WIRE DRAWING

The Unknown (FORGOTTEN) Hazards.

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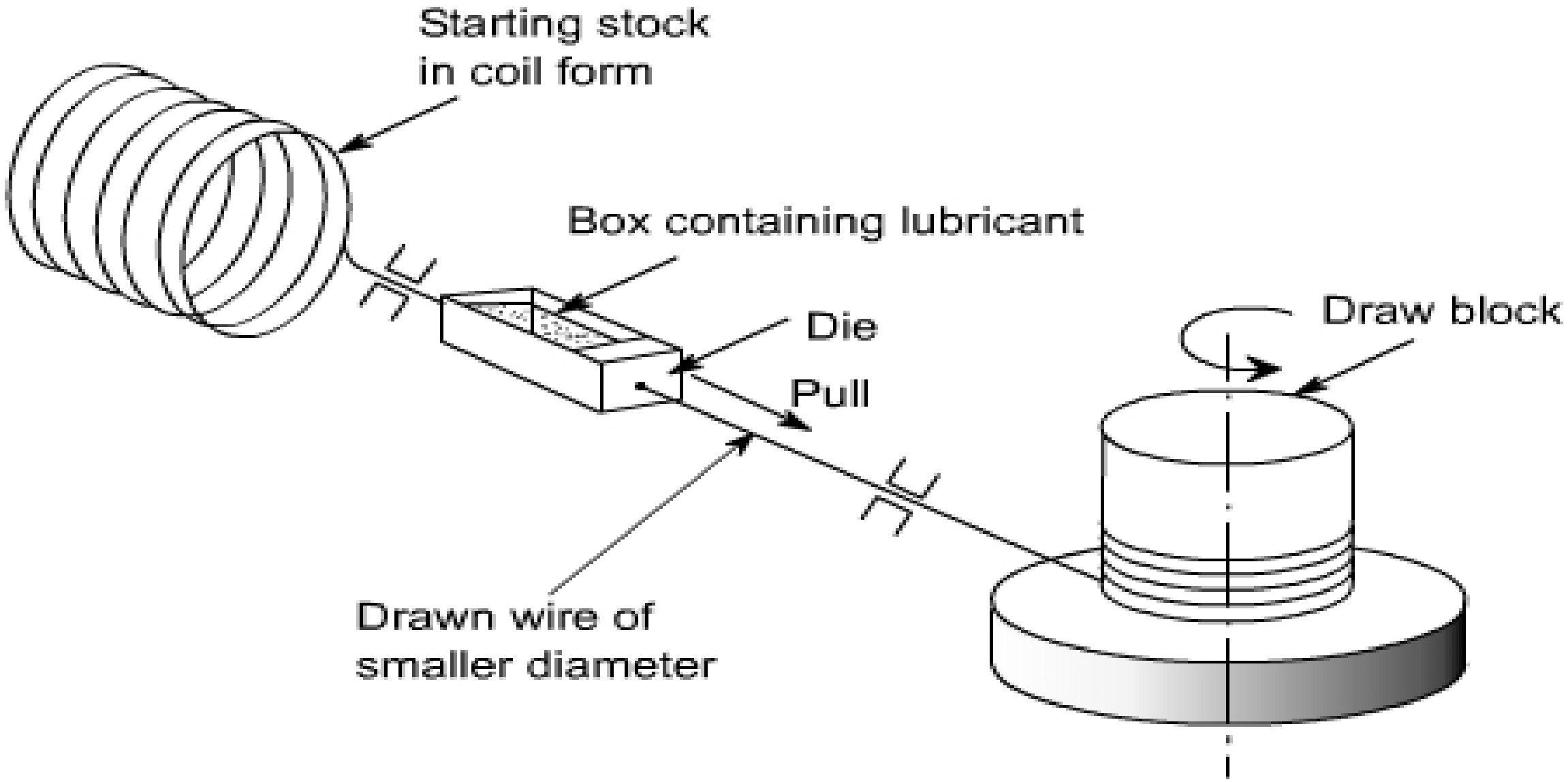
WIRE DRAWING IN SIMPLE TERMS



Let’s LOOK at some other hazards-

- OVERLOOKED – SOMETIMES
  - Housekeeping – slip trip and fall items
    - Mill scale
    - Lubrications - wet and dry
    - Tools
    - Wire Pieces
  - COMBUSTIBLE DUST – if we use soaps made with Stearate (calcium or sodium)
    - Then dust created in drawing is a ST1 combustible dust.
  - Machine Guarding – Moving equipment and nip/pinch points
  - Safety Warning Labels – if shown on machine or equipment but not used!!

SAMPLE OF CITATION – CHAPTER & Verse

- Citation 1 Item 1 Type of Violation: Serious
- **29 CFR 1910.22(a)(1): All places of employment, passageways, storerooms, service rooms, and walking-working surfaces are kept in a clean, orderly, and sanitary condition:**

The employer does not ensure routine cleaning of soap/mill scale resulting significant accumulation of combustible dust. This violation was observed in the wire draw area, exposing employees to dust explosion, deflagration, and other fire hazards.

What is the technical definition for combustible dust?

- The Occupational Safety and Health Administration (OSHA) in the United States defines combustible dust as "a solid material composed of distinct particles or pieces, regardless of size, shape, or chemical composition, which presents a fire or deflagration hazard when suspended in air or some other oxidizing medium over a range of concentrations.“

- NFPA 652 defines Combustible Dust – “A finely divided combustible particulate solid that presents a flash-fire hazard or explosion hazard when suspended in the air or process-specific oxidizing medium over a range of concentrations.”[NFPA 654, 2013]

- Another example is Alberta's Occupational Health and Safety Code which defines combustible dust as "a dust that can create an explosive atmosphere when it is suspended in air in ignitable concentrations

- In the NFPA ‘Guide to Combustible Dust” a key point is highlighted – “Relevant ignition energy, limiting concentrations, and burning rate for combustible dust mixtures are not inherent properties of the material, as is the case of gas or vapors. Instead they are parameters for the specific dust sample that result from the material handling and conditioning as evidenced in particle size, shape, and surface characteristics.

Material	Moisture Content (wt.%)	Mean Particle Size (µm)
#7 ¼" Wire Drawing	8.1	27 94% < 75 µm 100% < 500 µm

Material	P_{max} (bar)	K_{St} (bar-m/s)	MEC (g/m^3)
Wire Drawing	6.3 ± 10%	92 ± 20%	200 < MEC < 250 MECestimate = 211
	MIE ***(with inductance)*** **(mJ)**	**MIT Cloud (°C)**	**Combustible Content (wt.%)**
	MIE > 1000* Es = Not Determined	**510**	~25

The sample tested was found to be explosible producing a K_{St} value of 92 bar-m/sec, thus, classifying it as an St1 class dust since the K_{St} value was less than 200 bar-m/sec.

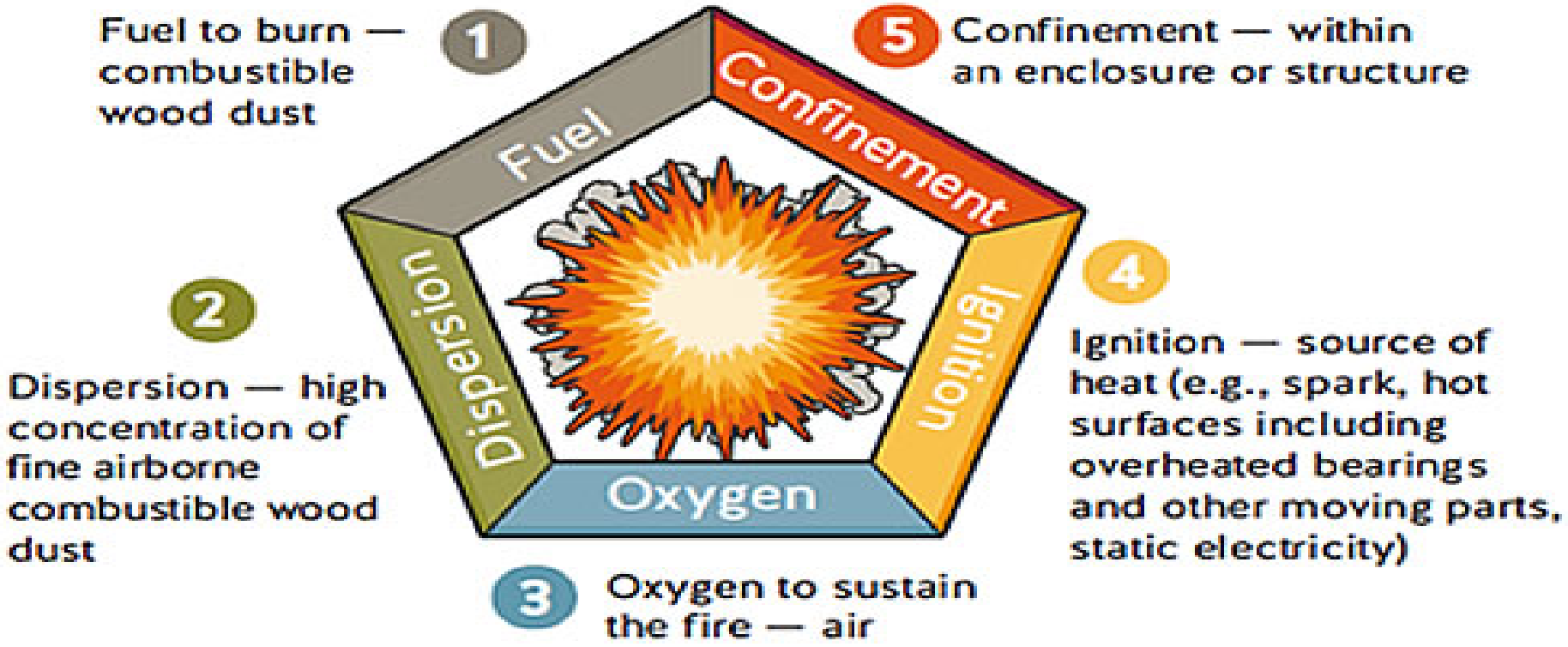
Material	Moisture Content (wt.%)	Mean Particle Size (µm)
FWD Drawing Department	8.4	345 38% < 75 µm 79% < 500 µm

Material	P_{max} (bar)	K_{St} (bar-m/s)	MEC (g/m^3)
Drawing Department	6.2 ± 10%	78 ± 20%	150 < MEC < 200 MECestimate = 194
	MIE ***(with inductance)*** **(mJ)**	**MIT Cloud (°C)**	**Combustible Content (wt.%)**
	MIE > 1000* Es = Not Determined	480	~48

The sample tested was found to be explosible producing a K_{St} value of 78 bar-m/sec, thus, classifying it as an St1 class dust since the K_{St} value was less than 200 bar-m/sec.

REMEMBER ALL FIVE ELEMENTS MUST BE PRESENT

Dust explosion pentagon



If a high concentration of wood dust becomes airborne and contacts an ignition source in a contained area, an explosion will likely occur.

Appearance of an Explosible Dust Cloud

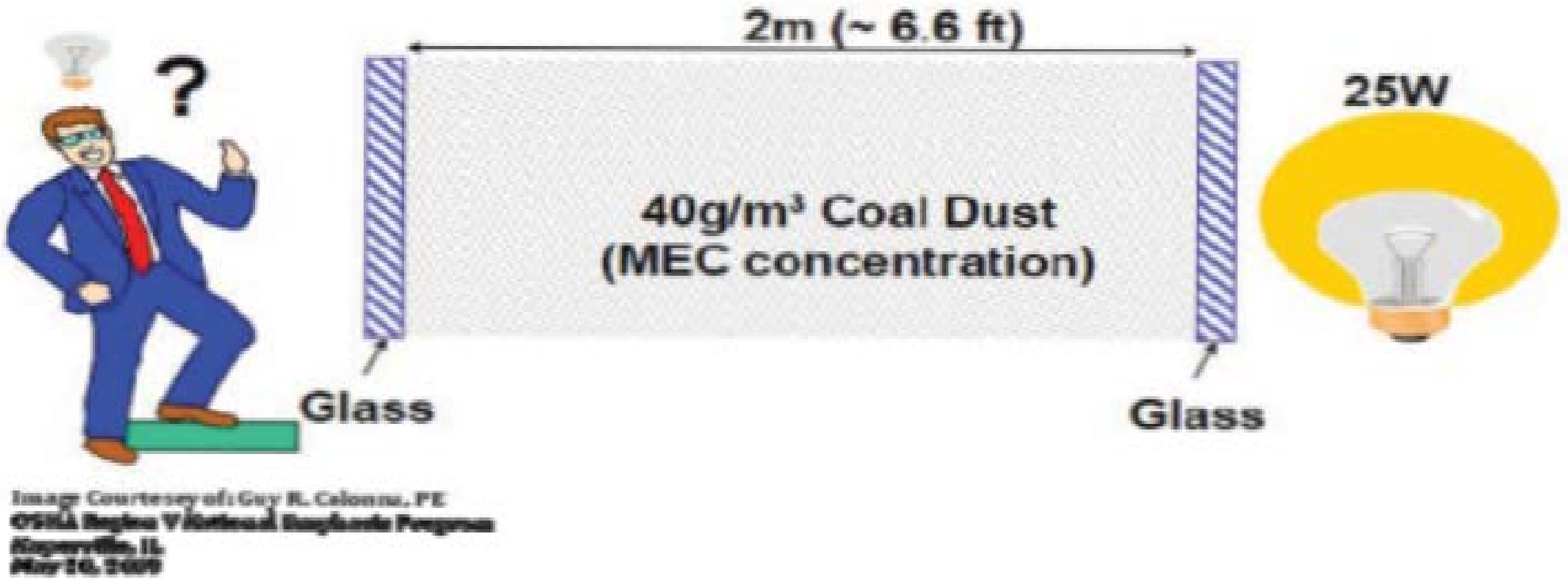


Image Courtesy of: Guy R. Colonna, PE

A cloud of 40 g/m$_3$ of coal dust in air is so dense that a glowing 25 W light bulb can hardly be seen through a dust cloud of 2 m (6.6 ft.) thickness. NOW THINK 5 TIMES THAT MUCH in the same space.

Dust Hazard Classes

Hazard Class	Deflagration Index, KST Range Bar-m/sec	Descriptive Phrase
ST-0	0	No Explosion
ST-1	Less Than 200	Weak Explosion
ST-2	200-300	Strong Explosion
ST-3	Greater Than 300	Very Strong Explosion

Exposable dusts with KST values below 200 bar-m/sec are classified as ST-1 dusts (weak explosive dusts).

This type of material, should ignition occur in a confined space, will produce a relatively weak explosion.

Even a weak explosion can have extreme consequences and should not be taken lightly.

Most dust handling equipment is not designed to survive dust explosion pressures and will fail catastrophically if exposed.

SAMPLE OF CITATION – CHAPTER & Verse

- Citation 1 Item 6 Type of Violation: **Serious**
- 29 CFR 1910.252(a)(2)(vi)(C): Cutting or welding was permitted in the presence of explosive atmospheres (mixture of flammable gases, vapors, liquids, or dusts with air), or explosive atmospheres that could develop inside uncleaned or improperly prepared tanks or equipment which had previously contained such materials, or that could develop in areas with an accumulation of combustible dust:

2018, the employer permitted welding in the area with combustible dust accumulations present, exposing employees to dust explosion, deflagration, and other fire hazards.

SAMPLE OF CITATION – CHAPTER & Verse

- Citation 1 Item 8 Type of Violation: Serious
- 29 CFR 1910.307(c): Electrical equipment in a hazardous (classified) location was not intrinsically

safe, approved for the hazardous (classified) location, or safe for the hazardous (classified) location:

- 2018, the employer did not ensure locations that have a presence of combustible dust use electrical equipment that is intrinsically safe, approved for the location or safe for the hazardous location.
- a) In the wire draw cages, a Guardair 55 gallon industrial vacuum was used for cleaning combustible dusts exposing employees to dust explosion, deflagration and other fire hazards.
- b) In the wire draw cages, overhead lights provided are not approved for the location, exposing employees to dust explosion, deflagration, and other fire hazards.
- c) In the wire draw cages, outlets and panel disconnects are not approved for the location, exposing employees to dust explosion, deflagration and other fire hazards.

Before(than) and After(now)
Covered Soap Box to control dust

CITATION RESULTS

- Citation/Item Amendment

01 / 001 Amend penalty to $ reduced

01/006 Amend classification to other-than-serious; Amend standard cited and violation language to read:

"29 CFR 1910.252(a)(2)(vii): Where relocation of combustible was impracticable, cutting or welding was permitted when combustible were not protected with flame-proofed covers or otherwise shielded with metal, asbestos guards, or curtains:

2018 in the 1/4 inch wire draw area, the employer permitted welding in the area with combustible dust accumulations present, exposing employees to dust explosion, deflagration and other fire hazards"; amend penalty to $; extend abatement

01/008 Item withdrawn; penalty withdrawn

MACHINE GUARDING – Take-Up Reels

Sample Citation – Chapter & Verse

- Citation 1 Item 5 Type of Violation: Serious
- 29 CFR 1910.219(d)(1): Pulley which were seven (7) or less from the floor level were not fully enclosed by guards:

The employer does not ensure that pulley(s) seven feet or less from the floor level are fully enclosed by guards. This violation was observed, in the inch galvanizing and combo lines, exposing employees to caught-in and amputation hazards.

Measurement – 7 foot rule -

Citation Chapter & VERSE – After discussion

- Amend classification to other-than-serious ; Amend standard cited and violation language to read:
- “29 CFR 1910.212(a)(1): One or more methods of machine guarding was not provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks:
- Employer does not ensure that ingoing nip points in the 1/4 inch galvanizing and combo lines are guarded. Employees are exposed to caught-in and amputation hazards.”

Warning Safety Labels.

IF IT IS LABELLED – Than it MUST BE USED!!

- If you have warnings labels on machines – that show required PPE then any of the PPE shown must be used during operation.

- If a LOTO Point is provided it must be in your LOTO PROGRAM and equipment specific procedures.

- Like wise any warning labels that are damaged must be replaced.