

Hazardous Energy!

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On April 17, 2018 a commercial airliner flying from New York to Dallas had a major failure of the left engine over eastern Pennsylvania. Fragments of the engine inlet and cowling (1) struck the wing (2) and fuselage, causing significant damage. One passenger window was blown out (3) causing rapid depressurization of the passenger cabin. The flight crew was able to conduct an emergency descent, and landed at Philadelphia airport. One passenger was fatally injured and eight others received minor injuries. The preliminary US National Transportation Safety Board (NTSB) report on the incident indicated that one of the engine fan blades had failed, with failure characteristics consistent with metal fatigue.

The fan in a jet engine is a piece of high speed rotating equipment, and contains a lot of kinetic energy (energy of motion). If there is a failure, pieces of metal shrapnel can cause major damage, and can travel a long distance. Many process plants also contain high speed rotating equipment – for example, compressors, centrifuges, and centrifugal extractors. This equipment could be subject to a failure similar to this jet engine failure. Process safety management systems must include systems to identify these hazards, and ensure proper design, fabrication, inspection, and maintenance of high energy equipment.

Photos taken from reference: US National Transportation Safety Board Investigative Update, Southwest Airlines Flight 1380 Engine Failure, DCA18MA142 SWA1380 INVESTIGATIVE UPDATE (<https://www.ntsb.gov/investigations/AccidentReports/Reports/SWA1380-DCA18MA142-Investigative-Update.pdf>)



Did You Know?

We often think of process safety as being about containment and control of hazardous material. This is an important part of process safety, but control of hazardous energy is also important. Some examples of hazardous energy that you might have in your plant include:

- Kinetic energy from high speed rotating equipment such as pumps, compressors, fans, centrifuges, or centrifugal extractors.
- Electrical energy
- High pressure, such as compressed air and other gases, or high pressure steam
- High temperature
- Potential energy from gravity – for example, the failure of a large tank full of liquid can cause major damage even if the liquid is not hazardous. In 1919, the failure of a molasses tank in Boston sent a wave of molasses 15 feet (5 m) high through part of the city resulting in 21 fatalities and over 150 injuries (May 2007 *Beacon*).

What Can You Do?

- With your co-workers, make a list of all of the hazardous energy sources in your plant. Be sure that you all understand the operating, inspection, and preventive maintenance systems in place to manage the risk associated with those hazards.
- Understand your role in ensuring that the hazardous energy safeguards in your plant are robust and functioning properly.
- Many high speed machines have vibration sensors with alarms or shutdown interlocks. Make sure these are not bypassed without following your plant Temporary Management of Change (MOC) procedures.
- If you are responsible for inspecting or maintaining hazardous energy equipment, follow all of the specified procedures diligently, and report any concerns that you have to your management and technical staff.

Process safety – control hazardous material AND energy!

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