NADCA Safety Series

• 4 parts
  • Basic Safety
  • Machine Maintenance Safety
  • Electrical Safety
  • Managing Safety
• General safety information
  • Visitors, new employees, refresher
• Can supplement, but does not replace plant safety training
Outline

• Safety Reporting
• Die Casting Hazards
• Control of Hazardous Energy
• Electrical Safety
• Personal Protective Equipment (PPE)
• Machine Guarding
• Hazard Communication
Safety in Die Casting

- Safety is **EVERYONE’S** job!
- It only takes one person not being safe to cause a hazard for everyone
Reporting Incidents

• If an accident or near miss occurs, report it immediately to a supervisor, manager or safety director
Common Injuries

- Sprains, strains and tears
- Fractures
- Cuts, lacerations and tears
- Bruises, contusions
- Heat burns
- Soreness, pain
Sprains, strains and tears

Sprains, strains and tears are the most common injury in die casting

- Improper lifting
- Over Reaching
- Repetative motion
- Slips or trips
Work Environment

• Housekeeping
  • Trip-fall / Slip-fall / Floor Clutter
  • Combustible Dust
  • Magnesium

• Equipment
  • Equipment Inspection / Repair
  • Forklifts / Cranes
  • Compressed Air

• General
  • Operator Platforms and Controls
  • Working at Heights
  • Parts / Material Handling
  • Elevated Temperatures
  • Metal Melting & Handling
Trip-fall / Slip-fall / Floor Clutter

- Uneven surfaces, protruding equipment
- Debris, Scrap, Cords, Hoses
- Spills (Oil, Water, Die Lube)
Combustible Dust

Dust settles on a surface

Dust is disturbed

Dust cloud is ignited and explodes
Magnesium

- Magnesium is highly reactive to oxygen in molten condition
  - Must be covered with inert gas at all times in the liquid state
- Do not try to extinguish a fire unless properly trained to do so
Equipment Inspection / Repair

• Inspect all cords, hoses and equipment before use.
• Any damaged components should be replaced or repaired immediately.
Forklifts / Cranes

- Do not operate forklifts or cranes without proper training
- Use designated walkways when moving through the plant
- Be aware of your surroundings
- Don’t walk under objects hoisted by a forklift or crane
Compressed Air

- **Correct**
  - Check connections before turning on air
  - Hold nozzle end when turning on air
  - Shut off air before adjusting air tools
  - Wear safety glasses when using compressed air

- **Incorrect**
  - Point air nozzle at someone
  - Use air to dust off hair, clothing and sweep floor
Operator Platforms and Controls

- **Operator Platforms**
  - These establish the proper working height and prevent fatigue
  - Should be of uniform height for similar machines
  - Need to provide a non-slip surface
  - Proper working heights minimize physical strain

- **Controls**
  - Must be at the proper height to avoid fatigue
Working at Heights

- Fall protection required at elevations above 6 feet
  - Guard rails around elevated platforms and openings/holes in floor
  - Hand rails for stairs
  - Guard rails for scaffolding
  - Guards and safety harness for working on lifts
  - Safety harness when working on ladders or on top of machines
    - Safety harnesses must be anchored to a location that will not yield under weight (5,000 lbs per person) and provide deceleration forces to a falling worker
Sharp Edges
From Trimming

Sharp Edges
From Flash

Sharp Edges
From Heat Check
Elevated Temperatures

- Check surfaces before touching as some surfaces may not be marked as hot
Heat Illness

- Inform your supervisor if feeling heat illness symptoms
  - Cramping
  - Fatigue
  - Nausea
  - Headache
  - Excessive Thirst
  - Weakness
  - Confusion or Anxiety
  - Dizziness
• Molten metal can splash when poured or injected
• Molten metal radiates intense heat
• Face protection required
Metal Explosion

Water expands 1,600 times!!!
Controlling Hazardous Energy

• What is Control of Hazardous Energy?
• Why is it necessary?
• Who does it effect?
Control of Hazardous Energy

What?

Bring machine to zero energy state to prevent injury due to unexpected startup of equipment or released energy.
Control of Hazardous Energy

Why?

During maintenance or servicing an employee may need to place part or all of his/her body into a machine’s point of operation.
Control of Hazardous Energy

Who?

- Authorized – Implements lock-out / tag-out
- Affected – Operates machine that is locked out
- Other – Works in the area of the locked out machine, but is not directly affected
Lock-out / Tag-out

Lock-out Devices

Tags

Lock-out Box
Electrical Safety

- Hazards
- Shocks
- Burns
- Falls
- Electrocution
Arc Flash

• Electrical fault in air producing an extremely high-temperature discharge, which can cause:
  • Severe burns
  • Eye Injuries
Arc Blast

- Arc fault causing a high pressure sound wave, which can lead to the following injuries:
  - Physical Injury
  - Collapsed lungs
  - Hearing Damage
Avoiding Arc Flash / Arc Blast

WARNING

Arc Flash and Shock Hazard Appropriate PPE Required

- 24 inch: Flash Hazard Boundary
- 3 cal/cm²: Flash Hazard at 18 inches
- 1DF: PPE Level, 1 Layer 6 oz Nomex®, Leather Gloves, Faceshield
- 480 VAC: Shock Hazard when Cover is removed
- 36 inch: Limited Approach
- 12 inch: Restricted Approach - 500 V Class 00 Gloves
- 1 inch: Prohibited Approach - 500 V Class 00 Gloves

Equipment Name: Sherry Pump Starter
Personal Protective Equipment

- Head
- Eye
- Hearing
- Hand
- Foot
- Body and Leg
Head Protection

- Hard hats and bump caps protect the head from injuries
- The hazards present in the plant will determine if head protection is required
Eye Protection

- Safety Glasses
- Goggles
- Face Shields
- Welding Helmets
- Full Hoods
Hearing Protection

- **Ear Plugs**
  - Ideal - fit inside ear canal and provide a snug cushion against noise

- **Ear Muffs**
  - Create sealed space around each ear – hair, earrings and eyeglasses can get in the way and reduce effectiveness
Hand Protection

- **Metal mesh gloves**
  resist sharp edges and prevent cuts

- **Leather gloves**
  shield your hands from rough surfaces

- **Vinyl and neoprene gloves**
  protect your hands against toxic chemicals

- **Rubber gloves**
  protect you when working around electricity

- **Padded cloth gloves**
  protect your hands from sharp edges, slivers, dirt, and vibration

- **Heat resistant gloves**
  protect your hands from heat and flames

- **Latex disposable gloves**
  used to protect your hands from germs and bacteria

- **Lead-lined gloves**
  used to protect your hands from radiation sources
Foot Protection

• Steel Toed Boots
  Protect toes from falling/heavy objects

• Metatarsal Guard
  Protect foot from falling/heavy objects

• Metal-free Non-conductive boots
  Protection from electric shock when working with or around electricity
Body and Leg Protection

- Cotton or Wool Clothes
- Reflective Vest
- High Visibility Vest
Proper Clothing
Machine Safety

- Moving Machine Parts
- Pinch
- Shear
- Electrical
- Hydraulic
- Hot Metal
Machine Guarding

- Examples of guarding:
  - Toggle Linkage
  - Injection Sleeve and Tip
  - Safety Ratchet
  - Operator’s Door
  - Robots
  - Trim Presses
Safety Bar

• When working between die halves the machine should be de-energized and a safety bar placed on the tie bar
Stuck Plunger Tip

• If the plunger becomes stuck in the sleeve follow the proper procedures
• The proper tooling is designed to prevent any part of the employee from being between the dies
Hazard Communication

- Hazardous Chemical List
- (Material) Safety Data Sheets
- Container Labeling

Example 1: HS85 Label

HS85
Batch number: 85L6543

Warning
Harmful if swallowed

Wash hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. Dispose of contents/container in accordance with local, state and federal regulations.

First aid:
If swallowed: Call a doctor if you feel unwell. Rinse mouth.

GHS Example Company, 123 Global Circle, Anyville, NY 130XX

Telephone (888) 888-8888
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• Every potentially hazardous chemical should have a Safety Data Sheet that is accessible to all employees.
Container Labeling

- Labels provide information of chemical in container
- All containers must be labeled
- Report unlabeled containers to supervisor or safety manager
## Pictograms & Hazards

### Health Hazard
- Carcinogen
- Mutagenicity
- Reproductive Toxicity
- Respiratory Sensitizer
- Target Organ Toxicity
- Aspiration Toxicity

### Flame
- Flammables
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Self-Reactives
- Organic Peroxides

### Exclamation Mark
- Irritant (skin and eye)
- Skin Sensitizer
- Acute Toxicity
- Narcotic Effects
- Respiratory Tract Irritant
- Hazardous to Ozone Layer (Non-Mandatory)

### Gas Cylinder
- Gases Under Pressure

### Corrosion
- Skin Corrosion/Burns
- Eye Damage
- Corrosive to Metals

### Exploding Bomb
- Explosives
- Self-Reactives
- Organic Peroxides

### Flame Over Circle
- Oxidizers

### Environment
- Aquatic Toxicity

### Skull and Crossbones
- Acute Toxicity (fatal or toxic)
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<td>4</td>
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**NOTE:** Lower number = more hazardous!
Summary

• Everyone must follow safe operating procedures
• Report incidents, near misses, and concerns to improve safety
• Sprains, strains and tears are most common injury
• Keep work environment clean to reduce injuries
• Keep water away from molten metal
Summary

• Follow lock out/tag-out procedures when repairing/servicing a machine
• Be aware of electrical hazards and stay away from open electrical panels
• Wear the correct PPE and follow safe procedures
• Do not by-pass machine guards
• Know what chemicals you are working with and what hazards they may possess
Questions

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