

安全警示

SAFETY ALERT

11月
第13期
24日

滤芯起火事故

事件还原

2025年9月25日下午，两名同学在更换金属激光3D打印设备烟尘过滤系统的滤芯时，一名同学计划使用垃圾袋盛装废滤芯，同时另一名同学从注满硅油的过滤桶中提出滤芯，在垃圾袋靠近提出滤芯的瞬间，滤芯内部燃烧。事故发生后，现场同学第一时间将明火扑灭，随后报告，安保人员到场后进行进一步处理。事故未造成人员伤亡。



原因分析

直接原因

滤芯中的钛、铌、镍、铝等合金金属粉末粒径小，有自燃和易燃特性，在用普通PE塑料袋盛装滤芯时，展开塑料袋过程中产生静电，与未完全钝化的金属粉末在空气中接触后，静电释放引燃金属粉末。

间接原因

滤芯更换指引存在安全漏洞。厂家指引更换滤芯前使用10L硅油钝化2小时，可能存在硅油用量不足、浸润时间不充分的情况。

改进建议

1. 实验室针对滤芯更换操作重新制定SOP和应急处置措施，并培训相关操作人员。
2. 将接地线延长，将滤芯更换场所从室内引出到走廊或门口空旷位置，现场拉好警戒，备好消防灭火器材和应急器材。
3. 再次确认钝化硅油的注入量，建议尽可能注满，硅油注入关闭蝶阀后，可缓慢晃动筒身，使硅油充分和粉尘混合包裹，然后静置，硅油的浸入时间应至少延长至6小时以上。
4. 收集废滤芯时，用金属或者塑料桶盛装大量防爆硅油来收集废滤芯。即在确保滤芯完全钝化后，将废滤芯从烟尘收集系统金属桶中取出立即放入大量硅油中浸没，再一起回收。
5. 针对金属激光3D打印设备进行风险评估，评估各环节的安全预控措施的充足性，并提出适当的改善建议。

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NOV 24
NO. 013

Filter Cartridge Fire Accident

Brief Description

On the afternoon of September 25, 2025, two students were replacing the filter cartridge of the smoke and dust filtration system for metal laser 3D printing equipment. One student planned to use a garbage bag to hold the waste filter cartridge, while the other lifted the filter cartridge from a filter barrel filled with silicone oil. At the moment the garbage bag approached the lifted filter cartridge, the interior of the filter cartridge caught fire. Following the accident, the students on site extinguished the open flame immediately and reported the incident promptly. Security personnel arrived later for further disposal. No casualties were caused by the accident.

Cause Analysis



Cause Analysis

Direct Cause

The alloy metal powders (such as titanium, niobium, nickel, and aluminum) in the filter cartridge have small particle sizes and possess spontaneous combustion and flammable characteristics. When using ordinary PE plastic bags to hold the filter cartridge, static electricity is generated during the process of unfolding the plastic bag. This static electricity discharges when it comes into contact with the incompletely passivated metal powders in the air, igniting the metal powders.

Indirect Cause

There are safety loopholes in the filter cartridge replacement guidelines. The manufacturer's guidelines require passivation with 10L of silicone oil for 2 hours before replacing the filter cartridge, but there may be cases where the dosage of silicone oil is insufficient or the soaking time is inadequate.



Improvement Suggestions

1. The laboratory shall re-formulate SOPs (Standard Operating Procedures) and emergency disposal measures for filter cartridge replacement operations, and conduct training for relevant operators.
2. Extend the grounding wire, move the filter cartridge replacement site from indoors to an open area such as a corridor or doorway, set up warning signs on site, and prepare fire-fighting equipment and emergency supplies.
3. Re-confirm the injection volume of passivation silicone oil; it is recommended to fill the barrel as much as possible. After closing the butterfly valve for silicone oil injection, the barrel body can be shaken slowly to ensure full mixing and wrapping of silicone oil with the dust, followed by standing still. The soaking time of silicone oil shall be extended to at least 6 hours.
4. When collecting waste filter cartridges, use metal or plastic buckets containing a large amount of explosion-proof silicone oil for collection. That is, after ensuring the filter cartridge is completely passivated, take it out from the metal barrel of the smoke and dust collection system and immediately immerse it in a large amount of silicone oil before recycling them together.
5. Conduct a risk assessment for metal laser 3D printing equipment, evaluate the adequacy of safety pre-control measures in each link, and put forward appropriate improvement suggestions.