Good Practice Guide to Dark Room Operations

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Abstract. “The processing of exposed Industrial Radiographic Film can be either disastrous or successful”.

The quality of Industrial Radiographic Film depends to a large extent on the procedures and actions executed in film processing in the darkroom. Aspects related to resource management and control, significantly enhances the productivity and the consequent quality of radiographic films.

This paper takes a closer look at the operations of a dark room, identifies and assesses the aspects that would influence the quality of films produced and provides a guide of good practice to each scenario.

While certain aspects only depend on manual processing, controls related to automatic and even digital radiographic film production is considered and discussed.

The following aspects are some of the parameters being discussed:
1) Resources – Human, equipment, consumables, venue
2) Radiographic quality parameters (based on the various codes / standards)
3) Procedural operations
4) Control checks and verifications

Introduction

The quality of images on Industrial Radiographic Film depends to a large extent on the procedures and actions executed in film processing in a darkroom. Aspects related to resource management and control, enhances the productivity and the consequent quality of radiographic films.

1. Basic technique

Radiographic film can be exposed by x-radiation, gamma radiation and visible light. The silver bromide grain in the emulsion layer on the radiographic film that was exposed to any of the mentioned electromagnetic waves will form a latent image. The film must be processed using different chemicals to obtain a visual image on the radiographic film.

2. Darkrooms

In the darkroom many activities take place, such as loading, unloading and processing of radiographic film.
2.1 Light
The darkroom needs to be completely lightproof, so the entrance must be able to prevent visible light to enter the darkroom usually in the form of two doors. Radiographic films are best processed normal orange-red or green darkroom lights also known as safe lights.

2.2 Tanks & Solutions
The processing tanks used in the manual process, films are held vertically in their frames. The process solutions are starting at the developer, the stop bath or water rinse and lastly fixer. These solutions should be checked regularly to limit depletion by replenishment.

3. Handling of film
Radiographic film should always be handled carefully to avoid physical damage, such as pressure marks, creasing, buckling and static marks.

Marks resulting from contact with fingers contaminated with processing chemicals, as well as crimp marks, are limited if large films are always grasped by the edges and hang free. Hands must be washed and drayed regularly.

Removing film rapidly out of containers will result in generating static electric discharges which result in circular or treelike black markings in the radiograph.

The ends of lengths of roll pack film in paper sleeves should be sealed in the darkroom with tape to prevent exposure to visible light.

4. Examples of Problematic Film Handling
Images of faults associated with poor handling to appear on poster.

5. Process control
Producing images in Industrial Radiographic Film must frequently meet requirements of density and sensitivity as required by inspection specifications. Radiographic film rejection rate must be kept to a minimum. Control of variability in both exposing and film processing is essential if these requirements are to be met. Although exposure and processing are the most frequent sources of significant variations, other factors, such as intensifying screens and film, also contribute to radiographic variances.

5.1 Procedure
Specific exposure techniques for each x-ray unit must be established. A separate technique for each unit is essential because of variability in units of the same design and variations among units of different designs. Each time control film is exposed in a unit, the technique established for that particular must be followed exactly.

Maintain an accurate, up to date log containing all information that could affect process control. The following should be included in the log:
5.1.1 Maintenance data and changes resulting from readjustment of an exposing unit, including the supply of electrical current to the unit and any significant changes in line voltage.
5.1.2 Maintenance data and changes resulting from readjustment of a processor.
5.1.3 Age of the replenished developer.
5.1.4 Replenishment rate of the developer.
5.1.5 Age of developer.
5.1.6 Temperature of developer at the time the control slips are being processed.
5.1.7 Comments on fixer and wash and their replenishment rates.

References

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