	NORTH CAROLINA DEPARTMENT OF LABOR	No. 27-2
	OSH DIVISION	Date: 10/2009
	OSHNC INDUSTRIAL DATA REPORT	Pages: 5

Industry: **Printing**	Sub-Group: **Commercial Printing**
SIC: **2721, 2731, 2732, 2741, 2752, 2754, 2759 and 2761**	NAICS: **323110, 323111, 323112, 323114, 323116 and 323117**

PROCESS DESCRIPTION: Commercial printing is a broad term that describes the work of specialists whose business is to produce books, stationery, or any of many printed products. Some printers do a variety of work and are known as commercial job printers. There are four basic stages in printing: 1) Layout or design for the intended use; 2) Prepress – stage in which negatives and plates are made; 3) Press work—type is inked and printed on paper; 4) Bindery – printed sheets are folded, fastened, cut, counted, packaged or otherwise processed. The most common printing processes used in commercial printing are letter press, the oldest printing process, and offset lithography (usually shortened to offset printing).

Letterpress produces a printed image from a raised or relief surface which receives ink and then transfers it under pressure to paper. The type for letterpress print is cast, a cellulose fiber mat is made from the typed form and is used to make a mold for the printing plate which is cast from hot lead.

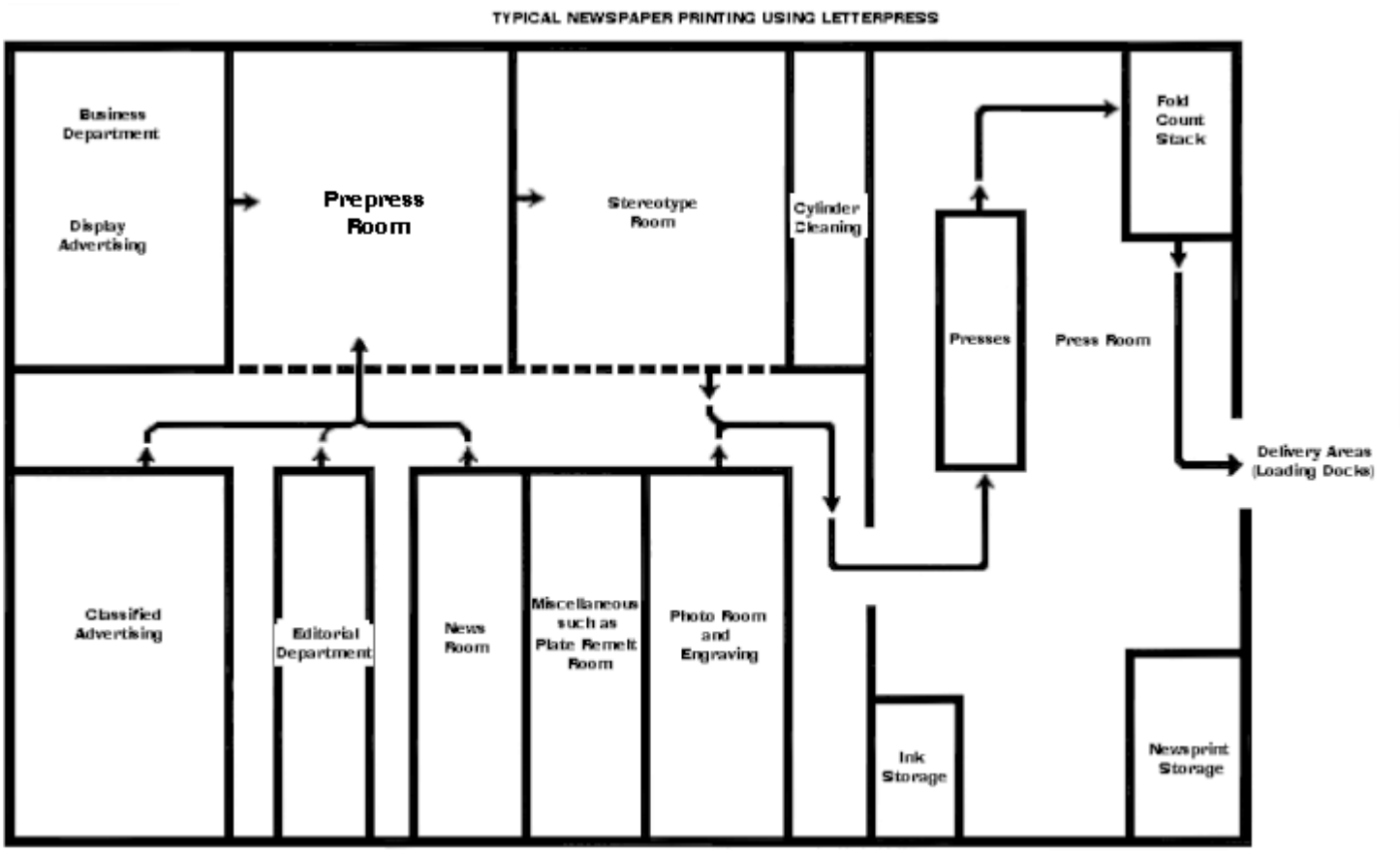
In commercial lithographic printing, the printing ink image is transferred or offset from a rubber blanket on which the image has been deposited by the printing plate. All printing plates in commercial lithographic printing are made photographically and as a result the process is known as photo-offset lithography. This process has grown considerable in the past 40 years and now comprises ⅓ to ½ of all printing. Offset printing presses have three printing cylinders and two sets of rollers. The printing plate is clamped to the top of the cylinder and as it rotates the plate passes first under the dampening rollers, then inking rollers. The dampeners wet the plate so the non-image area will repel ink. The inked plate then prints on the rubber blanket of the second cylinder. Typical products include advertising brochures, illustrated books, color printing and business forms. Offset printing can be recognized by the smooth, slightly dull print, lack of any impression or ring of ink.

Commercial printing also involves other graphic arts processes such as engraving, embossing and duplicating. Engraving is used in fine stationery, business and calling cards, formal announcements, stamps and paper money. Most engraving today utilizes a pantographic engraver which etches the desired pattern into a ¼” steel plate coated with asphaltum. After etching, the plate is run on a die-stamping press using a 3” x 8” plate. The entire plate is inked with a roller and the ink is wiped from the surface by paper from a roll, advancing after each wiping. The sheets are then either dried for several hours or quick heated and stacked. Embossing is also done on a die-stamping press in which the design stands up in high relief. The die is carved, etched or machined. Engraved printed products are often embossed, as are covers for brochures and books. Duplicating uses simplified techniques to reproduce letters, forms instructional materials, working drawings and similar printed work. Direct image plates (masters) are used in duplicating processes. These “masters” are usually prepared by typing, drawing or printing directly on the masters.

Platemaking in commercial printing refers to producing any original or duplicate surface for printing an image. Examples of platemaking are: rubber plates or stamps, photoengraving, offset plates, hand-cut blocks and duplicating masters.

Another facet of commercial printing is bindery work. Simple bindery is done by most printers and reproduction departments. This includes such processes as folding, punching or drilling holes, gathering sheets in order, making pads, trimming, stapling or stitching and many other hand operations. Some bindery work is also done by machine. Other types of bindery work include bookbinding and edition binding which is a specialized operation usually performed in trade binderies rather than by printers.

PROCESS FLOW:



Hazards Analysis

Major Hazards			Other Hazards		
Location	**Item**	**Hazard**	**Location**	**Item**	**Hazard**
Receiving and shipping area	Rolls of printing paper	Crushing or fractures	Press room	Inks and solvents Printing inks	Dermatitis from handling inks and solvents. Fires Inhalation of organic solvent vapors
Throughout	Housekeeping	Fires, slips, trips and falls	Press cylinder	Solvents	Fumes and eye injuries
Press room	Nip points on press cylinders	Crushing and amputations			

	Noise (near presses)	Hearing loss			
Press room and bindery area	Exposed belts and pulleys, gears, chains, and sprockets	Crushing, amputations and other bodily injuries			
Bindery area	Power guillotine cutters	Amputations			
Ink and solvent storage	Storage of flammable and combustible liquids and materials	Fires and explosions			

Key OSHNC Standards

Reference	29 CFR 1910 — General Industry Standards
ANSI B30.6	Overhead Underhung hoists
Subpart D	Walking and working surfaces
Subpart E	Exit Routes, Emergency Action Plans, and Fire Prevention Plans
Subpart	Personal protective equipment
Subpart O	Machinery and Machine Guarding
1910.95	Occupational noise exposure
1910.106	Flammable and combustible liquids handling and storage
1910.147	Control of hazardous energy – lock-out/tag-out
1910.151	Medical services and first aid (especially eye wash and emergency shower stations)
1910.176	Handling Materials - general
1910.178	Powered industrial trucks
1910.179	Overhead and Gantry Cranes
1910.1000	Air contaminants
1910.1200	Hazard Communication

Inspection Analysis

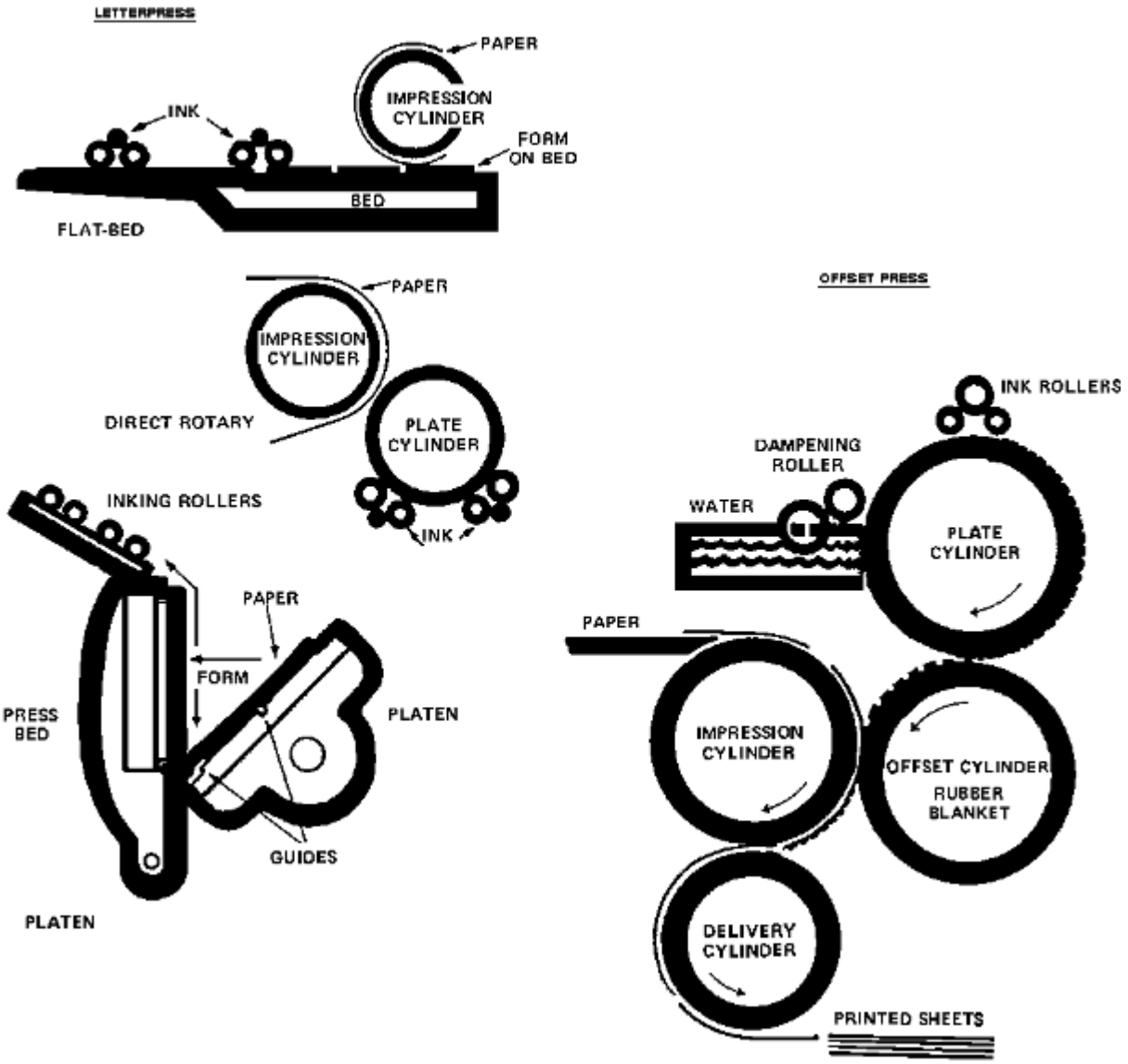
The inspection should begin in the layout room where the task is planned and the best ideas are incorporated into a comprehensive layout. This includes rough sketches, photographs, drawings, lettering, decorating and writing the message intended for the layout. The inspection should then proceed to the composing room where the type is set on linotype machines or photographically reproduced. After the composing room is the stereotype room or area where the printing plates are cast or molded (depending upon whether it is a letterpress or offset operation). Areas around lead casting machines, lead saws and cutters, portable hand tools and rubber mat molding machines must be carefully checked. before proceeding to the press room, sidetrips could be made to the lead remelting area, checking for potential health hazards with lead and to photo room, checking for proper

storage of photographic supplies and equipment. In the press room, check areas where the printing paper and inks are stored. In checking the presses, note guarding of power transmission apparatus, inrunning nip points, and points, and points of operation. Determine locking and tagging procedures when operators are performing maintenance or making adjustments and repairs to presses. Housekeeping in area should also be checked for fire and tripping hazards and proper storage of flammable and combustible liquids. The press room should also be scrutinized for adequate ventilation where inks and solvents are handled and used. Areas adjacent to presses where cylinders and plates are cleaned also needs screening for adequate ventilation. Personal protective equipment must be checked where employees use solvents and other agents in clean up areas. Machines used in bindery work should be examined for proper guarding or power transmission apparatus. Power guillotine cutters can possibly be found in the bindery area and point of operation guarding must be carefully examined.

Finally, the receiving and shipping areas where printing paper (usually rolls) and printed jobs are shipped or distributed must be checked for proper storage and handling techniques, especially those areas where mechanical handling equipment is utilized.

Other Pertinent Comments: Lead poisoning is the result of overexposure to dust or fumes containing particles of the metal. The incidence of lead poisoning has been reduced in those printing operations using lead due to control measures such as adequate ventilation, washing facilities and the switch to electronic printing. Lead does not volatize (or become vapor) until 550ºC (1022ºF) and the temperature in most printing melting pots is usually less than 300ºC (572ºF).

Printing inks must also be examined and composition determined in the event hazardous organic solvents or carcinogens are present.


LETTERPRESS
PAPER
IMPRESSION CYLINDER
INK
FORM ON BED
BED
FLAT-BED
PAPER
IMPRESSION CYLINDER
DIRECT ROTARY
PLATE CYLINDER
INK
INKING ROLLERS
PAPER
FORM
PRESS BED
PLATEN
GUIDES
PLATEN
OFFSET PRESS
INK ROLLERS
DAMPENING ROLLER
WATER
PLATE CYLINDER
PAPER
IMPRESSION CYLINDER
OFFSET CYLINDER
RUBBER BLANKET
DELIVERY CYLINDER
PRINTED SHEETS