

SAFETY MEMO

December 14th, 2020 – Evaporator Implosion



Incident

Laporte provides employees with information on industry incidents to further knowledge of Occupational Health and Safety (OH&S). This memo is provided as a case study of an incident and to highlight industry hazard awareness.

Context

Evaporation systems apply heat to liquid products while under vacuum to remove water from the product, concentrating the desired minerals, sugars, proteins, or fats that are left behind.

Evaporation systems utilize mechanical vapor recompression (MVR) technology to reduce steam consumption, improving their energy efficiency. These compressors may be very large, with duct sizes measuring several feet in diameter. MVR compressors may be either large centrifugal compressors or turbofans.

Plants that rely MVR typically have steam-powered thermo-compressors as a backup in the event of mechanical failure or maintenance of their mechanical compressors.

Incident description

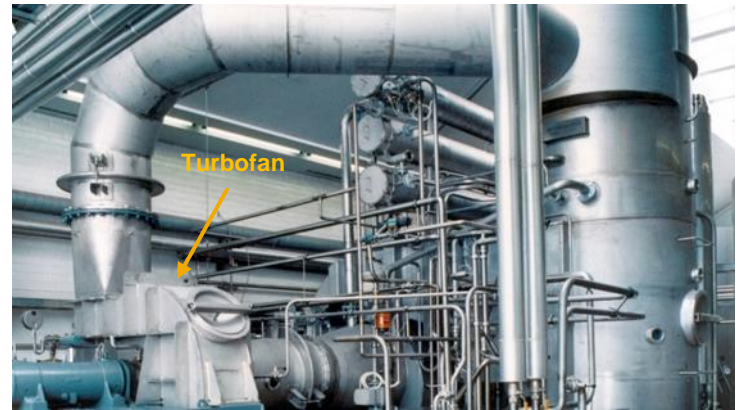
Workers were required to perform maintenance on a turbofan. To maintain production schedules using their thermo-compressor backup, the workers built a blinding flange to isolate the fan and maintain vacuum. At the moment when the flange was installed, the evaporator was started and as the evaporator approached its vacuum set point, the blinding flange imploded, sucking one of the workers into the turbofan and seriously injuring the other.

Consequences

One worker was killed, and another was seriously injured. The plant was shut down to allow an OSHA investigation to complete.

Incident causes

- The plant was required to run during maintenance, putting pressure on workers.
- Workers did not apply hazardous energy control practices to their activities.
- The workers designed their own blinding flange without completing proper engineering calculations. In this case, the blinding flange was not engineered to resist vacuum.



Lessons learned

- Apply hazardous energy control practices to pressure and vacuum systems.
- Install guards or other personnel barriers to isolate systems undergoing maintenance from plant personnel.
- Utilize qualified engineering resources designed to operate around hazardous energy when sourcing components.

