the Mix/Cast work center.

Completion of this training is required for
general access to controlled facilities within

Mix/Cast Contamination Control
This course will:

courses to qualify you for access to Mix/Cast facilities.

This Mix/Cast Contamination Control is part of a series of training.

Awareness course before attending this Work Center Specific

You should have completed the Basic Contamination Control

Mix/Cast Contamination Control
Check Points to Control FOD
Mix/Cast Empty Pockets/No Button Policy

- Mix/Cast Work Center has a No Button Shirt Requirement to
- No Buttons

- Badges, Papers, and Cell Phones
- Watches, Rings, Wallets, Exposed Piercings, Pens, Coins, Items and all Personal accessories, such as Earrings,

- Is the practice of emptying all clothing pockets of personal

- Empty Pockets
Requirements and are escorted as required.

ALL transient personnel follow all area PPE and FOD control

Area Supervision and building personnel are responsible to ensure that

Access Responsibilities
Free to explore if appropriately attired
Must be aware of FOD restrictions
Must check-in/badge-in through control point
Escorted by trained personnel

(please select all that apply)

Transit areas and visitors to Mix/Cast Controlled Areas must be:

Let's take a quiz.
Building Status

Other reasons for maintenance, repair activities or for suspended pending completion of control measures have been for FOD, tool, material, and/or access. All FOD, tool, material and access control measures are in force. The designated status of an area or facility indicates whether control.

Open Status: Controlled Status:
FOD Control Zone Guidelines

1. Year or as directed by Work Center Director.
2. Clean all horizontal and overhead structures, including cranes, beams, platforms, etc. at least once per calendar month.
3. Prescription safety glasses with tether and side shields.
4. FOD is not introduced into the process (e.g., tacky mats, shoe brushes, etc.).
5. Entryways to the outside of a facility or areas outside a control zone are to be controlled such that FOD migration into the facility or area is prevented.
6. FOD control zone are to be controlled such that FOD migration into the facility or area is prevented.

Next
to identify systemic generators of FOD.

These bags are emptied and the contents are placed in the bags. These bags are discovered during floor walks or audits.

Any non-contaminated loose items discovered during these bags/cans are encouraged to be used in production areas, as an effective tool for monitoring the FOD "health" of a facility or process. Any FOD Bags/Cans are reviewed by the facility/processor as a means of helping to identify systemic generators of FOD.
Each tool, in and out of facilities.

Maintenance work to approved work orders and inventory control point.

Notebooks, pens, clip boards, etc.) must be logged in at the point for at least one month.

Any other items taken into a FOD controlled zone (e.g., used and remain on the at the facility controlled/process check-in maintenance activity, a tool checklist (FOP-0179) must be

Area Supervision must control all loose items (tools, loose item accountability during controlled status
At the conclusion of this activity, Operations and/or Quality Assurance Inspecting:

Maintenance activity in FOD Control Zones.

Operations must provide 100% monitoring/surveillance of all Monitoring:

Monitoring and Inspection
An Open Status is when all FOD tool, material and access control measures are in force.

Let's take a little quiz.
Controlled status, how often?
Monitored/surveillance of all maintenance activity in FOD Control Zones when in a
For Maintenance work in a Controlled Status, Operations will provide
Let's answer some questions.

Only on weekends
Only when maintenance requested
Only 100% of the activity
Only on swing shift
Housekeeping Continued

- Floors will be cleaned daily unless building is not in use.
- All spills must be cleaned/addressed immediately.
- All out-of-place propellant must be cleaned/addressed.
- Wastes will be removed at earliest opportunity.
- All escape routes must be kept clean.
- Control zones to maintain a visually clean (VC) level of cleanliness.
- Personnel are to practice a "clean-as-you-go" policy in all FOD.
Working days:
All spills or out-of-place propellant must be cleaned/addressed within the next 2 days.

Let's take a quiz.
Let's see what you have learned.

Maintenance personnel are responsible for their tools carried into the controlled production area. These responsibilities include:

- Use Tool Checklist (FOP-0179)
- Clean as you go
- Work to approved work orders
- Inventory each tool in and out

Submit Restart
Control Zones by keeping outlets, connections and hoses clean and dry.

Operations are to maintain the quality of the compressed air/nitrogen used in FOD.

- Compressed Air
- LMC and M-325

In the Mix/Cast work center, this monitoring includes the following:

- Nitrogen

Contamination in the environment and in plant-air systems and RSM program requires regular monitoring of particulate.

Environmental Monitoring
Charring:

Obtained data will be controlled through SPC Control Team (CCT). Only particle sizes of 5.0 micron and larger will be measured. Portable systems as approved by the Central Contamination Control Laboratory (CCL) and M-325 Laboratory are to be measured weekly.

Environment Monitoring
Blind holes will either be filled or positively identified by applying a contrasting color ink/paint. Cross through the hole in contrasting color ink/ paint.

Approved Methods are:

- Stack/Preventing
- Lock-Tie
- Locknut
- Safety-Wire
- Lock-Wire

Fastener Control

Fasteners must be positively secured.

Planning to provide hardware protection. In FOD Control Zones, all adjustment screws will be positively secured or controlled per planning. Adjacent FOD Control Zones (except...
Critical Tooling/Hardware Protection

Critical Tooling/Hardware must always be protected from exposure to outside air/dust and FOD. Vehicles entering the process building must be equipped with a spark/flare arresting device.

In areas where plastic hanging curtains are used, the individual curtain strips are to be regularly inspected and cleaned of any potential FOD.
During regular Contamination Control Audits, this team will track and assure a timely response to actions identified during any management and established procedures. Defined by engineering and operating objectives as guide, coordinate and assure implementation of FOD objectives and engineering and operating. They meet regularly to communicate their work Center CCT is composed of representatives from
Findings shall be forwarded to the work manager for corrective action.
Any findings/discrepancies that cannot be corrected on the spot, must be documented in writing and forwarded to the applicable operations.

Contaminant Control Audits
As a minimum, audits shall be performed annually in all facilities.

Center CCT for documentation and charting.
Material Containers

Open bins and mix bowls containing product should not be left untended (except where remotely processed). Lids or covers should only be removed within the confines of a secure area or station.
Required.

All protective shields and overhead canopies must be used as screened before addition.

All raw materials added to a mix-bowl or a grinding mill, must be material screening.
All raw materials added to a mix-bowl or a grinding mill, need not be screened before...

Let's take a little quiz.

False
True

addition.
At the LMCP a special "Casting Area Item Checklist" is used to control FOD. This form must be maintained from the time the case is installed in the pit until the pit is covered. A checklist is also required during other critical operations such as Castable Inhibitor application.
Core Processing

Core exterior must be covered before transporting and during horizontal storage in the LMCP. For RSRM, at Pit-13, before scheduled Teflon coating operations. The core interiors must be vacuumed and stored in the horizontal position with the at end.
For RSM, the pit lid must be installed if segment is not covered.

If not being worked at a casting pit, Motor Segment is to

Segment/Motor Protection
Tape Control

For when removed.

If tape is used to secure plastic covers, all pieces must be accounted used. Great care is required when applying and removing the tape. is used only when planning calls for it to be used. Whenever tape is The process of tearing plastic tape easily generates loose FOD. Tape
Controlled Materials

- Bottles of PF degreaser and IonoX BC solvent will be distributed from appropriate bottle fill stations.
- Bottles of PF degreaser and IonoX BC solvent will be ordered from supply stores.
- All wash bottles containing Methy Chloroform will not be allowed.
- Refilling of solvent wash bottles by operators will be allowed.
- Solvents
Pick up new bottle at fill station or supply stores

Dispose of old bottle at fill station

Refilling of bottles by operators is not allowed

Solenoid wash bottles:
The following statement are true for methyl chloroform, PF degreaser and Lonix BC

Let's take a quiz.
M-320 – 3 Ton Hoist in battery room
M-314 – North and South 2 Ton cranes for lifting Iron Oxide bags
back up east bay
M-120 – 7.5 Ton, 2 Ton West Bay, 5 Ton East Bay and 5 Ton
M-27 - ¾ Ton Jib Crane
Mixers (M-20, M-22, M-24, M-25) 8 Ton and 4 Ton Cranes

The following list of cranes have been waived by the Contamination Control Team for requiring a debris/drip shield:
Crane Debris/Drip Shield Exemptions
Mixing Areas:

Zones (Darkened Areas)

Mix/Cast Process FOD Control
Ingredient/Premix Preparation

Mix/Cast FOD Control Zones
Average completion time = 25 min. Make sure you change to the proper number.

Contamination Control Awareness

Completion, completed.

And others as required (must be contamination control training additional work center specific contamination controlled areas).

If access is needed to these processes within any work center.

Access to any of the controlled contamination does not grant.

Most ATX Thirskol work centers.

Required for general access to completion of this training is.
The goal of this training is:

Why more training?

Process:
control measures to prevent the introduction of contaminants into our
providing you with the ability to recognize contamination and knowledge of
improve the quality, reliability, and safety of our products and work areas by

And themselves:
This training will provide basic contamination control knowledge and encouragement
The individual take the appropriate steps to protect the facilities, the hardware,
Recognize building access restrictions.

List methods to control contamination and give examples of their application.

Identify the various forms of contamination and give examples of their sources.

State the impacts contaminants can have on our products.

Describe what contaminants are.

After completing this training, you will be able to:

What is in this course for me?
Let's review how contaminants can affect our products.

The key to the definition of contamination is that the substance is unwanted in a particular environment. As often is the case, a material necessary in one process might be a contaminant in another.

What is Contamination?
These unwanted materials everywhere we go.\linebreak[1]\linebreak[1]If it’s numerous particulates and contaminants. We tend to spread them, we are carriers. The clothing we wear has loose threads, fibres, we shed skin, hair, perspiration, and spread oral and nasal fluids.\linebreak[1]\linebreak[1]You may be surprised to learn that people are the most common source of contamination.\linebreak[1]Contaminants come in every state of matter: solids, liquids, and gases. Contamination has a vast number of forms and is found almost everywhere.

States of Contamination
Particulate matter of significant size are grouped loosely under the name of FOD, from overhead cranes. For other objects such as debris, material shedding, and deburring activities may include: smoke, weld splatter, and fumes, machining chips and burrs, materials shedding, and debris. These are just a few of the many sources of contamination that are potentially hazardous. But people are not the only source of contamination we are concerned with... Particulates are particles from adjacent manufacturing processes that may be hazardous. These particles-pelletized may be skin scale, hairs, dust, lint, fibers, and ash from cigarettes.

As shown on the previous page, solids contamination are materials brought inadvertently into a process. These particles-pelletized may be skin scale, hairs, dust, lint, fibers, and ash from cigarettes.

Solids
Through the workplace, liquids and semi-solids are difficult to control because they are often hard to see and so easily spread and tracked. Liquids and other liquids may cause corrosion, electrical shorts, and ungrounds. Water and other liquids can be a contamination. Common sources are people's perspiration, water, solvents, oils, lubricants, and humidity. A liquid in the wrong place can be a contamination.
Let's have a quick review of what we learned.

and the spread of liquids.

Spills must be cleaned up immediately to prevent fumes escaping.

Paint and solvent cans must be tightly closed when not in use.

Critical breeding areas.

Only electric-powered forklifts and manlifts are permitted inside.

Invisible, making it difficult to identify and control.

Vapors and combustion exhaust gases. Gaseous contamination can be visible or

surfaces. Gaseous contaminants can come from workteam members, chemical

gases.

Gaseous Contaminants
Only a concern if it is a solid FOD.
Not a big deal in our business.
Sure where it shouldn't be.
OK because there is so much of it everywhere.

Contamination is:
People are:

- Not very good at seeing most contaminants.
- Carriers of contaminants.
- Sources of many types of contaminants.

(Select all that may apply)
The planning says the parts should be clean, so we just don't look as hard.

- They are introduced at the vendor's plant and we assume the parts are clean.
- They are very small and suspended in the air.
- They are very small particles on the part's surface.

(Select all that may apply)

Some of the reasons we do not see many contaminants are:
Let's begin by protecting the parts from the people.

Each must be made clean. Materials, and even the air are allowed into controlled bonding or assembly areas, and are protected with cleaning equipment. Before people, equipment, and are protected with cleaning equipment. Before people, equipment, work.

These Foreign Object Control areas are identified by signs on doors, barcodes, work.

We must make sure all bonding and components used to manufacture the hardware, controlled bonding or assembly areas.

are clean and free of contamination. The best place to begin control is outside of the contamination the unwanted substances. Everywhere and comes in numerous forms. This next section of this course will focus on controlling the quality and safety of our products. We were shown how contamination affects both the

Controls of Contamination
other work areas.

After bonding operations, the low-lint clothing is removed and disposed of to prevent contamination collected from the bonding operation from entering into the hardware or tooling.

Buttons from entering into the hardware or tooling:

- tee-shirts will prevent loose clothing with buttons
- Pull over
- Operators and transients in the area

Since the special thremeselves, Since the special clothing to limit contamination generated by the metal/air interface, operators must wear the appropriate low-lint clothing covers most of the body.

Before entering rocket motor segments,

Critical Process Controls

During bonding and assembly operations, contamination from operators is controlled in a controlled area and only essential work team members allowed to enter the area.

Through strict entry procedures and apparel. All critical processes must be performed through the strict entry procedures and apparel.
Hair Nets

Hair and beard nets must be worn in all Foreign Object Control Bonding areas.

Hair nets are required for the job.

Always check planning to see if hair and beard nets are required for the job.

Be aware that hats are not permitted in some areas. Always check planning to see if hair nets are required for the job.

When wearing a hat, it must be entirely covered with a hair net. When wearing a hat, it must be entirely covered with a hair net.

You are performing.
contaminates bonding surfaces.
transfer them to everything they touch. Take care not to
easily absorb grease and liquids and
unfortunately, absorbent. These gloves
leather gloves are both long lasting and,

with solid gloves.
them often to prevent touching hardware
you are using disposable gloves, change
wear gloves called out by planning. When

home or likewise transfer contaminants back to your job (fabric softeners, etc.).

because you may unknowingly spread industrious contamination into your

them in at the change area and pick up clean ones. Do not take work clothing home

spreading particles and other types of contamination everywhere you go. Turn

they have gross contamination or lose threads, then you may be unknowingly

Change your clothing regularly. If coveralls, coats, or smocks are soiled or worn until

Clothing
Certain you are in compliance with area procedures.

Please check in with area supervision to make sure NOT allowed.

Are not noticed into the processes:
- Ingested or similar items that could chip or false alerts or bracelets and necklaces, ( Provided or false jewelry or any kind, exceptions on Medical pockets before entering.

Control boarding areas. All personal entering a FOD sensitive area shall empty their pockets.

The "Empty Pockets" policy is in force at all mixer buildings and in Foreign Object Empty Hands.
Typically these areas do not allow food, tobacco, or gum and an Empty Pockets rule applies.

Other areas have check-in requirements where transistors and observers are screened for clearance to the manufacturing areas.

Door locks. These doors must be securely closed after opening.

All operators and transistors or observers must enter through the Controlling Access...
Isolating Operations

operations using materials for production work that are potential contaminants to

Other operations must be isolated or cordoned off.

The placement of tacky

Tacky and assembly areas is

Object Control Bonding

the entrance to foreign

mats or shoe cleaners at

Mats should be changed regularly to avoid being

Tacky recommended.

is everyone's

overloaded with dirt; this

Responsibility.

Control: Hand Tools

- Never leave hand tools in an area where they could slip or fall into open use.

Use shadow boards to store tools and account for tools when they are not in use.

A station checklist must be maintained.

- Always clean hand tools before processing.

- Return items to storage.

- Foreign object control areas are to be assured all items entering the area.

- If any item is not accounted for, shut down and account for at all times.

Segment considered to be in the component or until a lost item is found, it is:

Find it.
Cloths in an approved container.

Prevent the cloths from becoming saturated with contaminants. Dispose of soiled cleaning clothes regularly.

When hand cleaning with solvents, change the cleaning clothes frequently.

Cross-contamination.

Prohibited. Tag and properly dispose of contaminated squeeze bottles to prevent contamination. Attach a „use when dispensing“ label to the squeeze bottle. Never leave a gap between the dispensing nozzle and the cloth.

Squeeze Bottles

A solvent bottle can easily spread contamination if not properly used.
Air Lines: Controlling Contamination

Hydrocarbons continuously monitored for moisture and compressed air sampling plans. The air is compressed air contamination control laboratory (M-35A Lab) using the system will be accomplished by the contamination building supervision.

Inspect outlets on compressed air system for any contamination in or around outlets.

For RSM facilities, testing of the compressed air stop use immediately; place a "Use Prohibited" tag on the outlet, then notify the facility immediately.
Roll-up doors in FOD Control Zone bonding areas help control migration of tools, equipment or materials are moved in and out of the building. The only time they should be open is when contamination from outside the area.
Those materials called out in the shop planning materials used in our work centers. Use only body oils, Teflon®, grease, lubricants, and other agents: Silicone, fluorocarbons, fluoroelastomers.

Several substances are considered release agents. An unfused by reducing the strength of the bond. A release agent on a bonding surface will cause penetration mating surfaces. Forward core to prevent propellant from bonding to tooling. RTV (silicone) is used on the bonding. Teflon® tape, for example.

Release Agents
covered.

When spray must be applied to equipment that cannot be
booth or outside and away from building airducts.
Equipment requiring spraying should be isolated into a spray
booth.

The mist from spray cans is easily airborne and can drift to
the mist from spray cans is easily airborne and can drift to

Always be wary of using aerosols in a controlled facility. The material in the can as

Aerosols
In a building are also sources of particles. Facilities may not have clean surfaces, aging painted walls, and cracked floors. Tools and normal operations contribute to the contamination work environment with overhead cranes, and hand tools contribute machinery such as forklifts, manlifts.

Sources of Contamination
The next crew, when you may be in a hurry to finish up a job, and never leave your mess for Clean potential contamination as you are working, don't leave it for the end of your shift. The QUIZ button below will take you to the next series of questions and a TEDS ink.

Clean As You Go
The person in the picture needs to take his overalls home for a good washing. Should seriously consider a visit to the Laundry. Is appropriately dressed for a critical bonding job. Is proud of his work, and shows it.
Use sticky tape to remove the debris.

- Use shelf cover or finding a cleaner long term solution.
- Remove the rubber for cleaning. Do not ignore the problem. Consider replacing.
- Grab a shop rag and wipe out the particles.
- Use high pressure compressed air to blast away the pieces of debris.

A solution could be:

- Shelf cover.
- Plastic flakes from the worn-out.
- The dark spots on the rubber pattern.
Wait for a friend to let you in.
Better find another way in.
If you don't work in here, please check in.

This sign means:

Restricted Area

or Page: 510, 860, (932) 5332, 6861
or Call: 4239, 5332, 6861
From Resident Supervision
Permission To Enter Building
Visitors/Must Obtain

Reset
Click on the correct picture.

Which operator is wearing a hair net correctly?
Nobody and nothing leaves until we find that saw!

Bob must have taken that hacksaw with him.

Just empty the trash and I am done.

Good to go.

The next facility for Final Assembly.

The job is done and the truck is ready to take the hardware to
Just cover up the rust with tape.

- Go to the Crib for an aerosol can of paint and spray.
- In between jobs, use a wire brush on the rust.
- The air bearing has some loose rust and paint chips. It needs a little touch up.
undesired areas.

Air moving systems also move these fine particles into parts. If not controlled, spray particles can drift onto nearby critical areas of the parts.

The aerosol propellant can be as bad as the paint. The spray consists of fine particles. (Select all that may apply)

IS: The problem with aerosol cans in bonding and assembly areas
Ways we control contamination in bonding and assembly areas:

- Using anti-socks, tacky mats, shoe scrubbers and cleaners.
- Wearing the proper clothing.
- Restricting access to critical areas to those persons qualified and
- Monitoring compressed air lines.
- Controlling aerosols.

Are: (select all that may apply)