	NORTH CAROLINA DEPARTMENT OF LABOR	**No. 28-4**
	OSH DIVISION	**Date: 10/2009**
	OSHNC INDUSTRIAL DATA REPORT	**Pages: 6**

Industry: **Chemicals and Allied Products**	Sub-Group: **Plastics and Synthetics**
SIC: **3084, 3085. 3086, 3088 and 3089**	NAICS: **322223, 325199, 325211, 326111, 326112, 326113, 326122, 326160, 326191, 326220, 337110 and 327125**

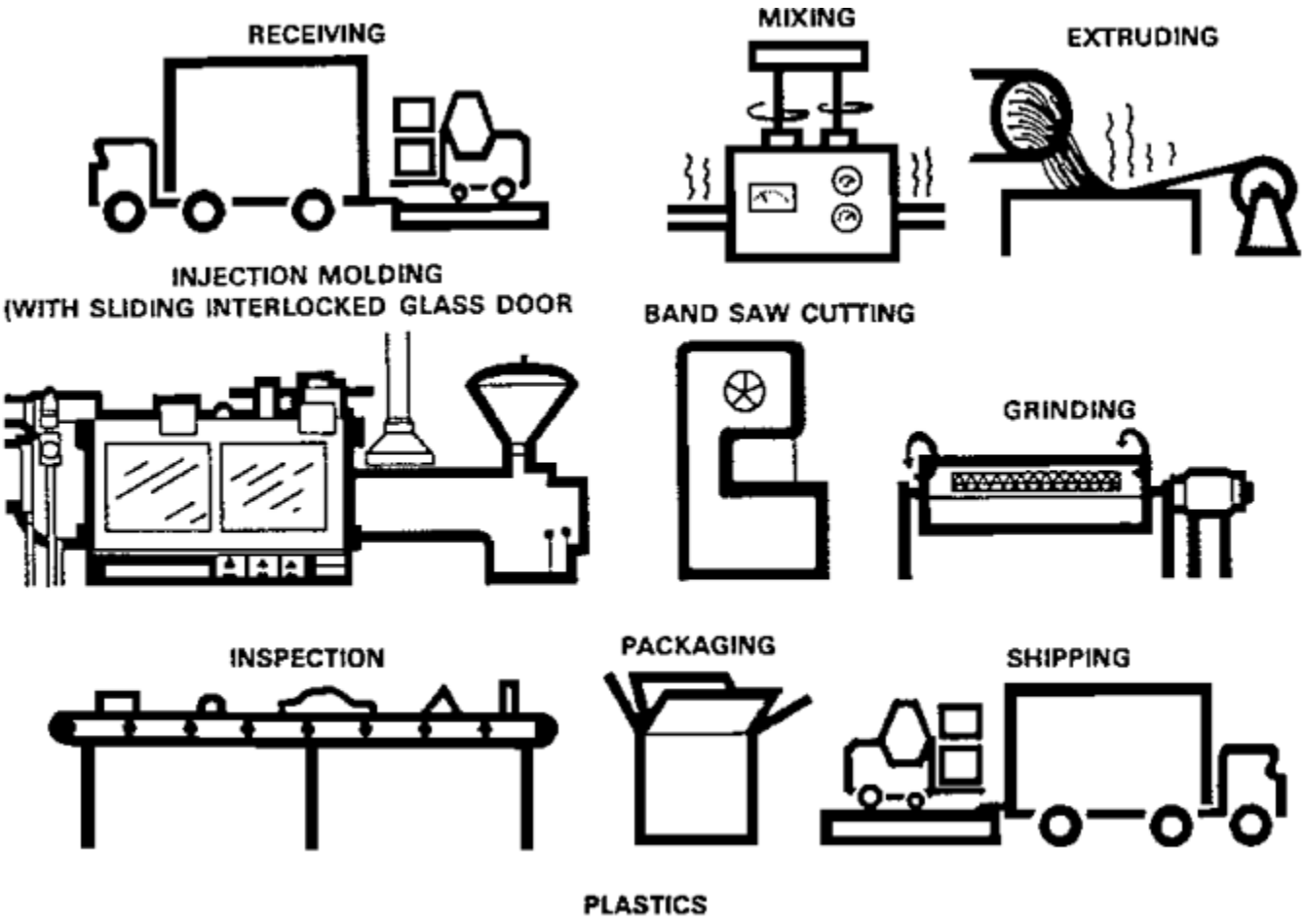
PROCESS DESCRIPTION:

Plastics. The plastic industry is a very complex operation with diverse products such as toys, tubes, rods, pipe and furniture. Granular resins are received by the manufacturer, mixed according to formula with chemicals or solvents, acetic acid, toluol, sodium hydroxide caustic soca, xylenol, methacrylate solvents and thinners to name a few. This mixture is fed by hand or vacuum through machine feed hoppers to extruders, power presses or mold where the end product is formed through heated dies. The product is cut to size by automatic or hand saws and shears. Rough edges are sanded or smoothed on grinders. The scrap is reclaimed by being fed into a grinder where it is sized for re-use. The end product is inspected, packaged and stored in the warehouse to be shipped. Conveyor systems, hand and forklift truck are used to stack and loan on trucks for delivery.

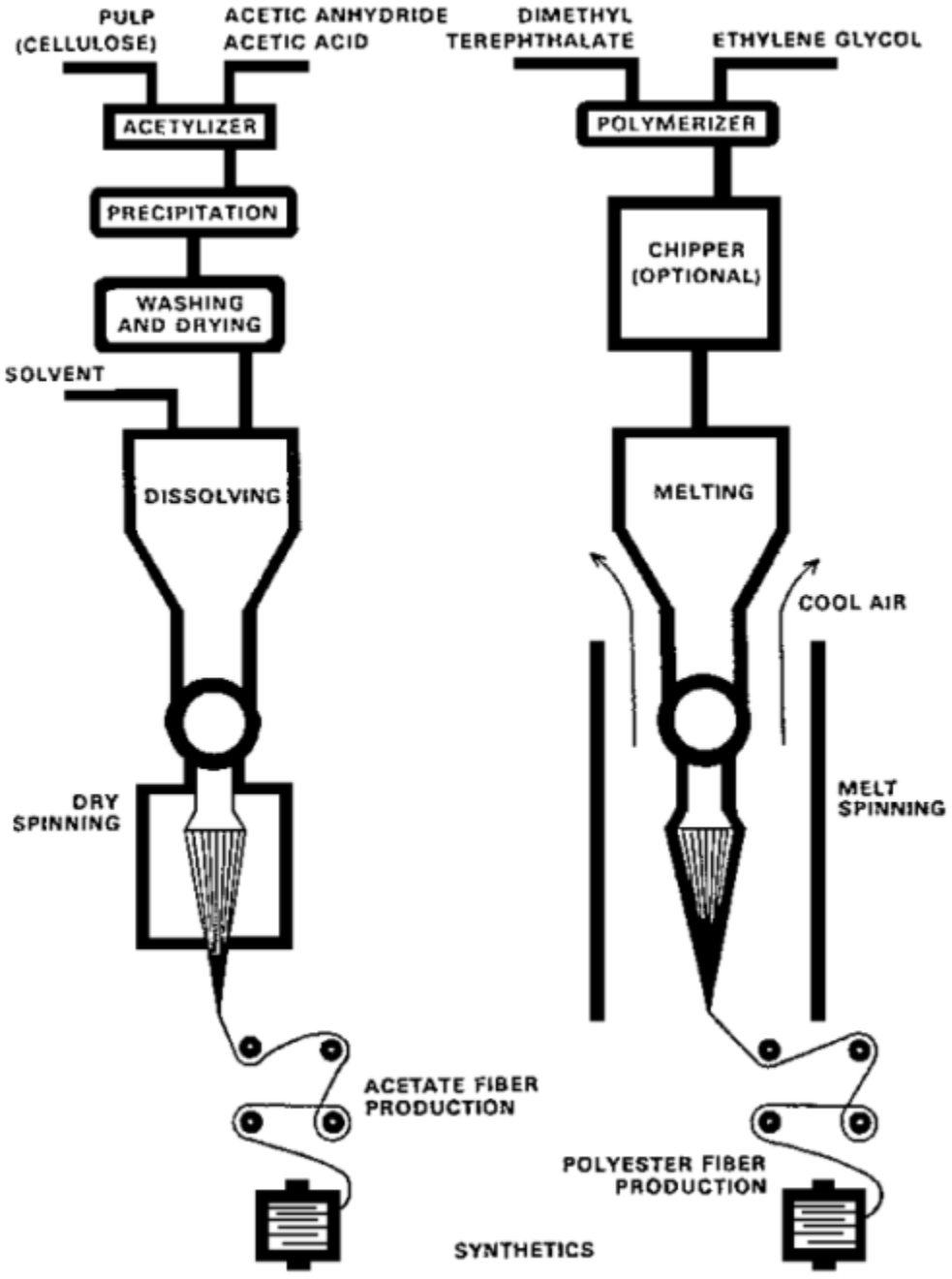
Synthetics. Synthetics, or man-made fibers, produced by the textile industry have a wide range of uses from fishing line to permanent-press clothing. This is a broad area which encompasses many different types of operations. There are probably more different chemicals used than by any other single industry. Synthetics are produced by processing plants using nay number of methods and packaged and shipped to other textile plants where the multi-operations of textile processing take place. These could include yarn production from short staple fibers, dyeing and finishing, knitting, weaving, or shipping to other plants for further processing and products. Two examples of synthetics are acetate flake, is precipitated, purified, dried and dissolved in acetone to prepare the spinning solution. This solution is extruded through spinnerets into a column of warm air which evaporates the acetone leaving solid continuous filaments of cellulose acetate that are twisted and wound on bobbins in the form of yarn. In making staple fiber the filaments from numerous spinnerets are combined in tow form, crimped, cut to the required length and packaged in bales. Polyester is a manufactured fiber in which the forming substance is any long chain synthetic polymer composed of at least 85% by weight of an ester of dihydric alcohol and terephthalic acid. The polyer is accomplished by high temperature using a vacuum. The glucol and ester reaction forms a polymer chain, releasing methanol. The filaments are spun in a melt spinning process and stretched several times their original length. These filaments are wound on bobbins, packaged and shipped.

PROCESS FLOW:

Plastics



Synthetics


PULP
(CELLULOSE)
ACETIC ANHYDRIDE
ACETIC ACID
DIMETHYL
TEREPHTHALATE
ETHYLENE GLYCOL
ACETYLIZER
POLYMERIZER
PRECIPITATION
CHIPPER
(OPTIONAL)
WASHING
AND DRYING
SOLVENT
DISSOLVING
MELTING
COOL AIR
DRY
SPINNING
MELT
SPINNING
ACETATE FIBER
PRODUCTION
POLYESTER FIBER
PRODUCTION
SYNTHETICS

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Hazards Analysis

Major Hazards			Other Hazards		
Location	**Item**	**Hazard**	**Location**	**Item**	**Hazard**
Throughout	Mechanical power transmission apparatus	Amputations and mangled limbs from contact with gears, shafts, pulleys, belts, chains and sprockets	Throughout	Housekeeping	Slipping, tripping and fire
	Hot pipes and tanks	Burns, heat prostration, fire			
Mixing	Chemicals	Lung, skin, heart disease	Molding and grinding	Nip points, saws, shears, cutters, sanders, presses	Amputation and mangled limbs
	Personal protective equipment	Burns from corrosive chemicals			
Mixing and grinding	Platforms and ladders	Falls, trips and falling objects from platforms with no toeboards and guardrails	Grinding	Noise from grinders	Hearing loss
Warehouse	Material handling	Collisions, strains, falls from improper stacking, unflanged dockboards and unsafe forklifts			

Key OSHNC Standards

Reference	29 CFR 1910 — General Industry Standards
Subpart D	Walking and working surfaces
Subpart E	Exit Routes, Emergency Action Plans, and Fire Prevention Plans
Subpart I	Personal protective equipment
Subpart O	Machinery and machine guarding

SIC: 3084, 3085. 3086, 3088 and 3089

NAICS: 322223, 325199, 325211, 326111, 326112, 326113, 326122, 326160, 326191, 326220, 337110 and 327125

1910.94	Ventilation
1910.95	Occupational noise exposure
1910.146	Permit required confined space entry
1910.147	Control of hazardous energy (lockout/tagout)
1910.151	Medical services and first aid (especially eye wash and emergency shower stations)
1910.176	Handling materials - general
1910.178	Powered industrial trucks
1910.1000	Air contaminants
1910.1200	Hazard Communication

Inspection Analysis

Plastics Industry:

The safety officer should begin the inspection where the raw materials are received. Guard rails for open-sided platforms, dockboards, material handling by lift trucks are among items that must be observed. In the warehouse, stacked materials should be noted for stability, blocked aisles, visibility of exit signs and ways to exit marked and accessible.

Upon entering the processing area, the safety officer should gain an overview. This can include the surrounding areas, housekeeping, electrical fixtures, machines and operating procedures.

The point of feeding raw material into feed hoppers over machines can be a source of falls from platforms or ladders. Power transmission apparatus must be checked for proper guarding. In some instances such as in extruding pipe or other items, wet floors contribute to slips and falls. Steam lines, in come cases, are in the operator's work area and are the cause of burns. High temperature is used in some processes in cutting plastics and films, thus generating a referral to an industrial hygienist. This could also include fumes as well as chemicals being uses. This area must be observed very closely. Point of operation on presses and mold must be observed to assure proper guarding. Saws, shears and sanders are also included.

The use of protective equipment (safety shoes, eye and face protection) should be determined by observation and interviewing employees. The procedure for the use and storage of chemicals and flammable or combustible materials must be observed. All entire electrical equipment must be checked especially extension cord use, cords on wet floors, equipment grounding and open switches and junction boxes.

Synthetics Industry:

Inspecting the receiving and shipping areas would be very similar to the procedure outlined for the plastic industry. In both cases, the Compliance Officer would observe and discuss the proper procedure for handling vinyl chloride.

In the manufacturing area, the safety officer must inspect the electrical system, housekeeping, condition of floors and work areas. Stairways and working platforms must be checked for proper railings and toeboards, and ladders must be checked for proper construction and condition. Steam lines must be insulated, machine guards in place and proper ventilation for fume removal. The handling and storage of chemicals and solvents and use

of appropriate protective equipment must be determined. After the yarn or staple is processed and packaged, the safety officer should follow the material flow to the warehouse.

Where further processing is performed such as spinning, twisting and knitting or weaving, the areas must be inspected. In processes using staple, which varies in length from 1½ – 8 inches, the opening room and blending areas must be checked. Normal processing continues until a yarn or finished product is produced.

Other Pertinent Comments: