Proper Handling of Automotive Airbag Modules
Understanding Airbags

• Airbags supplement seat belts by reducing the chance that the occupant’s head & upper body will strike some part of the vehicle’s interior when involved in a crash

• Airbags deploy in about 1/15th of a second which is 4 times faster than a blink of an eye

• The same speed & force that contribute to vehicle safety are potentially hazardous to workers who handle & install airbags in the plant
Airbag Details

• There are 2 types of airbags: Frontal (or near frontal) and Side-impact

• **Frontal airbags** are designed to protect the head & upper body and are located in the steering wheel hub (Driver-side airbags) and in the dashboard above the glove box (Passenger-side airbags).
  – Passenger-side airbags are 2-3 times larger than driver-side airbags due to the greater distance between the dashboard and the passenger than that of the steering wheel and the driver

• Frontal airbags are NOT designed to deploy in side-impact, rear-impact or rollover crashes
Airbag Details

• **Side-impact airbags** are designed to protect the chest (or torso), head and head/chest combination in moderate to severe side-impact crashes:

• Side-impact airbag locations are determined by the area of the body that they protect
  – Chest or torso side-impact airbags are mounted in the outboard edge of the seat back or in the door
  – Head side-impact airbags are usually located in the roof rail above the side-windows
  – Head/chest combination side-impact airbags are usually located in the side of the seat and are typically larger than the chest side-impact airbags

• Side-impact airbags are NOT designed to deploy in rear or frontal collisions or during a vehicle rollover
Airbag Functionality

• **Crash sensors** are devices that tell the bag to inflate
• Sensors are located in the front of the vehicle and/or in the passenger compartment (sensors for side-impact airbags are in the doors)
• Vehicles can have one or more crash sensors
• **Sudden deceleration of the vehicle causes the sensors to send the signal to the inflation system**
• Frontal airbag inflation occurs when there is a collision force equal to running into a brick wall at 8 to 15 MPH
Airbag Functionality

• **Passenger Presence System (PPS) Sensors** detect the presence of a passenger, by weight. If passenger weight does not exceed the PPS threshold (or if no passenger), the passenger airbag is disabled and does not deploy during a crash.

• **Pyrotechnic Seat Belt Retractor Pretensioner Sensors** are part of the seat belt system that recognizes the occupant during early stages of deceleration and tightens the seat belt webbing to reduce the load on the occupant and the severity & extent of injuries.
Airbag Inflation System

• The airbag’s inflation system ignites a solid propellant (sodium azide and potassium nitrate) which burns extremely rapidly to create a large volume of nitrogen gas to inflate the bag
  – Sodium azide may be toxic if ingested but it is sealed in the inflator and converts to nitrogen, which is not toxic
• The bag bursts from its storage site at approximately 200 mph
• Deployment is very loud but it lasts only briefly
• The airbag deflates as the gas quickly dissipates through tiny holes in the bag
Storing & Handling Rules

• Read Material Safety Data Sheets (MSDS) related to the airbag you’re handling. They can be found with the Safety Manager in the Materials office
• Store airbag modules in designated, secure areas
• Storage temperatures should not exceed 149 degrees Fahrenheit (65 degrees Centigrade)
• Transport airbags in their approved packaging
• Always store and handle airbags in an upright position
Storing & Handling Rules

- Always carry airbag modules with two hands
- Carry steering columns and instrument panels (IPs) equipped with airbags with two hands as well
- Always carry airbag modules (including steering columns & IPs equipped with airbags) with the trim cover/cushion deployment opening pointed away from the body
Storing & Handling Rules

• Always place airbag modules, including steering columns and I/Ps equipped with airbags, with the trim cover/cushion deployment opening facing up
  – This allows for the airbag to expand if it is unintentionally deployed
  – If an airbag deploys when placed face down on a surface, it could become an airborne projectile, causing injury
Storing & Handling Rules

- Treat all airbags as “active”, even if they’re marked “inactive”
- Always hold pyrotechnic seat belt buckle pretensioners and retractors by the protruding piston tube housing with the tube facing down and away from the body
  - Point piston tube housing away from others
  - Never hold the buckle pretensioner by the bracket assembly
  - Keep hands / fingers away from a retractor spool assembly
Deployed Airbag Handling

• When an airbag module deploys, heat is generated and the metal components become very hot

• **Notify your Lead or Supervisor to contact the Plant Safety Department immediately!**

• When handling a deployed airbag:
  – **Wait 30 minutes for a driver-side airbag module to cool before handling it**
  – **Wait 60 minutes for a passenger-side airbag module to cool before handling it**
Deployed Airbag Handling

When directed to handle a deployed airbag:

- **Wear** personal protective equipment (PPE) – safety glasses and chemical resistant gloves – to protect against residual heat & dust
- Immediately **wash hands** and exposed skin surface areas with mild soap & water
- Immediately **flush eyes** with water if exposed to byproducts
- Failure to comply with these precautions may result in personal injury
Deployed Airbag Handling

- Follow plant procedures to return all damaged or defective airbag modules to the vendor
- Deployed modules should be stored in containers that prevent water or precipitation from coming into contact with the units
- The plant’s environmental staff will arrange for the disposal of deployed airbags
Special Airbag Labeling

- An “Inactive” label must be applied to airbag modules when an airbag system is disabled.
- Dual-stage airbags should be labeled as to which module (primary or secondary) has been deployed.
- Bags labeled as “Inert” should be treated as live, unless the handler has knowledge otherwise.
- Pretensioners should be labeled as needed.
Ruptured Airbag Response

- If an airbag is ruptured, exposure to chemicals contained inside may be hazardous and should be avoided!
- If an airbag is ruptured without deployment, and exposure to the gas/heat generant materials or gases occurs, **first aid treatment** may be needed:

  **Inhalation:** Remove the person to fresh air. If breathing is difficult, administer oxygen. If breathing stops, CPR should be started at once. Seek medical attention immediately.
Ruptured Airbag Response

**Eyes:** Flush with tepid water for at least 20 minutes, holding the eyelids wide open. Seek medical attention if irritation develops or persists.

**Skin:** Wash thoroughly with mild soap and water. Seek medical attention if irritation develops or persists. Remove any contaminated clothing and launder thoroughly before reuse.
Ruptured Airbag Response

Ingestion: In the unlikely event of someone ingesting the gas generant materials, rinse out the mouth with lots of cold water. Never give anything by mouth to an unconscious person. Seek immediate medical attention.

More information may be found in the Material Safety Data Sheet (MSDS) for individual airbags.
Visually of Safe Usage

- Driver/Passenger trim style (side impact)
- Instrument Panel (frontal)
- Knee position airbag (frontal)
- Steering Wheel Chassis model (frontal)

*Airbags pose no chemical hazard when handled and used properly!*
Driver/Passenger Trim model

Place on specified shelving on the Kit Cart

Incorrect! Firmly lift the air bag (not the trim) and the wire harness together (do not let it hang loosely)
Instrument Panel (IP) model

Use BOTH hands!
Opening pointing AWAY from you!

Never lift or carry by the wires, connectors, or harness!
Knee position model

Front – Away from you and using 2 hands

Rear – toward you

Positioned in Kit Tote
Steering Wheel Chassis mount

Always use two hands and hold away from your body!

Incorrect! Do not hold the airbag facing you!
Airbag Handling Don’ts

- Do not deploy airbag components indoors
- Never place anything on top of or block the trim cover/cushion deployment opening
- Never dispose of “active” airbag components
- Never carry airbag modules, sensors or diagnostic units by the wires/connector/electrical harness/pigtails attached to the module
- **Never use damaged airbag modules**
Airbag Handling Don’ts

- Never attempt to repair, service, open or dismantle air bag components (Notify your Lead or Supervisor immediately if you discover a damaged module)
- Never attempt to repair any crash sensors, Sensing Diagnostic Module (SDMs) or diagnostic units (report damage to your Lead or Supervisor)
- Do not apply electrical power to airbag components except as specified during installation and servicing procedures
Airbag Handling Don’ts

- Do not hammer, weld, solder, braze, machine or drill airbag inflator modules
- Never apply power to any crash sensor or SDM unless it is firmly bolted down

Performing any of these incorrect actions may result in unwanted deployment or rupturing and consequently, personal injury!
3 Simple Safe Use Rules

1. Always carry airbag modules, including steering columns & I/Ps equipped with airbags, **with two hands and with the** trim cover/cushion deployment opening pointed away from the body.

2. Always place airbag modules, including steering columns and I/Ps equipped with airbags, **with the** trim cover/cushion deployment **opening facing up**.

3. Only handle deployed or ruptured airbag modules after the Plant Safety Department has been notified and **following established rules and Plant procedures**.