

## Definition of Artifacts

Artifacts are defects on the processed film.

## Examining Films for Artifacts

It is important to check films regularly for artifacts. By checking films for artifacts as part of your daily routine, you are better able to identify and eliminate the source of artifacts as soon as the problem arises. The early detection of artifacts can help you reduce the number of films that are affected by unwanted artifacts. This in turn provides two benefits:

1. lowered operating costs
2. minimized patient exposure to x-rays

You can incorporate the simple task of checking for film artifacts into your daily routine by following the two guidelines outlined below.

1. Check for film artifacts before and after you perform any of the procedures listed below: Preventive Maintenance Checks
  - o Cleaning of the Racks
  - o Inspection of Components and Assemblies
2. Check for artifacts on films as they exit the processor. When examining films for artifacts, try to do the following steps:
  - o Isolate the artifact.
  - o Identify the cause of the artifact immediately.
  - o Make any necessary corrections to eliminate the cause.

## Impact of Lighting Conditions

Another important factor to keep in mind when you examine artifacts is the lighting conditions under which you are examining the films. Different lighting conditions can help you identify different types of artifacts.

For example, by using **reflected** light, you will be able to locate flaws in the surface quality of a film more quickly and easily than if you use transmitted light. Therefore, if you are particularly interested in looking for unusual drying patterns or artifacts caused in the wash stage of the processing cycle, you should examine your films with reflected light.

If on the other hand, you wish to uncover artifacts caused in the development stage of the processing cycle, you should use **transmitted** light when examining the films. Transmitted light will enable you to see "through" the film rather than just being able to see the surface. To examine films, use an appropriate viewbox in a darkened room. Mask the area around the film so that extraneous light from the viewbox does not affect your viewing.

## Determining the Cause of Artifacts

When examining artifacts, watch for the indications listed below that may help you determine the cause of the artifact:

- characteristics of the film
- characteristics of the artifact
- position of the artifact

## Film Characteristics

Identifying the characteristics of the film can help you trace the cause of the artifact. For example, noting where the artifact appears on the sheet of film in reference to the items listed below can help you identify which parts in the processor might be causing the artifact.

- the direction of film travel
  - o leading edge
  - o trailing edge
- the film emulsion
- single emulsion fed up
- single emulsion fed down
- double emulsion

## Density Characteristics

The density of the artifact can also help you determine the cause of the artifact. Determining whether the artifacts are plus density (darker than the background) or minus density (lighter than the background) can provide you with useful information to determine in which stage of the processing cycle the artifact appeared.

**Plus-density (dark) artifacts can indicate one of two different scenarios:**

1. The artifact was caused by the application of physical pressure to the film after the film was exposed.
  - o poor film-handling techniques unloading the film from a Cassette
  - o dropping or bending the film before feeding it into the processor
2. The artifact was caused sometime during the development stage of the processing cycle.

**Minus-density (light) artifacts can indicate one of three different scenarios:**

1. The artifact was caused by the application of physical pressure to the film before the film was exposed.
  - o poor film handling techniques before or during the loading of the film into a Cassette
2. The artifact was caused sometime during the fixing or washing stage of the processing cycle.
3. The artifact was caused by dust or dirt in the Cassette.

## Artifact Position

The position of the artifact on the film with relation to the direction of film travel can also provide you with helpful information in determining what caused the artifact.

The spacing between artifacts can also serve as a valuable clue in diagnosing artifacts. For example, if artifacts appear 79.8 mm (3.14 or 1 inches) apart and are parallel to the leading edge of the film, the artifacts are probably caused by a problem with a Roller. If the artifacts are spaced identically to the spacing between the Tips of a Guide Shoe, the cause of the artifact is probably a Guide Shoe.

# Checking for Artifacts

## Introduction

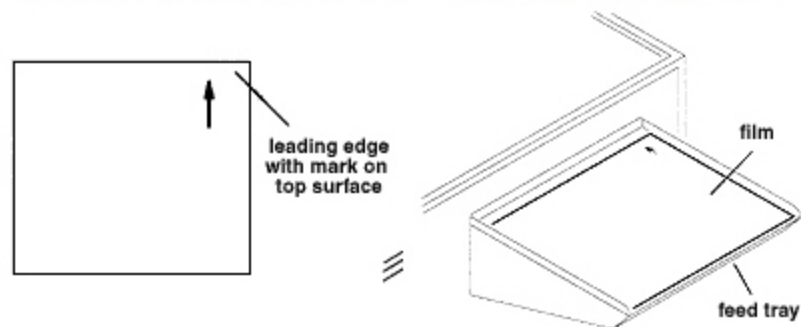
To begin diagnosing the cause of an artifact, you must first answer two basic questions:

1. Which is the leading edge of the film?
2. Do the artifacts appear on the top or the bottom surface of the film?

## Identifying the Leading Edge

The leading edge of a sheet of film is the edge of the film that is fed first into the Entrance Rollers of the processor. As well as being the first edge fed into the processor, the leading edge is also the first edge to exit from the Exit Slot in the Dryer. Once you have removed a processed sheet of film from the Receiving Bin of the processor, it may be difficult to remember which end is the leading edge of the film. Without knowing which end is the leading edge of film, it also becomes difficult to identify which edge of the film was on the drive side of the processor and which edge was on the non-drive side of the processor. To help you find the leading edge of the film, inscribe or scratch an arrow on the right corner of the top emulsion on the leading edge of the film before you feed the film into the processor.

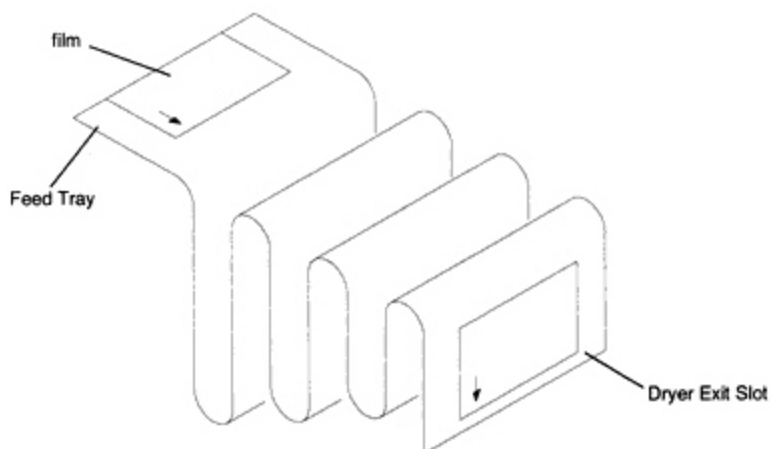
Figure 1: Identifying the Leading Edge    Figure 2: Feeding a Sheet of Film



## Identifying the Top Surface

The top surface of the film is the surface that faces up as you feed the film into the processor. Once you have removed a processed sheet of film from the Receiving Bin of the processor, it may be difficult to remember which side was facing up as you fed the film into the processor. If you drew an arrow at the right corner on the leading edge of the film, that same arrow can help you identify the top surface of the film.

Figure 3: Identifying the Top Surface of the Film





## Artifacts Caused by Guide Shoes

Several components of the processor, such as the Guide Shoes located in the Crossover Assemblies and in the Turnaround Assemblies, can potentially cause film artifacts, especially if the components are worn or are not adjusted correctly.

### Guide Shoes in Crossover Assemblies

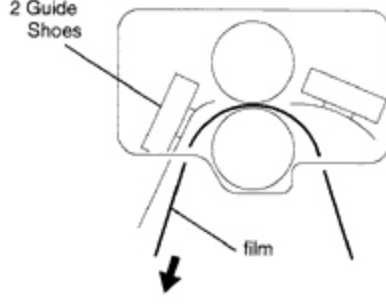
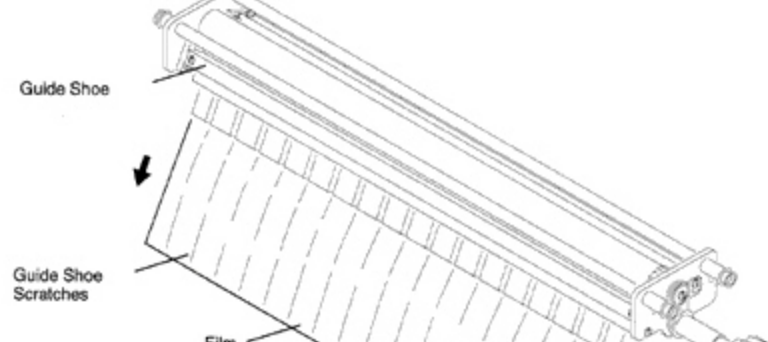


Figure 4: Identifying Guide Shoes in the Crossover Assemblies

If the Guide Shoes in the Crossover Assemblies are not correctly installed, the Guide Shoes can potentially scratch or mark the **top surface** of the film. Guide Shoe Marks can appear as either plus or minus density scratches. Guide Shoe Marks are typically easy to identify because they appear at regular intervals.

- Guide Shoe Marks caused by ribbed Guide Shoes appear at 25.4 mm (1 inch) or a multiple of 25.4 mm (1-inch) intervals.
- Marks caused by textured Guide Shoes appear at 0.06 mm (1/16 inch) or a multiple of 0.06 mm (1/16-inch) intervals.

Figure 5: Identifying Scratches Caused by Guide Shoes in the Crossover Assemblies



During normal operation of the processor, the film travels through several assemblies that contain Guide Shoes. As the film enters any one of the Crossover, Turnaround, or Squeegee Assemblies, the film responds in the same way.

- The leading edge of the film contacts the Guide Shoes.
- The remainder of the film conforms to the shape of the Master Roller.
- The trailing edge of the film "snaps" against the Guide Shoe as it exits the Assembly.

As a result of their contact with the Guide Shoes, both the leading and trailing edges of the film may acquire artifacts. Most often the artifacts appear as nicks measuring up to, but not exceeding, 0.3 mm (1/4 inch). The position of the nicks on the film will directly correspond to the location of the Tips on the Guide Shoes.



Figure 6: Matching the Nicks to the Tips of the Guide Shoes

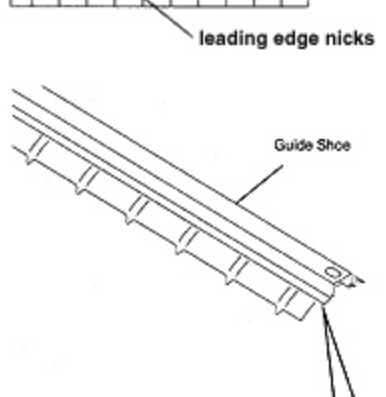


Figure 7: Identifying Nicks Caused by Guide Shoes

The position of Guide Shoe nicks can help you determine where a single scratch or mark is originating. When you encounter a single scratch or mark on a film, use the steps below to help you determine whether a Guide Shoe was the cause of the artifact.

1. Using a straight edge, align the nicks on the leading edge and the trailing edge of the film that are closest to the scratch or mark.
  2. Check whether the scratch or mark artifact appearing on the film lines up with the straight edge.
- If the scratch or mark artifact aligns with the straight edge and the two nicks, then the scratch or mark is most likely caused by a Guide Shoe.

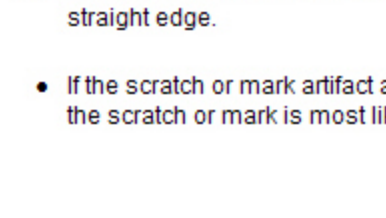


Figure 8: Testing for Guide Shoe Artifacts

### Guide Shoes in Turnaround Assemblies

If the Guide Shoes are not correctly installed in the Turnaround Assemblies, the Guide Shoes can potentially scratch or mark the bottom surface of the film. Worn Roller Bearings can also contribute to unwanted scratches and marks on the film. When the components of the Rollers wear, they can sometimes drive the film off the normal path and cause the film to contact the Guide Shoes, thus causing scratches on the film.

Just like scratches or marks caused by Guide Shoes in the Crossover Assemblies, scratches or marks caused by Guide Shoes in the Turnaround Assemblies are typically easy to identify because they appear at regular intervals.

- Guide Shoe Marks caused by ribbed Guide Shoes appear at 25.4 mm (1 inch) or a multiple of 25.4 mm (1-inch) intervals.
- Marks caused by textured Guide Shoes appear at 0.06 mm (1/16 inch) or a multiple of 0.06 mm (1/16-inch) intervals.

Scratches or marks caused by Guide Shoes possess one other identifying characteristic. The scratches or marks are parallel to the direction of the film travel.

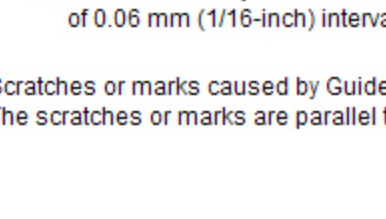
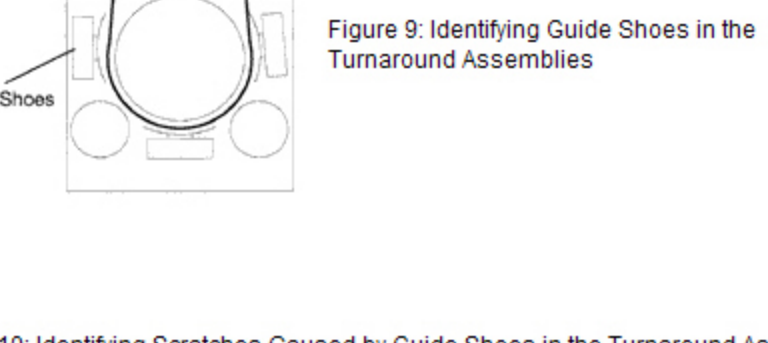


Figure 9: Identifying Guide Shoes in the Turnaround Assemblies

Figure 10: Identifying Scratches Caused by Guide Shoes in the Turnaround Assemblies



## Artifacts Caused by Rollers

The Rollers in the outside path of the Developer, Fixer, or Wash Rack contact the **bottom surface** of the film. Any scratches or marks caused by the Outer Path Rollers occur on the **bottom surface** of the film.

The Rollers in the inside path of the Developer, Fixer, or Wash Rack contact the **top surface** of the film. Any scratches or marks caused by the Inner Path Rollers occur on the **top surface** of the film.

Scratches or marks caused by the Outer and the Inner Path Rollers are similar in that they both possess one main identifying characteristic:

- The scratches or marks on the film are spaced at approximately the same distance as the circumference of a Roller.

| Diameter of the Roller | Circumference of the Roller<br>$\pi \times \text{Diameter}$ | Space Between Artifacts |
|------------------------|---|-------------------------|
| 25.4 mm (1 inch)       | 79.8 mm (3.14 inches)                                       | 79.8 mm (3.14 inches)   |
| 50.0 mm (2 inches)     | 159.5 mm (6.28 inches)                                      | 159.5 mm (6.28 inches)  |

Figure 11: Identifying Inner and Outer Path Rollers

Figure 12: Identifying Artifacts Caused by Inner and Outer Path Rollers

