

Apparatus for Removing Remaining Adhesives of Filter

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1. Introduction

A Large amount of ventilation filter was used at radiation areas not only in nuclear power plants but also in nuclear facilities. These spent ventilation filters are generated as radioactive waste and composed of a steel frame, glass fiber media and aluminum separator. When treated, the spent filter is separated into filter media for air purification and frame. After separation, while the filter media is collected using steel drum for reducing internal exposure, the filter frame is treated further to remove adhesives for recycling the frame as many as possible in order to reduce waste and cost and improve working conditions.

Usually, the adhesives are separated from the filter frame manually. As a result, a lot of time and labor is required. So, the objective of this study is to develop a motor-driven apparatus for removing adhesives efficiently.

2. Structure and operation

In other country, for treatment of a spent filter, cutting and separation of a filter are applied. In that case, the objective filter is fixed on a piece of board and then cut into 3 parts from the top of the filter using a circular saw moving downward. After separation, the filter media at the center of the filter is wound with a fixed pulley and the aluminum separator is separated from the filter media and dropped downward. In contrast to that, the removal apparatus in this study is characterized by removing adhesives at the filter frame using separation unit with a knife.

As shown in Fig. 1, the apparatus is composed of a base unit, separation unit, leveling unit and driving unit. Additionally, there is a collecting unit to collect removed adhesive easily. Each unit is shortly described.

First, in the base unit, there is a base part to fix a filter tightly and a frame part to support the base part. The base part is a plain board having a bolt hole to combine it with a guide part of the driving unit.

Second, the separation unit is a 'L' shaped steel knife for separation of adhesives from filter frame. As the knife is combined to the leveling unit, it can be moved up-and-down to locate the position of adhesives for

the filter frame. The separation unit is designed to be detached from the leveling unit. As a result, the used separation unit with a damaged blade of knife can be easily replaced with a new one.

Third, the leveling unit has a clamp that is combined with the separation unit. A leveling screw of the clamp is used to move the clamp up-and-down. As a result, it is possible to adjust the level of the clamp by rotation of the screw. In addition to that, the leveling unit has an elastic rubber plate. Located on the top of knife-attaching point of the leveling unit, the rubber plate partially absorbs shock generated when the knife contacts filter fixed at the top of the base unit.

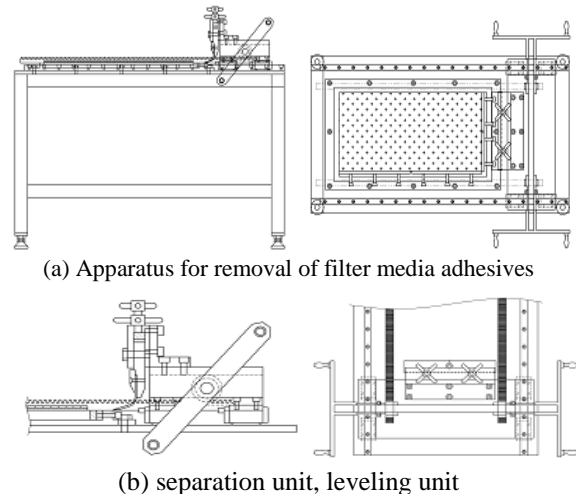


Fig. 1. Apparatus for Removal of Remaining Adhesives of Filter

Fourth, the driving unit is composed of a body part, driving part and guide part. In front of the body part, the leveling unit which is united with the separation unit is combined by bolting. At the driving unit, there is a pivot and a handle. Bearing is then inserted by contacting the point of the pivot and the body part for the smooth rotation of the pivot. The pivot can be rotated by rotation of handle or manually. At the guide part there is a pinion gear and a rack gear. A rotary motion of the pinion gear combined with the pivot of the driving part converted into the rectilinear movement of the rack gear. The pinion gear is fixed at the pivot. At both of the

side the filter is fixed, the rack gear is located on top of the base part. The knife can be closely maintained with constant elasticity supported by a rubber plate. When a handle of driving part rotates by the pinion gear and rack gear, body part moves forward and backward from one side of the base unit to another side with the knife. By the movement of the knife, remained adhesives at the filter will be removed. After the removal, the knife will be moved back to initial position.

Finally, the collection unit is a container for collecting media adhesives removed from the spent filter. The collection unit can be detached from the base part of the base unit. As a result, the collected adhesives can be treated easily.

3. Expectation

Using the apparatus developed in this study, the media adhesives remaining at filter frame can be easily and quickly separated. Also, as this apparatus can be operated motor-driven, labor can be reduced. In addition to that, by operation using motor at airtight space, the internal dose to radiation workers due to radioactive dust spread can be reduced.