

High Speed Foil Fusing (HSFF)



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What is traditional foil fusing and what are its limitations?

Traditional foil fusing technology uses a series of heated rollers to fuse foil to toner image areas on certain papers and plastics. While this technology has important applications, it also has several limitations. These include slow speed, excessive foil waste, restrictions in suitable papers and finishes and the inability to selectively apply foil within surrounding toner image areas.

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What is HSFF™ and what advantages does HSFF™ offer over traditional foil fusing?

THERM-O-TYPE has introduced a new foil fusing technology called High Speed Foil Fusing™ (HSFF™). The HSFF™ process significantly increases the utility of foil fusing and offers solutions to each of the traditional foil fusing limitations. HSFF™ technology can be easily and inexpensively adapted to most platen foil stamping equipment.



Using HSFF™ technology, installed on a NSF series press, foil can be fused to paper at speeds up to 4,000 impressions per hour. Excess foil waste is eliminated and a much wider range of papers and finishes can be foil fused. Foil can also be selectively fused to toner image areas on the sheet without the need for separate print passes as with traditional foil fusing.

How does HSFF™ work?

The High Speed Foil Fusing™ process fuses foil to toner image areas on the paper. The mechanics of the process involve the adhesion of a specialized foil to the toner using heat and pressure. Specialized make ready materials are used to selectively transfer heat and pressure to the paper in a method that does not crush or iron the paper surrounding the impression area.

The reactive chemistry within the toner does not diminish over time. As a result, sheets can be run through the HSFF™ process days, weeks or even months after being imprinted with toner.

How does HSFF™ handle fine lines and screens?

The HSFF™ process can create foil images with exceptionally sharp detail on fine line artwork and text. Many customers have commented that the quality level achieved with the HSFF™ process on fine line toner images is better than they could produce with a metal die.

The most important factor in using HSFF™ on fine line work is the quality of the toner image. A sharp, clean toner image is essential to achieve a high quality fine line foil image.

HSFF™ is not compatible with fine screens. Care must also be taken with text and artwork with "shadow" screens as these areas will appear as a solid foil area (if the screen is dense enough) or as a broken up foil area (if the screen is too fine).

Are special materials required?

There are four special materials required when using the HSFF™ process. HSFF™ make ready materials are designed so presses can easily switch between flat foil stamping, blind and foil embossing with dies, and High Speed Foil Fusing™ without dies, in a few minutes.

High Speed Foil Fusing (HSFF) - 2



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HSFF™ Foil

Unlike traditional hot stamping foils that stick to paper, HSFF™ foils are manufactured to adhere to toner. As a result, traditional hot stamping foils can NOT be used with the HSFF™ process.

Because the HSFF™ process differs from traditional foil fusing, many foils that work with traditional foil fusing do not work with the HSFF™ process. In spite of the special characteristics of HSFF™ foil, a wide selection of metallic colours, pigments (including white), metallic glitters, metallic and transparent holographic patterns, and even security foils are available for HSFF™.

An interesting side note on HSFF™ foils is that these foils CAN be used with metal dies to apply foil over solid toner backgrounds. This is a hybrid process combining a traditional die with HSFF™ foils.

Thermal Transfer Plate (TTP)

HSFF™, like traditional foil stamping with metal dies, requires heat and pressure to create a foil image. With traditional foil stamping, the image area is defined by the metal die. Using the HSFF™ process, no die is required and a toner image defines where the foil will be applied.

The Thermal Transfer Plate (TTP) is the surface used to apply heat to the foil, toner and paper. This plate is approximately 6.35mm thick and replaces the die on the chase. TTP material is a composite with a metal backer with a high temperature, compressible, synthetic coating facing the foil/paper. Thermal Transfer Plates can be purchased to match customer's image area requirements. To maximize HSFF™ production, we recommend that the TTP be mounted on a chase configured with mounting holes. Honeycomb style chases are NOT recommended for HSFF due to the lower heat density/transfer through this type of chase.

The TTP thickness and mounting method allows most foil stamping presses to easily switch between traditional foil stamping, with metal dies, and HSFF, without dies, in just a few minutes.

The TTP has several important characteristics required for successfully using the HSFF™ process on the widest range of stocks at the highest speed with the longest durability.

Bottom Makeready Material (BMM)

The most confusing issue with HSFF™ is that even though the TTP and foil may cover many different toner image areas on a sheet, the HSFF™ process allows foil to be selectively applied to certain image areas without affecting the surrounding toner image areas.

The solution to selectively fusing foil is a simple make ready procedure and the use of Bottom Make ready Material (BMM) which allows localised pressure to be applied to the paper and foil against the TTP.

By cutting and applying the self adhesive BMM to align only with the toner image areas where foil is to be fused, pressure can be selectively applied to these image areas.

Preparing a HSFF™ make ready is very easy and can usually be completed in a few minutes. We recommend that HSFF™ make ready be mounted on Acetate, as this allows a make ready to be used over and over again. Pre-configured acetate make ready sheets can be mounted on the press with masking tape in less than a minute.

Thermal Insulating Material (TIM)

Under certain circumstances, HSFF™ foil may adhere to toner outside the areas defined by the BMM. This can be caused by various factors including paper flexing during the HSFF™ impression cycle or if toner image areas are very close to where foil is being fused. Thermal Insulating Material (TIM) is a thin, self adhesive, high temperature insulation that can be cut with scissors and applied to the Thermal Transfer Plate to stop foil from fusing to toner outside the areas defined by the HSFF™ make ready.

In many applications, such as greeting card personalization, Thermal Insulating Material is not needed.

What is ThermoFusing™?

The HSFF™ process can also be used to create a spot varnish effect on toner image areas. This process is called "ThermoFusing™" and is also known as toner glossing or post fusing. When ThermoFusing™ toner image areas, a special fusing film is used to keep toner from offsetting to the Thermal Transfer Plate during the fusing process. In addition to glossing the toner image area, ThermoFusing™ also improves toner adhesion and durability.

High Speed Foil Fusing (HSFF) - 3



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What is ThermoEmbossing™?

While HSFF™ is normally used to produce a flat foil image, a process called ThermoEmbossing™ has been developed by THERM-O-TYPE that allows a foil embossed image to be created without dies. At this time, the Kodak NexPress is the only printer that can apply the toner lay down required for this process.

To create a ThermoEmbossed™ image, background (flat foil) and foreground (embossed) layers must be created in pre-press. The background layer is designated to print as a 75% black toner image. The foreground layer is designated to print as a “rich black” (with or without Kodak’s “Clear Dimensional DryInk”) toner image. Background and foreground toner is applied to the sheet in a single pass through the NexPress. When foil is fused to the background and foreground toner, the “rich black” areas appear embossed.

Are there special considerations while using the HSFF™ process?

There must always be some gap between toner image areas when one image area is to be foil fused and the adjacent image area is not. This gap will vary depending on the registration accuracy of the printer applying the toner to the sheet. It is important to understand the capabilities of your laser printer when foil fusing select toner image areas on a sheet.

An air blast foil separation system is recommended for HSFF™. Fusing foils do not come in different release formulations. In spite of this fact, solid areas and fine line type can usually be foil fused with excellent quality provided temperature, impression pressure, foil tension and air blast controls are adjusted correctly.

While the HSFF™ process dramatically increases the range of papers that can be foil fused, there are still some restriction, mainly due to incompatible coatings on certain papers. Paper surface finish, which is a huge issue with heated roller fusers, is not an issue when using the HSFF™ process. In fact, papers with very deep textures can be foil fused with the HSFF™ process, provided the laser printer can apply toner within the textured surface.

As with heated roller foil fusing, HSFF™ is NOT compatible with all toners. Customers who wish to see if their printers are compatible with the HSFF™ process can send sample sheets to Caslon Limited for testing.

Using a foil press that can support multiple foil rolls, it is possible to combine HSFF™ and ThermoFusing™ in a single press pass. One application for this capability would be to foil fuse one panel of a greeting card verse insert while ThermoFusing™ a full colour toner graphic on the opposite panel.

Another multiple foil roll application can include fusing transparent holographic foil over a full colour toner image while fusing one or more metallic coloured foils to other toner image areas on the sheet. This is a format which has been demonstrated to produce graduation announcements with three foils fused to different image areas in one press pass.

The utility of the HSFF™ is normally based on product quantity. It is obvious that the cost of a metal die, and the ability to run faster on a NSF press, would negate the advantages of the HSFF™ process as quantities increase. However, small quantity orders are currently a strong growth market and this is where the HSFF™ process excels. Imagine personalizing a thousand invitations, with a different name on each (variable data), and then running these through the HSFF™ process, at up to 4,000 iph with foil fused to each personalized invitation.

Because HSFF™ does NOT use a metal die, any texture in the paper will NOT be crushed flat by the foil fusing process. As a result, the texture of the paper will show through the foil. This HSFF™ characteristic allows some unique visual effects to be created.

Are there additional benefits of HSFF™, ThermoFusing™ and ThermoEmbossing™?

High Speed Foil Fusing™ and ThermoEmbossing™ processes enhance and encapsulate toner in foil. These processes also provide significant protection to the toner image. Even the ThermoFusing™ process, which does NOT deposit a coating over the toner, enhances and improves the durability of the toner during the “post fusing” process.

As with any other printing process, high speed foil fusing is not a perfect solution for all situations. However, HSFF™ offers a completely new set of capabilities that have obvious applications in most foil stamping markets. Graduation name cards, announcements and invitations, business cards, and greeting card personalization are just a few examples of applications that can benefit from the high speed foil fusing process. For additional information on the HSFF™ process, make ready material, set up procedures, fusing foils and films contact Caslon direct using the information on this website.

Patent claims have been submitted by THERM-O-TYPE to the United States Patent Office covering the High Speed Foil Fusing™ and ThermoEmbossing™ technologies.