Titanium Fires Simplified

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By Robert G. Lee
Chair ITA Safety and Compliance Committee
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Facility and Transportation

- Regulations are voluminous and complex

- ASTM E 1226 Standard Test Method for Pressure and Rate of Pressure Rise for Combustible Dusts.
- 49 CFR (Code of Federal Regulation, Transportation)
- ERG (Emergency Response Guide)
- EPA (Environmental Protection Agency)
- IATA Dangerous Goods Regulations
- IBC (International Building Code), as adopted by local jurisdiction
- IFC (International Fire Code) as adopted by local jurisdiction
- ICAO International Civil Aviation Organization
- IMDG (International Marine Dangerous Goods)
- NEC (National Electrical Code)
- NFPA77 Recommended Practice on Static Electricity
- NFPA 484 Standard for Combustible Metals
- NFPA 499 Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
- NFPA 654 Standard for the Prevention of Fire and Dusty Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids.
- OSHA
- TSCA (Toxic substances Control Act)
- Specific modes of transportation and specific carriers also have special regulations, packaging and handling requirements that must be identified and complied with.
TITANIUM FINES ARE NOT CREATED EQUAL

• UNDERSTAND HOW YOUR MATERIALS REACT AND HOW YOUR PROCESSES CAN CREATE IGNITIONS CONDITIONS.
  – At least 10 different kinds of powder and fines
  – At least 10 different kinds of processing methods
  – About a dozen factors that influence flammability, ignition, dust dispersion
  – Test and ignite a small quantity of your material at various process steps
  – Require employees to observe how the material burns
DUST AND TUBES

• BEWARE OF CREATING DUST AND COLLECTING IN TUBES (ROCKETS)

– If your process is creating dust-stop the process
– Implement engineering controls
– Be extra cautious with collection in “explosion proof systems”. Yes they may be explosion resistant, but like “bullet proof vests’ no such things exist in the real world.
– Ignition can occur when dust moves through the air.
– HVAC are dust collectors
– Set up monitoring stations in strategic process areas to collect and monitor dust quantities and their ignition potential
– Careful monitoring can drive maintenance and housekeeping
STATIC ELECTRICITY

• Not well understood not adequately tested

  – The likely culprit of “spontaneous” ignitions even when the material does not meet the spontaneous combustion test
  – Get a static testing meter and test all stages of processing and material accumulation including the time for dissipation.
  – Avoid using materials that create static charges
  – Ground equipment
  – Avoid contact of powder with Aluminum and iron, especially damp and wet forms.
  – Yes some forms of very fine, low oxygen powders will spontaneously ignite, but most will not without the addition of an energy source.
STORAGE AND ACCUMULATIONS

Probably the most important step to avoid a dangerous situation

Cost should not be the driver for processing methods

Avoid moisture and high humidity

Process and store in the smallest quantities you can

Store only in covered non static non flammable containers

Segregate and separate quantities stored with space of physical barriers

SEGRAGATION WILL STOP A SMALL FIRE AND PROVIDE YOU THE CHANCE TO KEEP IT FROM BECOMING A LARGE FIRE YOU CANNOT EXTINGUISH
BUILDING AND FIRES

• AVOID THE EXPLOSION AND SPECTACULAR VIDEOS

• No water-No Nitrogen
  – Notify your local fire department, what you have and no water can be used
  – No sprinklers where titanium is stored or processed
  – Avoid combustible materials in the areas
  – Processing and storage areas must be built with none combustible materials
  – Avoid extinguishing methods that spread material

LET IT BURN-
YOU CANNOT PUT OUT A LARGE TITANIUM FIRE
A SMALL FIRE WILL NOT CAUSE MUCH DAMAGE
TRANSPORTATION

• Most titanium fines are a flammable solid and cannot be transported by normal packing
  – You the shipper are responsible to determine if the material is a flammable hazard
  – You must be trained and have recurring training
  – The penalties are tough
    • 2013 59 passengers fined-3 over $25,000
    • 2013 67 shippers fined 7 over $50,000 up to $72,000
    • 13 shippers in 2009 to 2012 over $100,000 one $620,000