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NASA TECH BRIEF

Marshall Space Flight Center

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Thin Spray Film Thickness Measuring Technique

A portable, commercially available, light density measuring device can be used in conjunction with a glass plate or photographic film to measure thin spray film application depths, specifically in the 0.0002 cm. to 0.002 cm. (0.0001 to 0.001 in.) range. The system replaces previous measurement techniques involving large, nonportable units such as laser interferometers and hologram equipment.

The item to be sprayed is placed above, but as close as possible to, the glass plate or unexposed, developed, clear photographic film (see Fig. 1). The thin spray film will then coat both the item and the glass (or photo film) to the same depth.

A graph of densitometer readings versus coating thickness is then prepared in the following manner. Apply a thin spray film several times until the applied thickness can be measured with simple mechanical type inspection tools such as micrometers, depth gages, etc. Remove the sprayed item and place the coated glass plate (or photo film) on the densitometer. Compare the reading taken with the zero reading taken before the coating process was performed. The net densitometer reading will be an accurate measurement of the thin spray film density. By repeating the process

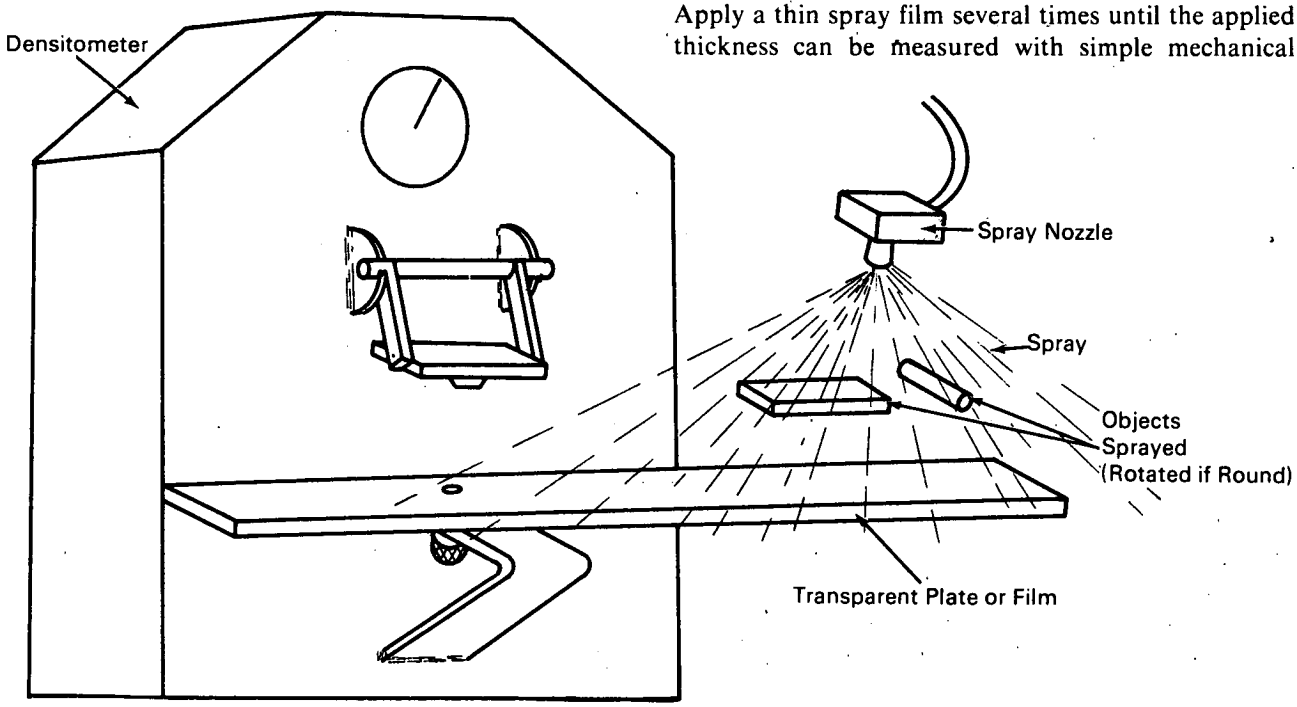

Figure 1. New Technique in use; Diagrammatic

(continued overleaf)

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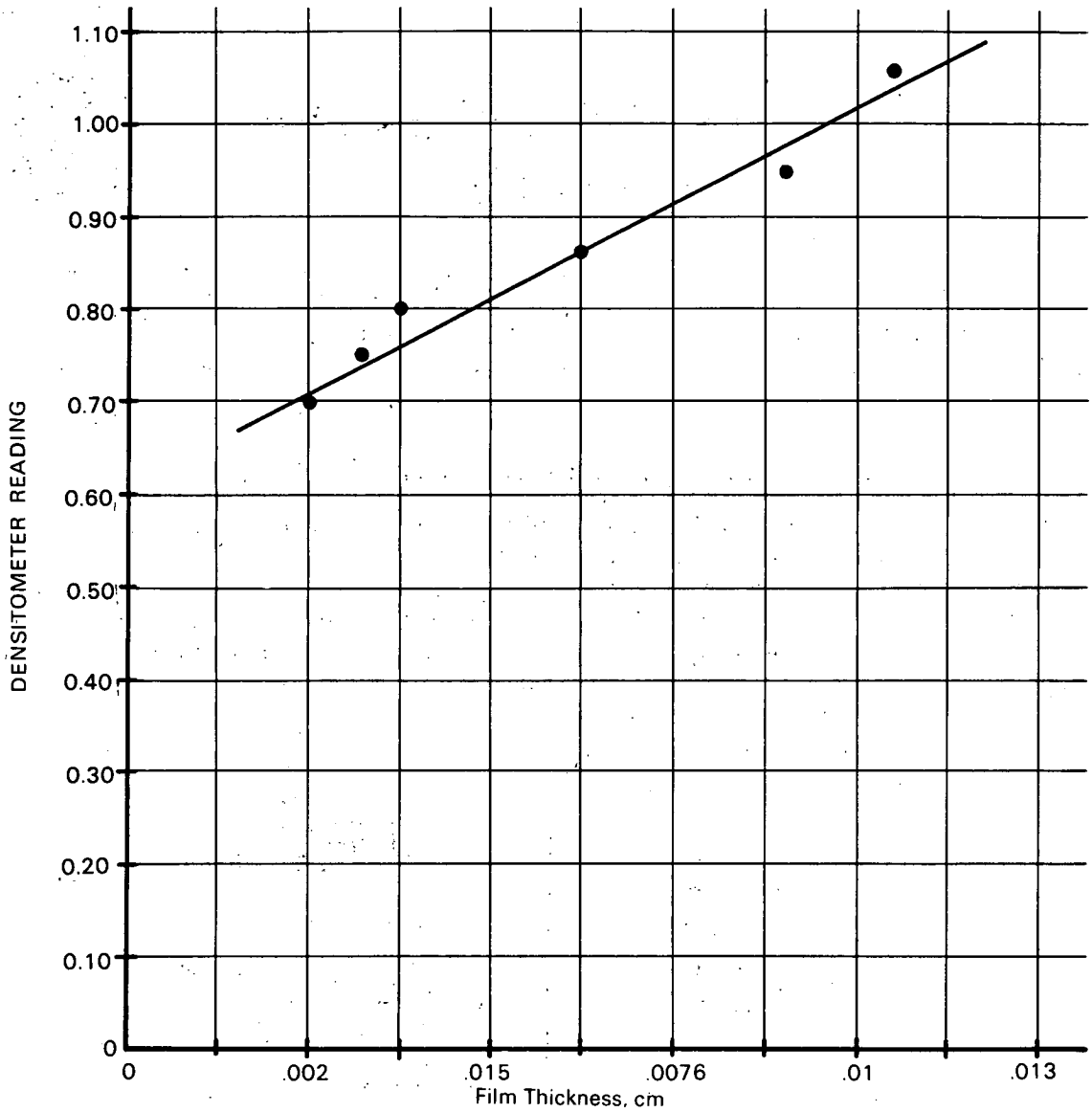

Figure 2. Typical Plot of Film Thicknesses Versus Densitometer Readings

for several different thicknesses, the curve of densitometer reading versus coating thickness can be derived for future application to final thin spray film problems.

The method can be automated by using a mechanical/electrical control for shutting off the film applicator at the desired densitometer reading. The control could be an adjustable limit switch activated when the densitometer needle reaches the desired reading.

A purely electrical means of accomplishing the same task might involve a cutoff switch activated when the voltage from the densitometer is sufficient to deflect the needle to the desired reading. Such voltages could be predetermined from calibration tests involving the densitometer itself.

The technique could also be adapted to a fully automatic operation where a continuous light density measuring device is employed. A typical curve of densitometer reading versus thin film thickness is shown in Figure 2. The curve was derived from a continuous X-ray type densitometer and liquid penetrant developer as the thin film.

Note:

Requests for additional information may be directed to:

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No patent action is contemplated by NASA.

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