



## FACTORS AFFECTING THE QUALITY OF PAD PRINTING

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Pad printing is a kind of gravure printing process in which ink is transferred from the plate to a substrate using special pad. Pad printing technology is used for printing on curved surfaces and different materials.

The analysis of the problems arising in the pad printing was conducted. In particular, the problem of fixing ink on certain types of plastics and the resistance of the print to mechanical damage.

Factors that influence the quality of printing include the following:

- material and physical properties of the printing pad;
- type of the printing plate;
- printing ink;
- properties of the printing material.

Printing pad is made of silicone rubber. They come in different shapes, hardness and quality. The printing pad does an image by sampling the paint to the cliché and then transports this paint to the printed object. Therefore, the material from which the pad is made must be flexible but at the same time it is important to keep clear a portable image. Wrong properties of the printing pad can result image distortion.

Different types of printing plates must be used depending on the desired print quality and number of prints. It may be polymer, thick and thin steel plates. If you want to print large runs thick steel plates are preferred.

Requirements to the ink may vary depending on the intended use of the material on which printing is performed and desired quality. Different materials react differently to the various elements in inks. For example, the ink used for printing on certain plastics may not adhere to glass or aluminium. One-component, two-component and UV inks are distinguished.

One-component ink dries through evaporation of the solvent entering into its structure. At the same time, the surface of thermoplastic materials (e.g., polystyrene, polycarbonate) is reacting with solvents which results ink penetration into the surface of the printing object. Excellent paint adhesion and resistance to damage like scratches are guaranteed in this case. One-component paint dries very quickly.

Two-component ink gives a very good resistance to chemical and mechanical stress and has good adhesion. The ink should be added to the hardener, which trigger a chemical reaction with the substrate. It is important to observe the right balance. The hardener should be added to the ink directly before printing, because ink with added hardener can be used for a limited period of time. This period may vary from 6 to 12 hours depending on the type of ink. Sometimes, full hardening of ink occurs after a few days. Typically, this process is accelerated by a heat treatment with some types of paint and as a result it increases mechanical resistance. The most common



mistake is to check adhesion and chemical resistance too early. It is very important to follow the instructions for use that come with the supplies.

UV-curable inks are used when fast drying time required. Quick drying generally is an important feature as printers will be able to react flexibly and quickly to urgent customer demands. Printers do not have to wait for long periods of time for UV prints to fully cure like you have to with 2- component solvent based pad printing inks. Basically, UV inks do not necessarily require solvents. However, to achieve good processing properties small amounts of solvents are essential.

Very important factor that affects printing quality is properties of the substrate. Applied technologies may vary depending on what type of material must be printed.

For example, polypropylene has very low adhesion, so printing ink does not penetrate into the substrate which causes very low resistance to a mechanical damage. Heat or electrical treatment must be applied to the printing substrate directly before printing. Additional equipment implements to the printing machine – flame burner or corona treater.

Therefore, pad printing is a complex process. Monitoring different factors that affect printing can help to achieve high quality and minimise rejects during production.