defects may remain hidden just beneath the surface of the cut section and remain undetected.
- ✗ Time taken for each section analysis is high



Because of the above reasons, the time taken for product development is very high.

With Digital Radiography, the internal defect can be seen as a video. So the time taken for detection of the internal defects is very fast. Hence product development process is accelerated.

6. Safe and Convenient

Karma's Industrial Radiography uses electrically generated x-rays. These are very safe to use (cutting power stops x-ray generation) and directional. All our systems are supplied with self-shielded chambers, so the operator can stand right next to the machine for operations. **Karma's machines are the first and only Made-In-India Digital Radiography Self-Shielded Systems approved by Atomic Energy Regulatory Board (AERB).**

The other industrial radiography methods use Radioactive Isotopes; whose radiation cannot be stopped. Hence extreme precautions and safety procedures and essential. Karma does not work with radioactive isotopes.

<p>भारत सरकार परमाणु ऊर्जा नियामक परिषद् अध्यक्ष Chairman</p>	 <p>GOVERNMENT OF INDIA ATOMIC ENERGY REGULATORY BOARD</p>
Case File Number: TN-22120-IR-SU-IRE-D-E-001	Issuance Date: 17/02/2021
Document Number: 21-COMSUPPTA-591282	Expiry Date: 17/02/2024
TYPE APPROVAL FOR INDUSTRIAL X-RAY EQUIPMENT USED IN INDUSTRIAL RADIOGRAPHY	
<p>This has reference to your application no. 21-687403 dated 12/01/2021 . In exercise of the powers conferred under Section-16 of the Atomic Energy Act, 1962 read in conjunction with Rule 3 of the Atomic Energy (Radiation Protection) Rules 2004, the Atomic Energy Regulatory Board (AERB) hereby issues Type Approval from radiological safety view point for the Industrial X-ray Equipment Unit Model DX160 manufactured by KARMA INNOVATIONS AND SOLUTIONS PVT LTD India with technical specifications given in Annexure -I for sale, installation, operation, servicing and maintenance in India.</p>	
TERMS AND CONDITIONS	
<ol style="list-style-type: none">1. This Type Approval becomes invalid if any change is made in Model.2. The Unit shall be supplied only to the user who has obtained requisite permission from AERB to procure the above equipment.3. The supply of the said Model after expiry of this Type Approval is conditional upon its re-validation.4. This Type Approval may be subject to review and modification based on operational experience feedback.5. The additional terms and conditions are specified in Annexure-II.	
Issuing Authority	
G. Nageswara Rao Chairman	
MR. KARTHIKEYAN JAWAHAR KARMA INNOVATIONS AND SOLUTIONS PRIVATE LIMITED 46,ARASAMARA STREET,, AVARAMPALAYAM COIMBATORE-641006, TAMIL NADU	
	<p>परमाणु ऊर्जा नियामक परिषद्, नियामक भवन, अणुशक्तिनगर, मुंबई 400094 (महाराष्ट्र) Atomic Energy Regulatory Board, Niyamak Bhavan, Anushaktinagar, Mumbai 400094 (Maharashtra)</p>
वेबसाइट/Website: www.aerb.gov.in	दूरभाष/Tel: 91-22-2599 0604
फैक्स/Fax: 91-22-2599 0344	

Digital Radiography Industrial Inspection Systems – Made in India

Karma Innovations is a pioneer indigenous manufacturer of Digital Radiography Equipment. Karma Innovations benchmarks its equipment quality the leading manufacturers in the world yet the equipment is available at affordable prices for Indian companies.

Being a manufacturer, Karma Innovations has the capability to customize the equipment to suit the specific requirements of the end user.

Being an import substitute Karma's research was funded by Department of Science and Industrial Research, and Technology Development Board, both Government of India organizations. As proof of his research capability, Karma's Director, Karthikeyan Jawahar was awarded the Gold Medal for Innovation by DST-Lockheed Martin India Innovation Growth program. The manufactured product quality is at par with the best in the world as certified by Euro Cert.





EUROPEAN INSPECTION AND CERTIFICATION COMPANY S.A.

CERTIFICATE OF CONFORMITY

FULLNESS EXAMINATION OF TECHNICAL FILE

Certificate No.	: MDLV.0018
Issue Date	: 26/02/2018
Expiry Date	: 25/02/2023
Applicant (Name & Address)	: KARMA INNOVATIONS and SOLUTIONS PVT. LTD. / 10/11-3, KK Nagar, Bharathi Nagar 4th Cross Extension, Ganapathy, Coimbatore – 641 006, TAMIL NADU, INDIA
Manufacturer (Name & Address)	: Same as applicant
Test Report Ref.	: ITC/TEST/NS/1705/03-A, ITC/TEST/NS/1705/03-C1, ITC/TEST/NS/1705/03-C2, ITC/TEST/NS/1705/03-B, ITC/TEST/NS/1705/03-D1, ITC/TEST/NS/1705/03-D2
TCF No.	: TCF 01
Product Description	: Industrial Digital Radiography System
Model(s) Directive(s)	: 125kV, 160kV & 225kV Low Voltage Directive 2014/35/EU Machinery Directive 2006/42/EC
Standard(s)	: EN 60204-1:2006+A1:2009, EN 61010-1 : 2010 ; EN 61010-2-091 : 2012 ; EN ISO 12100:2010

This is to certify that, upon the relevant application of KARMA INNOVATIONS and SOLUTIONS PVT. LTD, EUROCERT as Third Party Authority has reviewed the Technical Construction File of the described product which found to fulfill the basic health and safety prerequisites of above mentioned Directive(s).

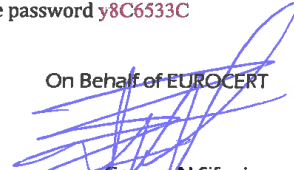
Note:

- The manufacturer should issue a Declaration of Conformity according to the basic requirements of the applicable and relevant directives.
- The CE marking can be affixed on the above-mentioned product with the manufacturer's responsibility, if all relevant and applicable directives are complied with.
- All modifications to the Technical File should be first submitted to the Third Party Inspection Authority to ensure further validity of this attestation.
- This certificate is valid only for the product and configuration described and in conjunction with the technical data detailed above.

Please check the validity of the certificate from our website using the password **y8C6533C**



On Behalf of EUROCERT



George N Sifonios
Director of Development

89, CHLOIS STR. & LIKOVRISEOS, 144 52 METAMORFOSI, ATHENS, GREECE
Tel: ++30 210 62.52.495, 30 210 62.53.927 - Fax: ++30 210 62.03.018
Internet site: www.eurocert.gr - e-mail: eurocert@otenet.gr





Summary

Digital Radiography is fast, convenient and cost-effective Non-Destructive Testing method to check for internal defects in components. The entire company right from the CEO to all the Department Heads can benefit from a Digital Radiography System.

Please call/ mail Karma Innovations for your specific requirements, we will be honored to provide you a solution.