

Evaluation of the management of explosive atmospheres in milling companies: the Île-de-France region example



Caisse régionale
Île-de-France

Janès A.^{1,2}, Dufaud O.²



¹Direction Régionale des Risques Professionnels de la Caisse Régionale d'Assurance Maladie d'Île-de-France, 75019, Paris, France

²Université de Lorraine, CNRS, LRGP, F-54000 Nancy, France

| Background

- Milling plants can generate explosive atmospheres (ATEX) into process equipment (silos, mills, conveyors, dryers or dust collectors) and in working areas (Figure b). If an ignition source is activated, an explosion occurs
- Objective was to assess the fire and explosion risk related to combustible powders in the milling and grain industries, within the framework of a French National Social Insurance multi-year prevention program concerning chemical risk

| Methods

Two approaches were combined:

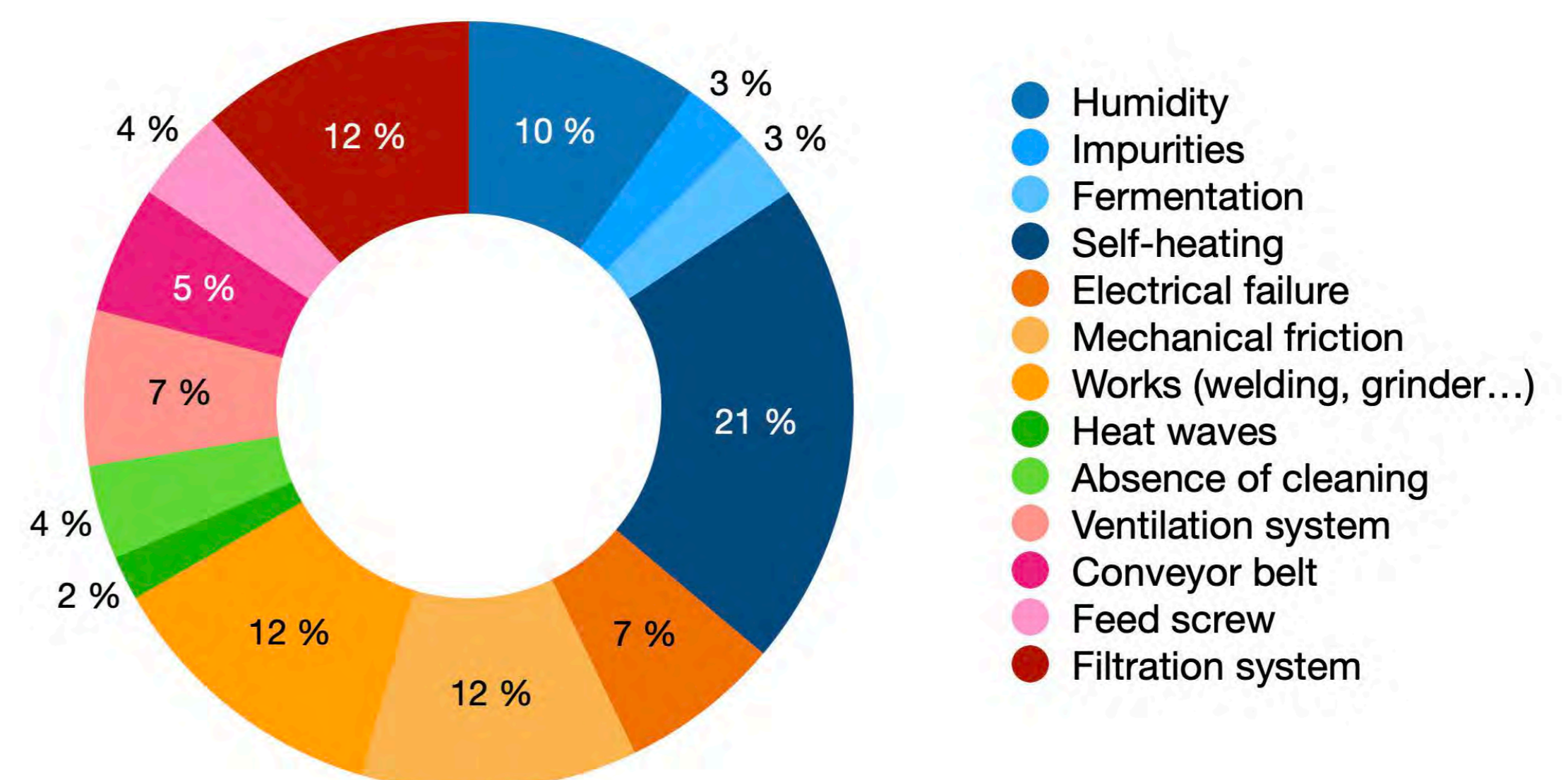
- Feedback from the ARIA (2021) accident database managed by the French Ministry of Ecological Transition, was thoroughly examined. More than 600 fires & explosions, that occurred between 1975 and 2021, were statistically investigated (Figure a).
- Onsite observations were performed on six facilities representative of the milling industries, in the Ile-de-France region

| Main results / database analysis

- Wheat, sunflower & maize are the products mainly involved
- Only few explosions, but cause the majorities of casualties
Process equipment very frequently implicated: silos & dryers
- Causes of dust fires and explosions are numerous, but self-heating, mechanical friction and works are the most common

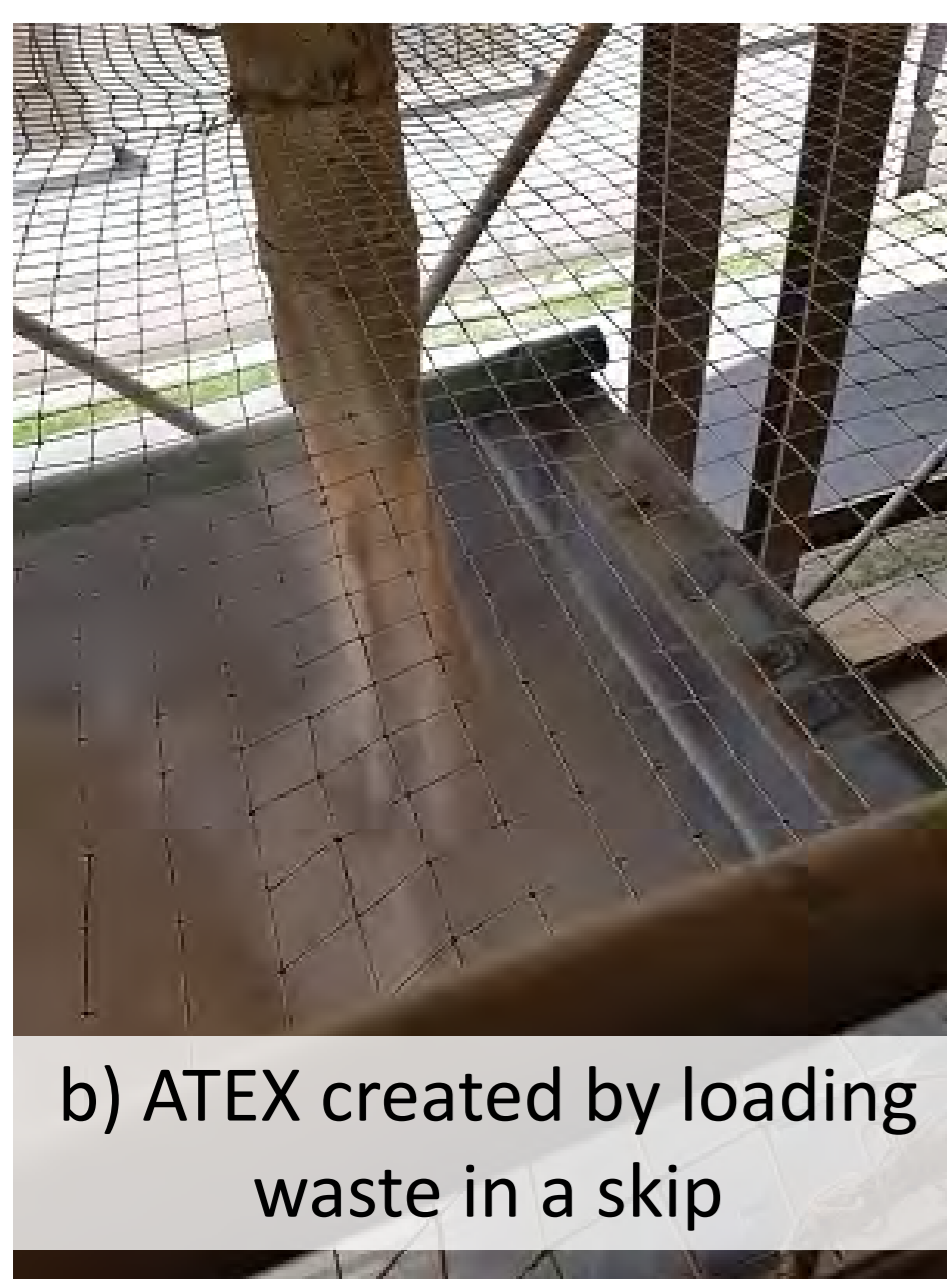
| Main results / onsite observations

- Every visited sites clean up dust deposits with mobile vacuums cleaners but also with broomsticks (Figure e), which is not recommended. A compressed air blower, which is even worse, was also observed



a) Main causes of the accidents with casualties

- In some facilities, many dust deposits are present (Fig. c & d)
- In one facility, equipment used for spark-producing work is observed in the vicinity of deposits (Figure f), which causes a significant fire and explosion risk
- Only two facilities have already trained their employees on the specific risks associated with ATEX explosion
- Although regulations have been applicable since 2003, the management of the fire and explosion risks is very disparate, depending on the culture of the company and its organization: the smallest facility has the best control over explosion risks, due to the skills and awareness of the company manager



b) ATEX created by loading waste in a skip



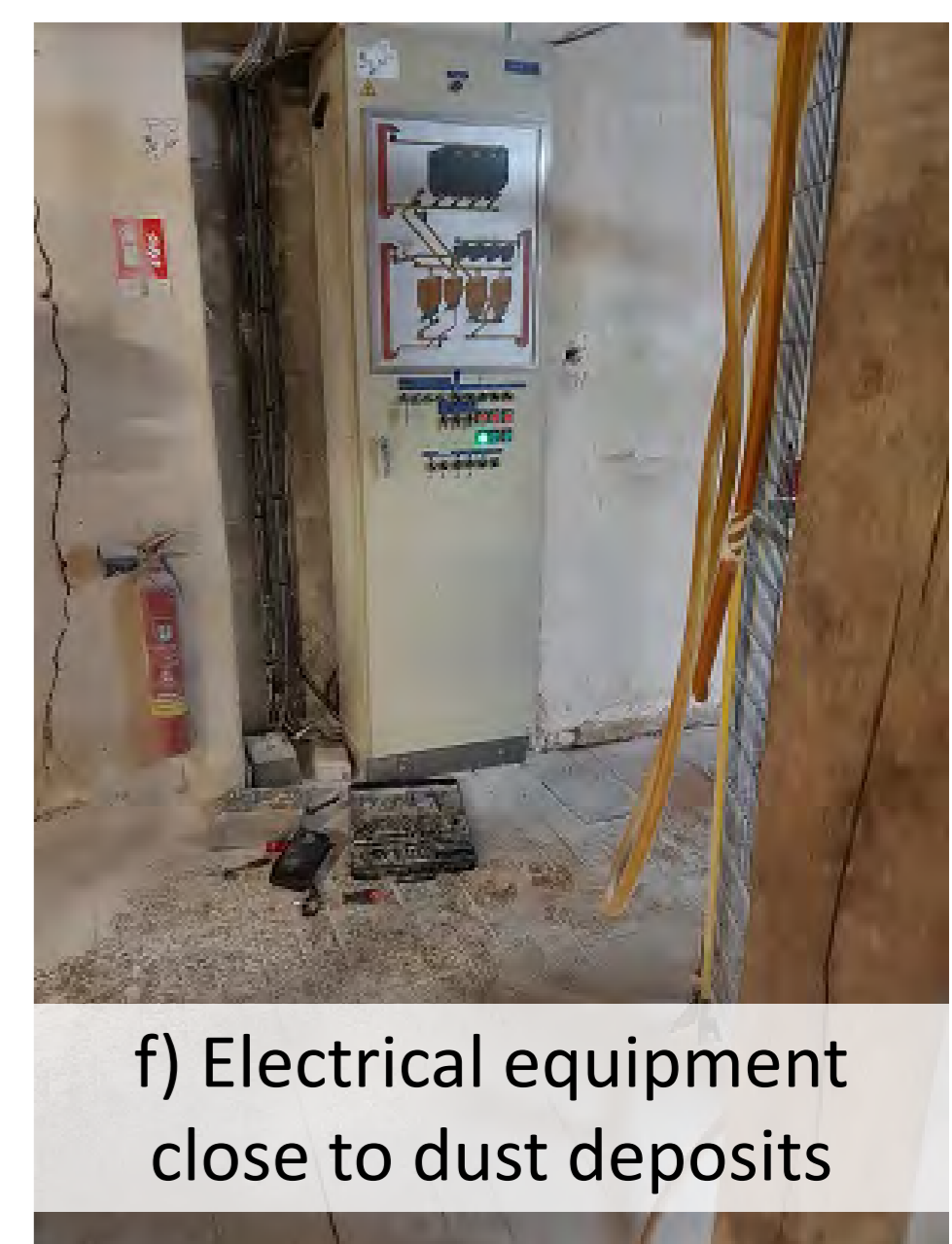
c) Wheat deposit on the floor



d) Flour deposit on the floor



e) Broom for floor cleaning



f) Electrical equipment close to dust deposits

| Conclusion

- Prevention messages still need to be carried, companies need to be trained to risk assessment and to apply safety measures
- This work allows the definition of a more systematic targeted action, which will have to be conducted in the next regional prevention program intended to make milling companies aware of this specific risk and convince them act quickly and sustainably

| Reference

ARIA, Analysis, Research and Information on Accidents database, 2021, database exploited by the Industrial Risks and Pollution Analysis Office (BARPI), part of the French Ministry of Ecological Transition, <aria.developpement-durable.gouv.fr> accessed 21.11.2021.