ERGONOMIC Safety Data Sheet
From the Pulp and Paper Health and Safety Association (PPHSA)

Rotary Die Cutter/Press

General Data

Staffing:	Usually 2-4 workers per crew (1 operator, 1 assistant, 1 material handler)
Shift length:	8 or 12 hours
Breaks:	1 lunch and/or dinner, 2 or 3 10-minute coffee breaks
Issues:	Neck, shoulder and low back strains, hand and arm discomfort

Tasks Descriptions

Operator's primary tasks

- set up in-feed table for correct box size
- set up / install print dies
- check to ensure that the steel die is installed correctly
- adjust box scores and rotary knives
- adjust feed rollers / guides for box size
- perform quality checks and troubleshoot jam-ups
- unload / stack completed boxes
- enter data into computer system

Assistant's primary tasks

- install steel dies
- feeding flat boxes into machine
- flush and clean ink system, bring and set-up new pails of ink
- clean up around rotary die cutter / press
- on occasion assist with operator tasks

Material Handler's primary tasks (may be present)

- unload / stack completed boxes
- move stacks of flat boxes to the in-feed end of the machine
- remove full units of completed boxes

Note: the Assistant may perform or assist with Operator's tasks.

The application of ergonomic principles in the workplace is essential to the prevention of work-related musculoskeletal disorders—MSDs

Identified Risk Factors for Musculoskeletal Disorders

The key risk factors for work-related musculoskeletal disorders that are associated with the tasks performed at a rotary die cutter / press are documented in the following pages. (1)

References

(1) – based on observations of more than 6 different rotary die cutters / presses in more than four different work locations

(2) – unpowered roller conveyors may be used to deliver pallets / stacks of flat boxes to rotary die cutter / press which require forceful pushes

(3) – processed boxes are stacked into shipping units or put into shipping boxes, some boxes are strapped in small lots before being stacked

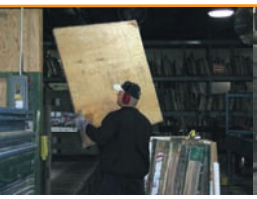
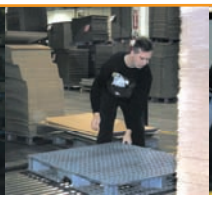
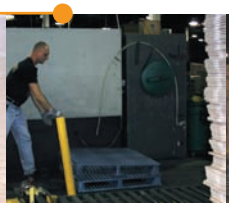
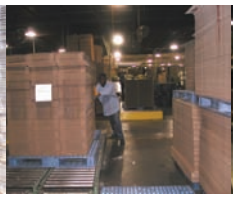
(4) – flat boxes can be delivered to the rotary die cutter / press on wood/plastic pallets. Wood boards may be lifted / placed on top of stacked boxes

Rotary Die Cutter/Press

Risk Factor 1: Lifting, pulling and Handling of Wooden and Plastic Pallets / Wood Boards (2,4)

Handling of wooden and plastic pallets at the rotary die cutter / press may place the worker at a significantly increased risk of injury. Factors that may increase the risk of injury include:

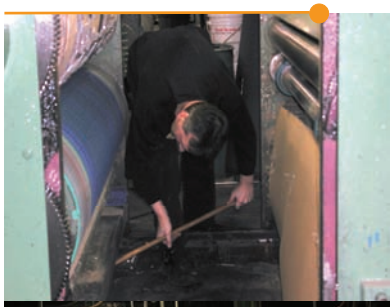
- weight of pallet (20 – 38 kg)
- height / location of pallet when put down
- frequency of pallet handling
- height / location of pallet when first lifted
- method used to handle pallet
- state of repair of pallet


Risk Factor 2: Awkward postures of back, neck and arms when making machine adjustments, cleaning, and performing other tasks

Workers must adopt awkward postures when making the many and various adjustments to the rotary die cutter / press. The design of the cutter typically requires the worker to bend at the waist, twist, and reach out to adjust rollers, guides, scorers, rotary knives, etc. Workers do not usually hold these postures for a significant duration. The frequency that workers adopt these postures will depend on the product mix being processed and the make, model and year of the rotary die cutter / press. Factors that may increase the risk of injury include:

- duration of time awkward postures are held
- frequency of adopting awkward postures
- number of extreme postures adopted
- accessibility to adjustment areas (machine design)




Risk Factor 3: Pushing / pulling of pallets / stacks of boxes on roller conveyors

Pallets of sheets may be delivered to the rotary die cutter / press via roller conveyors or pallet jacks. If the conveyors or pallet jacks are not powered, then the worker must manually push the pallets into position for feeding the machine. Some newer rotary die cutters / press have systems for automatically stacking the processed boxes. With these machines the worker may have to manually pull/push the full pallet of processed boxes from the machine to a storage area. Factors that may increase the risk of injury include:

- force required to push/pull pallets (10 – 35 kg)
- condition of roller conveyor or pallet-jack
- method used when pushing/pulling the pallet
- frequency of pushing/pulling

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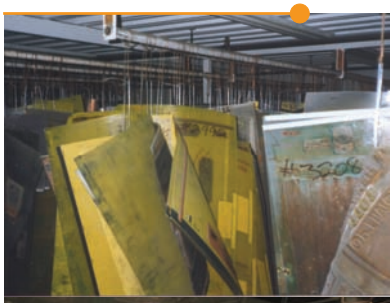
Risk Factor 4: Mounting / cleaning of rubber print dies



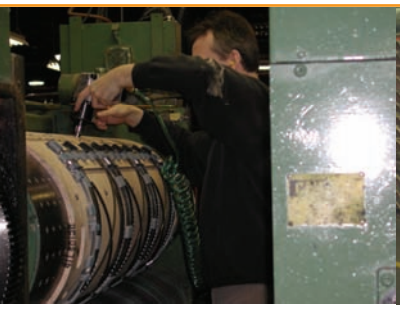
Rubber dies are installed onto the rotary die cutter / press. A press may be a one, two or three colour press and each colour requires a different section of a die (one three part die or a three colour press). Some rubber dies are very heavy and may be carried from a storage area to the press. Putting the die on the machine may require awkward postures of the hands, wrists and shoulders. Factors that may increase the risk of injury include:

- weight of the rubber print dies (4 – 20 kg)
- height / location of print die storage
- frequency of print die changes
- height of the print die rollers on the press
- work method used to install print dies

Risk Factor 5: Mounting / installing steel dies

Steel cutting dies, mounted on curved wood surfaces, are placed onto the cutting rollers of the rotary die cutter. Some of these dies are very heavy and require more than one person to handle them. These dies are often stored in high storage racks. Dies must be pulled from the storage racks and may be carried to the cutter. Installing the steel dies may involve some forceful exertions and awkward postures of the hands, wrists, and shoulders. Factors that may increase the risk of injury include:

- weight of steel dies (5 – 25 kg)
- design / access to the die storage racks / area
- frequency of steel die changes
- height of the steel die rollers on the press
- work method used to install steel dies



Risk Factor 6: Manual handling of processed boxes (3)

Workers are often required to manually handle boxes that have been processed through the rotary die cutter / press. Typically, boxes are stacked up in to short piles when they leave the press. Workers will then grasp and move a pile of boxes from the out-feed end of the machine / or an out-feed conveyor, and stack them up onto a conveyor / pallet to form a shipping unit. The size and weight of the pile of boxes being lifted will vary depending on the product being produced. The height and width of the stack of boxes in the shipping unit will also vary by product. Factors that may increase the risk of injury include:

- weight of boxes
- number of boxes in a pile
- height of boxes when picked up
- height of bottom of shipping unit
- height of top of shipping unit
- method used to handle boxes
- frequency of handling

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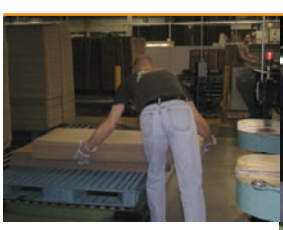
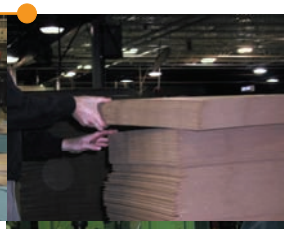
Risk Factor 7: Manual feeding of rotary die cutter / press





Many rotary die cutters / presses require workers to manually feed flat boxes into the in-feed of the machine. Workers will grasp a stack of flat boxes from the pile on the in-feed pallet, turn with the boxes to face the in-feed of the machine, and then place the stack of boxes into the feeder (onto boxes that are already in the feeder). Factors that may increase the risk of injury include:

- weight of flat boxes
- number of flat boxes grasped and type / width of grasp
- height of boxes when lifted
- height of boxes in feeder
- method used to move sheets
- frequency of handling

Risk Factor 8: Manual handling of ink pails

Rotary die cutters / presses require ink pails to be moved from the ink storage area to the press.
The pails weight ~18 kg when full. Factors that may increase the risk of injury include:

- weight of the ink pail
- height of the pail when lifted
- design of the ink storage
- distance the pail has to be carried
- frequency of handling
- method used to move sheets

Recommendations

Recommendation 1:
Lifting and Handling of wooden and plastic pallets / wood boards
Consider the following to keep manual handling of wooden / plastic pallets to a minimum:

- Use a pallet stacker / dispenser to store and dispense pallets when needed
- Use a pallet jack to move pallets to work areas
- Keep height of stacks of pallets to less than 1m in height
- If pallets must be lifted use two workers to lift pallets
- Slide, push, and tip pallets up onto raised conveyors or platforms

Recommendation 2:
Improve work postures required to make machine adjustments
Consider the following to improve work postures when adjustments are being made on the machine:

- Extend levers, knobs, etc. so that workers do not have to reach so far to make adjustments
- Use larger hand wheels, knobs, etc. to reduce forces
- Install steps, platforms, and railings to allow workers to more easily get up onto / into / over the machine where adjustments need to be made
- Provide tools with extensions to reduce the need for awkward postures and/or reduce the amount of time an awkward posture must be held.
- Ensure that adequate space if allowed for workers to access areas that need adjustment without having to adopt awkward postures
- Look for ways to raise the height of low level adjustments

Recommendation 3:
Reduce forces associated with pushing/pulling pallets of sheets
Consider the following to reduce the strain on workers when pulling/pushing pallets of sheets:

- Provide motorized pallet jacks for use when moving pallets of sheets into or from the press
- Ensure that pallet jack wheels are kept in good condition (not cracked, well greased, etc.)
- Ensure that workers are not required to push the pallet jack up and over ridges, bumps
- Keep the floor area where a pallet jack is used free from bumps, holes and cracks
- Use powered roller conveyors that are well designed and capable of easily moving the stacks of sheets

Recommendation 4:
Reduce strain related to mounting / cleaning rubber print dies
Consider the following to reduce strain related to mounting / cleaning rubber print dies:

- Hang print dies at the lowest height possible
- Hang sections of print dies together but separately so workers can pick up one section at a time
- Consider designing print dies with 'handles' to make them easier to lift
- Store print dies as close to the press as practical
- Use carts to transfer print dies from the storage area to the press
- Use steps / platforms to allow the worker to work in a better posture cleaning / mounting the print die

Recommendation 5:
Reduce strain related to mounting steel dies
Consider the following to reduce strain related to mounting steel dies:

- Redesign steel die storage areas to eliminate any lifting below knee or above knee height
- Ensure that two piece dies are stored on separate racks to reduce the risk of one die falling off the other when the die is being moved / removed from storage
- Use well designed carts to move steel dies from the storage area to the press
- Ensure that carts are designed to eliminate dies falling off the cart while in transit

Recommendations cont'd

Recommendation 6:
Improve work postures for workers unloading boxes from the cutter / press
Consider the following to improve work postures for workers who manually unload the press:

- Use an adjustable height lift to raise / lower conveyor / pallet in unit building station
- Insert lift table into floor to allow worker to keep all lifts below shoulder height
- Train workers to keep lifts below shoulder and above knee height
- Install a load former to eliminate the need to lift and handle processed boxes
- Educate workers about risks to the lower back related to material handling and twisting

Recommendation 7:
Improve work postures for workers feeding the cutter / press
Consider the following to improve work postures for workers who manually feed the press:

- Use an adjustable height pallet lift to raise / lower pallet when loading with sheets
- Inset pallet lift table into floor to allow worker to keep all lifts below shoulder height
- Train workers to keep lifts below shoulder and above knee height
- Place loading station/pallet 1m from press out-feed area to force workers to turn and step
- Educate workers about risks to the low back related to material handling and twisting

Recommendation 8:
Reduce grip width when handling sheets
Consider the following to reduce the strain on workers forearms when handling sheets:

- Educate workers about the extra risk / strain associated with using a wide pinch grasp
- Encourage workers to handle a smaller number of sheets at one time
- Use automatic sheet feeders to eliminate manual feeding of press

Recommendation 9:
Reduce risk to workers from handling ink pails
Consider the following to reduce the strain on workers from handling ink pails:

- Redesign ink pail storage areas to keep the top of the ink pails above knee and below shoulder height
- Consider raising the bottom ink storage shelf 30 cm off the floor
- Use carts / wagons to move ink pails from the storage area to the press
- Store ink pails as close as practical to the press
- Consider the possibility of using larger pails of ink that are moved to the press by pallet jack or lift truck (for high frequency / high number orders)

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