Coil Feeding vs. Blank Feeding Comparison
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The following is intended to provide a list of comparison items between two different methods of processing material through a transfer press or tandem press line operation - coil feeding and blank feeding. The technical and operational comparisons will be based on processing a similar part by both methods. This part is a sheetmetal stamping that requires a flat piece stock that is 36" wide x 24" long x .050" thick. In the coil feeding operations a progression of this material must be presented to the first operation. In the blank feeding operations a loose cut blank must be presented to the first operation. The coil feeding scenario will be based on a maximized coil size of 72" O.D. that contains a specific lineal footage of material. The blank feeding scenario will be based a optimized number of pallets of flat blanks that would contain an equal number of pieces as the coil.

Material Requirements:

Coil Material	Blank Material
- 72" OD x 23" ID	- 36" x 24" Area
- 36,000# Coil Weight	- 3,600# Stack Weight
- .050" Thickness	- .050" Thickness
- 6,000 Feet / Coil	- 15" Stack Height
- 3,000 Pieces / Coil	- 300 Pieces / Stack

Annual Usage:
There is no "typical" production volume for a sheetmetal stamping. Annual volume can vary from a few hundred pieces for "short-run" type stampers to millions of pieces for "high-volume" type stampers. For the purpose of this comparison an annual volume of 150,000 - 300,000 pieces will be used. Coil material would require approximately 50 - 100 coils to be purchased from the material supplier. Blank material would require approximately 500 - 1000 stacks to be purchased. The coil material method provides a 10x factor of less purchasing, receiving, tagging, and handling of "raw" materials.

Material Costs:
As a rule of thumb, coiled cold rolled steel (CRS) can be purchased for approximately $27 per hundred pounds of material (CWT), and blanked cold rolled steel (CRS) can be purchased for approximately $30 per hundred pounds of material (CWT). In the case of the blanked material the stamper is paying for the "value added" for the steel service center to blank, stack, band, store, and ship the material. This $3/cwt cost difference adds up to approximately a $108,000 difference based on the annual volume of 300,000 pieces. The cost savings associated with directly processing coiled material into the press can add up to hundreds of thousands of dollars per year.

Operations:
The process of cutting the blank to length or developing its shape is an additional operation in the stamped part development process. This operation comes at a measurable cost. As shown above, it can be reflected in the cost to purchase the "raw" material. If the "raw" material is in the form of a blank it will cost the stamper approximately 10% more than if the material were in the form of coil steel. To offset these cost premiums many stampers have "in-house" capabilities to make blanks. This comes at a cost as well. There are initial capital costs for the cut-to-length (CTL) or blanking equipment, direct labor costs, overhead costs, and operation costs. If the "raw" material for the stamper is in the form of coiled stock it will reduce the number of operations required for the stamper to make the part. This provides benefits such as lower tooling costs, lower per piece costs, improved payback on capital equipment investment, and reducing the "cycle time" required to flow materials and parts through the manufacturing operation.

Tooling Design and Cost:
The cost of tooling is a critical variable to the overall cost to produce for many metalstamper's. In addition, many stampers are under extreme pressure to reduce tooling costs. Direct coil feeding provides the benefit of reduced tooling design and cost. Many metalstampers currently produce directly from coil utilizing "cut-off and draw" tooling in the first operation. Depending on the part design these can be complex tools that require higher initial costs and ongoing maintenance due to the multiple operations being performed. Stampers that choose to process a pre-cut blank in the first operation must typically design and build a blanking die that can cost up to $50,000. The tooling costs for a quantity of blanking dies for a new program can be extremely high.

Work in Process:
Blank processing can present considerable WIP costs and constraints to the manufacturing operation versus coil stock processing. If the blanks are purchased, the stamper must release orders and maintain inventory to support the mix and volume of production required for a given transfer press workcenter. One week's production volume of the example part is 6,520 pieces. The WIP for this time period is 21 stacks of blanks. If the blanks are stacked in a "two-high" configuration this WIP will require approximately 66 square feet of floorspace for storage. Coil processing also results in certain WIP costs and consideration. The same one week's production volume will require 2 coils of steel. These coils will occupy approximately 36 square feet of floorspace for WIP storage or 50% less floorspace than the blanks. The blank feeding method also requires additional WIP handling to store the stacks until demanded at the stamping press. From the Receiving Area or Blanking Workcenter the blank stacks must be moved to a designated WIP Area. Once demanded at the transfer press the blank stacks must be moved again. Multiple handling of the same materials adds indirect costs to the final parts and often results in increased requirements for hilo's and operators within the plant.

Dunnage:
Blank stacks are typically maintained on some type of wood dunnage or material pallet. Some manufacturers utilize rough sawn 4x4 wood skids banded to the stack that are discarded after some use. Others use structural fabricated metal pallets that are continually used in the material handling process. Either method requires handling of some dunnage for the blank stacking and destacking process. In the case of wood dunnage the stacks must often be removed from the 4x4's or skid prior to entry into an automated destacking machine. The process of cutting the stack banding and handling a loose stack of blanks can present a safety hazard to the plant operations. Workcell productivity can suffer while the press waits for stacks to be accurately and safely loaded. Fabricated pallets offer a benefit of improved handling of the blank stacks. Many versions of fabricated pallets offer adjustable locating pins to suit the exact blank dimensions and these pallets can be loaded directly into automated destacking machines. The trade off of this method is the high initial investment cost and ongoing maintenance cost associated with the fabricated pallets. Again, the additional handling requirements and investment costs of blank processing are avoided by the direct coil feeding system.

Quality Control:
Directly processing coil stock into the press where the stamping operation is performed improves the stampers quality control potential. To process blanks the coil strip must be unwound, straightened, cut, and stacked by the cut-to-length (CTL) equipment. The stacks are then maintained as WIP. The blanks must then be loaded, destacked, and fed into the press performing the stamping operation. The potential for damage to the blank surface or edges is increased by the redundant stacking and destacking processes. The blanks are also subject to the plant ambient conditions for the time kept as WIP. Dirt and oils on the blanks can prohibit efficient destacking. To solve these problems the coil material can be delivered on a JIT basis to the press workcenter. It is then unwound, straightened, and fed directly into the tooling. Exposure to

redundant handling and potential damage is minimized. Not only does the material quality improve with direct coil feeding, but the press tooling can also benefit. By eliminating potential for dirts, oils, and foreign materials from being introduced, tool life can be extended and the quality of parts produced is improved. Another measure of improved quality control is in the part itself. Today's critical stamping operations demand the right combination of material composition, die conditions, press and handling operations. As a stamper experiences part shape, dimensional, or structural problems decisions must be made as to the source of the problem. If the parts are processed from pre-cut blanks, there is potential for thousands of pounds of compromised WIP throughout many locations in the manufacturing operation. If the parts are processed directly from coil material, the potentially compromised material is usually located in the coil storage area.

Flatness Control:
A specified blank flatness tolerance must often be maintained for most automated destacking machines to work efficiently. The blank flatness is established by the leveler or straightener in the cut-to-length (CTL) equipment. This equipment is often in a different plant location or in the case of purchased blanks in a different company. Out of tolerance flatness can go unnoticed until problems are encountered at the destacking process. Production efficiencies are compromised and WIP can contain substantial volumes of bad stock. Again, the direct coil feeding eliminates this potential pitfall. The material flatness required to feed the material is established directly at the press at the same time as the stamping process is being performed. Any adjustments required to maintain targeted flatness can be made immediately without any disruption to the stamping operation.

Material Handling:
As shown by the example part and material, a coil of steel can contain 10-20 times more material and pieces than a stack of blanks. Once the coil is loaded and threaded through the coil processing equipment the material handling is complete for an extended period of production running. At an average production rate of 20 SPM the above mentioned example coil will run for approximately 2.5 hours. The production operator can now focus on the press, tooling, scrap, and other factors to keep the ram going up and down. This provides the stamper with the potential for a very productive workcenter. By contrast, to maintain continuous production with stacks of blanks, a new stack must be loaded every 15 minutes. While most destackers are provided with certain "continuous run" features, each stack must be properly located, bands must be cut, dunnage must be handled, and the machine must be properly set-up. This increased material handling requires increased attention from the operator, set-up personnel, hilo drivers and crane operators for non-value added operations.

Production Efficiency:
The production efficiency of the transfer press is dependent on the capability and efficiency of the auxiliary devices to move material into, through, and out of the press. Coil feeding equipment as compared to destacking equipment often offers a simpler solution and the potential for improved production efficiencies. This point is demonstrated very simply in the Material Handling section of this comparison. The process and equipment required to unwind, thread, straighten, and feed coil stock are proven and accepted technologies. Most pressroom set-up and operations personnel have high comfort levels with this equipment. The process and equipment required to handle unbanded stacks of blanks, spread the blanks, destack the blanks, and feed the blanks is often complex and less user-friendly to the pressroom operator. Process problems such as poor toleranced stacks, mis-aligned stacks, double blanks, and rejected blanks can adversely impact the machine's production efficiency. All other variables common, at the end of each shift the coil-fed transfer press will produce a greater number of hits than the blank-fed transfer press.

Blank Shapes:
The traditional benefit of the destacker and blank feeding method is the ability to process a wide variety of blank shapes in the same machine. A destacker can be designed to process square, trapezoid, parallel, and developed shaped blanks. Machine design complexity often increases as these capabilities are integrated into the same machine, but the stamper is provided with production capacity and flexibility to process blank

shapes that optimize both die design and material usage. Traditional coil feeding systems have been limited to feeding the strip into "cut-off" tools under the ram or "cut-off and draw" tools under the ram. The drawbacks to these methods are that additional tooling is required and valuable space "under the ram" is used for the cut-off process. Integrated coil feeding and cut-to-length (CTL) lines can provide the capability to feed square cut blanks into the first station of the press. This method eliminates the need for cut-off operations to be performed "under the ram". Unfortunately, neither of these direct coil feeding methods provide the potential material savings of trapezoid, parallel, and developed shape blanks.

Integrated Technology:

In a transfer press workcenter, the fundamental requirement of the upstream material handling equipment is to present material at a rate and with the precision required to optimize all downstream operations. Recent machine developments have integrated the production benefits of coil processing and material utilization benefits of blank feeding. This combination of equipment utilizes the inherent benefits of both methods to provide optimum production efficiency and flexibility for transfer press operations. Conventional coil processing equipment has now been combined with the cut-to-length and material handling equipment to process a wide variety of blank types and shapes. This new type of "Direct Coil Feeding" system is capable of processing square cut, parallel cut, and trapezoid cut blanks into the first station of the transfer press. The end user benefits from the long list of cost savings, production efficiency, and quality improvements as well as the potential material savings associated with parallel cut and trapezoid cut blanks. With consideration of all process variables listed in this comparison **20%-30%** production savings can be realized.