Where did Foil Indexing come from?

Written by Michael B. King – President & CEO of Graphics Art System, Inc,

As the term "Foil indexing" is being abused through-out the industry, I thought it would be useful to put it back in the real world perspective so that the industry can base their decision on something else than salesmen hype and avoid costly mistakes.

As the designer / inventor of all Eagle System Foil Machines, I started at the early age of 15 years old, working for my father's company building a hot foil puller called Brighten Leaf Pullers which were attached to small automatic die cutting presses and clam shells. Within a couple of years I realized there was a need for a large format foil solution so I created the first electronic foil indexer called the BOA System. This new technology was most effective in creating actual foil savings with a resolution in indexing of +/- 1/8 of an inch. In 1990 I created the Eagle Systems Hot Foil indexer with high resolution +/- .002 thousandths of an inch creating the most extreme results in foil savings. In 2007 I started developing and created the Eco-Eagle Cold Foil System an in-line foiling solution for offset printing presses. The following is a partial summary of where the term "indexing" came from.

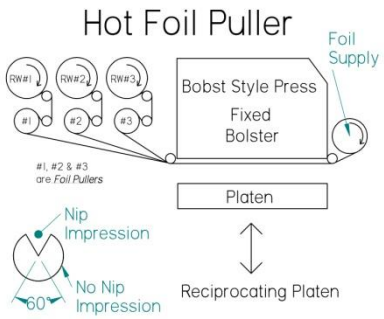

Figure 1

In the early years of hot foil stamping the machines in the market place were called ***foil pullers (figure 1)***. They were exactly that. The foil was on a supply roll on one end of the stamping area and on the other end was a mechanical device that had rollers which the foil wrapped around and literally pulled the foil through the machine. It worked but applied a lot of stress to the carrier and was not controllable. Foil pulls were not accurate, foil sticking to the substrate would have a lot to do with accuracy of pull. If supply was too tight then foil would be damaged on carrier. It worked but at a very slow speed. The choice was, one size pull every cycle, then later with newer mechanical foil pullers, a step and repeat in a mechanical world. We learned at an early stage the stress on hot foil carrier would not be conducive to a good quality stamped product.

In late 1977, I introduced the first electronic foil indexing machine on a Bobst press. This system was made of dc motors and vacuum clutches driving an ***index roller (figure 2)*** which had the supply inches away from the roller. The foil would then wrap around the head of the press in the opposite direction of the paper direction

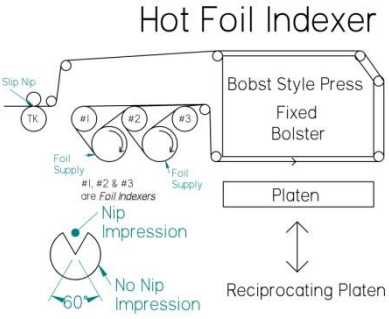

Figure 2

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and then be slightly pulled by a light nip on a continuous running roller called a take up roller (TK). This system then and still today allows step and repeat of any combination of sizes. Example: 2" 10 times and then 20" clear pull. The sky is the limit on flexibility of foil savings but speed still held back by several other scenarios. The heat transfer process, substrate bonding, size area allowed, and mechanical process of registration limitations. The list is long, but today we are very close to limits in hot foil process speeds.

If you look at both hot foil diagrams, you will see nip Impression equals 60 degrees which is approximate with various machines. As you can see, because of this area we have time to make the move with foil. The mechanical restraint is you have .7 seconds to make the foil move at 3600sph. While it seems fast as it is less than a second, it is quite a bit of time to make the move. At and double the speed of 7200 SPH we are doing the same move at .35 seconds. That's getting tight but still doable. Looking at the hot foil process the press is off impression a greater percentage. Indexing came from the hot foil world over 30 years ago. **Indexing is a hot foil term!**

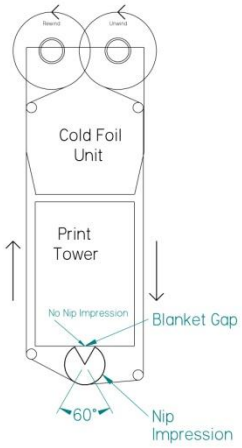

Figure 3

Cold Foil indexing should really be called **blanket gap savings**. After extreme testing and trials of cold foil blanket gap savings, the time allowed by impression on / Nip does not allow for a viable solution to saving the foil waste in the gap. If you see by both hot and **cold foil diagram (figure 3),** the differences between the time to make the move on cold foil is totally opposite and extremely small window of opportunity.

Example: The time off nip is: .3 seconds at 3600sph.
.15 seconds at 7200sph
.075 seconds at 10,800sph

The average cold foil production speeds today are around 11,000sph, However cold foil can be run easily at speeds a lot higher. The hold back on most jobs is the regular everyday variables not related to cold foil.

It must be noted here that Cold Foil is performed on a sheet fed offset press and it is running continuously, not intermittently as in hot foil. What we called the "time to make the move" above is actually the time available to stop the foil movement that is otherwise running continuously with the press.

This time does not allow the possibility of making the stop without stretching the carrier. Stretching the carrier will then disturb the foil particles that are bound together when made. Exaggerate the thought in your mind, by thinking of a piece of plastic wrap coated with a layer of paint. After it is fully dry, stretch it and you will be able to see through the plastic wrap and through the paint. You will also see the separation of the paint you are trying to transfer. The damaging effect will only allow the possibility of saving foil on gap at a very slow speed. Mechanically the foil carrier can be moved at these speeds but the quality of your results on your products will be quite inferior. Extreme pin holing which you are now creating by stretching and sheet lead edge piling and swirling will occur. If you look closely at the variables the true savings is in narrow web and running at speed. Even after doing the math you will see narrow web is more cost effective.

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Example: Based on a job length of 10,000 sheets

A typical job example:

- Paper cost $1500
- Ink cost $250
- Foil cost $2800
- Adhesive cost $200
- Press time cost $650

total $5400

Indexing (blanket gap) savings

- Foil savings (15%) -420
- Plus cost for reduced speed (10'000sph i.o 12'000sph) +100
- Plus cost for additional setup (additional 30') +250
- Plus cost for additional waste (additional 3%) +150

+$80 = Negative savings!

Indexing (step and repeat within the format) savings

- Foil savings (30%) -840
- Plus cost for reduced speed (6'000sph i.o 12'000sph) +400
- Plus cost for additional setup (additional 45') +380
- Plus cost for additional tooling (blanket) +100
- Plus cost for additional waste (additional 5%) +250

+$290 =Negative savings!

Savings using narrow web

- Savings with narrow web (i.e. 30%) -1500
- No reduction of speed 0
- No additional setup time 0
- No additional waste 0
- No additional tools 0

-$1500 +real savings!

The damaging effect to your process is increased production stops, annoyance of foil dust, inferior product, production waste and longer make readies! Touching the live side of the foil is also a damaging effect as well as dancers that continuously create bending the foil back and forth.

The most cost effective way of saving money in foil, hot or cold is in the layouts of the process. Optimizing the layouts allow highest of production speeds and contribute to product quality.

Any questions please feel free to ask mikeking@graphicartsystem.com.

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