Solutions for catalytic filtration

One Source

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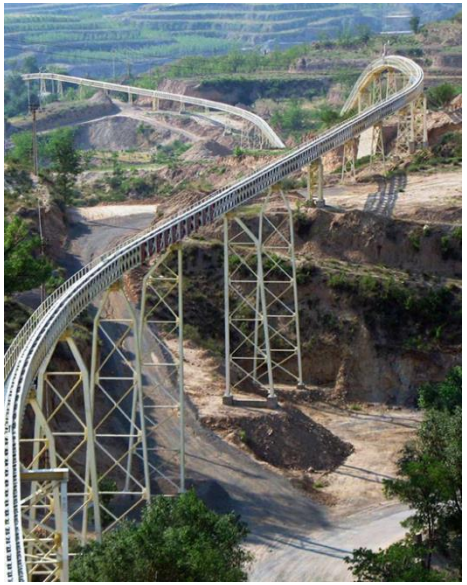
FLSmidth Offerings in Power

- Fabric Filters
- Coromax™ power supply for ESP
- Dry Sorbent Injection (lime, sodium bicarbonate, activated carbon)
- Dry Scrubber (CDS, SDA) Material handling
- Ash Handling
  - Fly Ash
  - Bottom Ash wet/dry
  - Bed Ash
- Reagent handling (WFGD, CFB)
  - Limestone milling and slurry preparation
  - Gypsum Dewatering



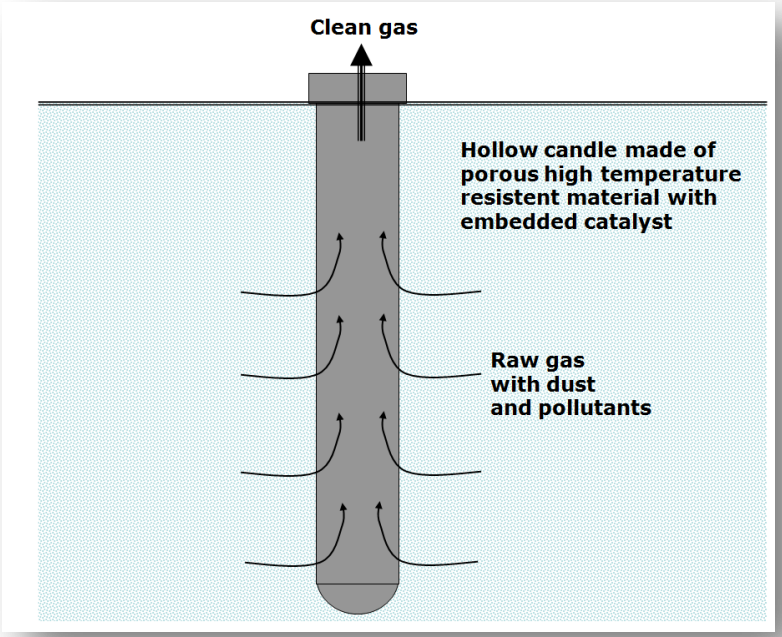
Regulations overview

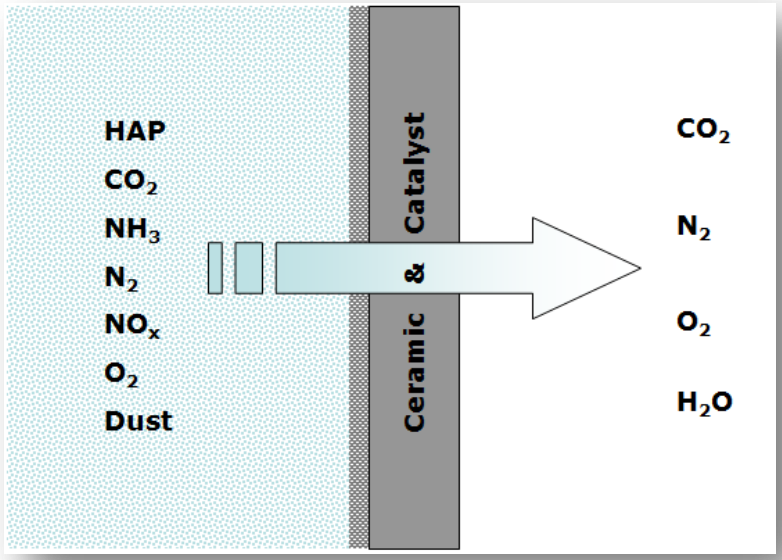
- Emission of **particulate** matter needs to be reduced
- Emission of **gaseous** pollutants – incl. new components – are getting regulated

- **Efficient** removal of gaseous pollutants like:
  - **NO_x**
  - **NH_3**
  - **VOCs**
  - **Dioxins/Furans**
  - and **PM**

  call for **all-in-one catalytic technology!**

CataMax™ cleaning principle





Combining proven technologies

- FLSmidth has a huge reference base of **fabric filters**, knowledge of **filter bag** manufacturing and **process integration technology** for more than 50 years

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- The **catalysts** used have proved long term performance for many years in utilities

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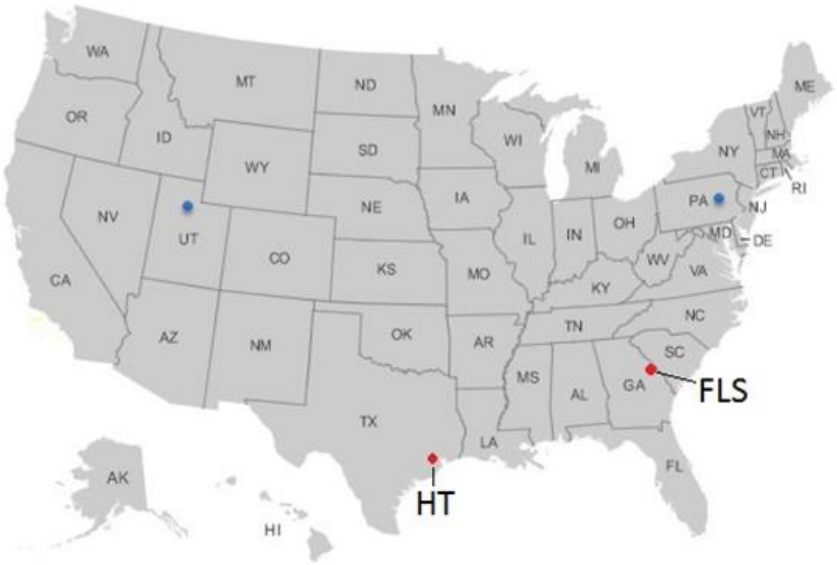
- Exceptional resistance to catalyst poisoning thanks to no contact between catalyst and potentially harmful particles
- Long bag life due to optimized distribution of gas and dust
- Minimized bag wear due to design of star cage and bag fabrication

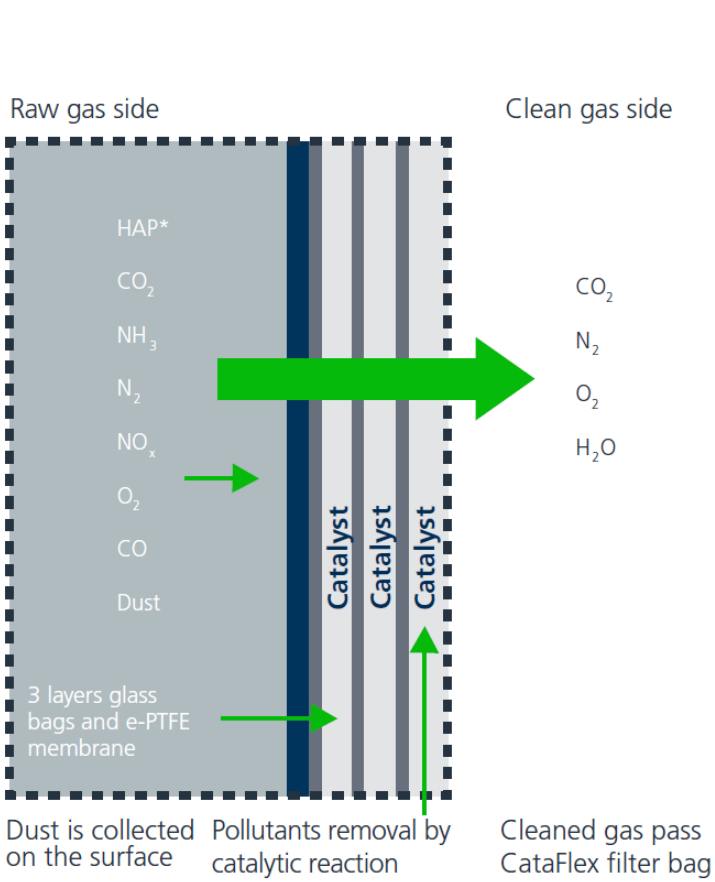
CataFlex™ Catalytic Filter Bags

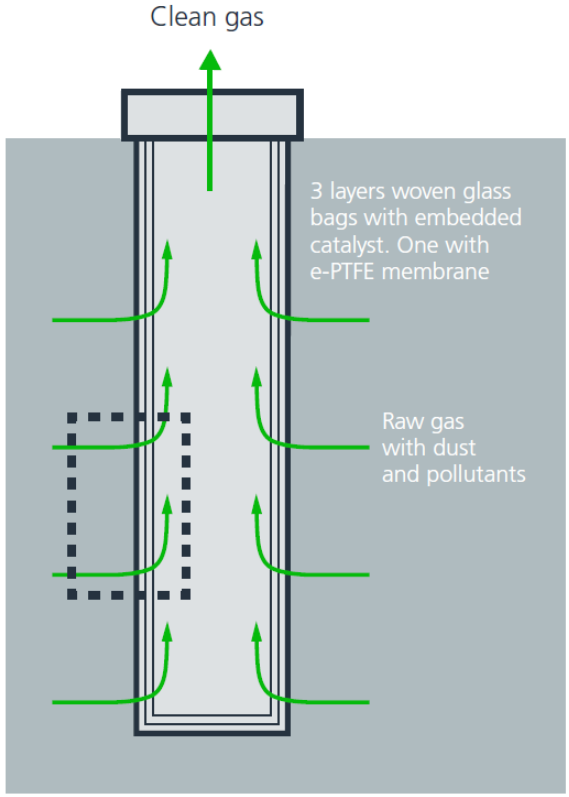
The two Danish companies **FLSmidth** and **Haldor Topsøe** (specialist in catalysis and surface science) have joined forces and developed a **patent** pending product **securing compliance** with the strictest **gaseous emission** regulations as well as the **PM** requirements

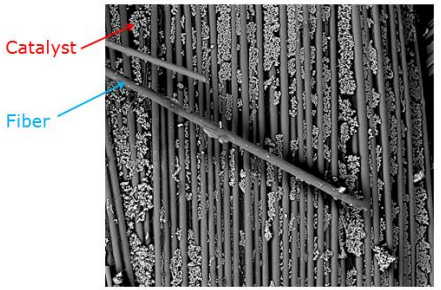


Other FLS offices

CataFlex™ cleaning principle

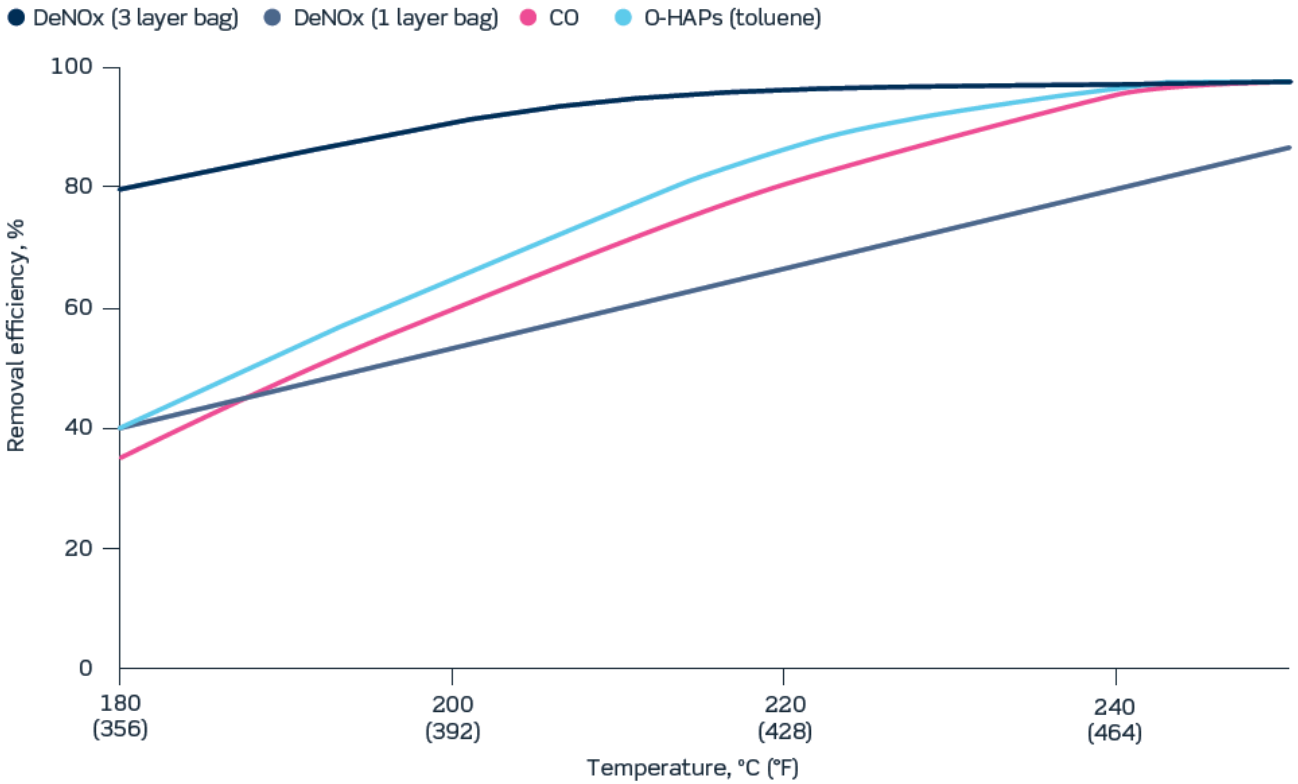






** Organic HAP includes formaldehyde, benzene, toluene, styrene, xylene (m-, p-, o-), acetaldehyde and naphtalene.*

CataFlex™ NO_x/VOC/o-HAP/CO* removal



High removal of NO_x combined with low NH_3 slip

High VOC (o-HAPs) removal

***CO optional depending on catalyst formulation**

Integration of CataFlex™ in your plant

- There are various possibilities to implement a CataFlex™ Catalytic Fabric Filter (CFF)
- A **new CataFlex™ CFF** includes all the FLSmidth fabric filter know-how, features and proven technology (e.g., online maintenance)
- **ESP to CataFlex™ CFF** conversion uses same principle as ESP to FF conversions
- Existing **FFs** can be **upgraded to CataFlex™ CFF** with FLSmidth unique gas distribution screens, online cleaning features etc. securing optimum operation

Testing on site - 1

- Pilot test
- NH_3 injection is possible
- Possibility for varying of process conditions (temperature, flow rate etc.)

Testing on site - 2

- Partial replacement of bags
- NH_3 injection is not possible however a $deNO_x$ effect is observed when NH_3 is present in the flue gasses

Facts and figures

CataMax™

References as per July '16:

- 1 full scale project under execution
- 4 slipstream tests

Continuous temp.: 680 °F

Peak temp.: up to 750 °F

Filter ΔP range: 9 – 13 inWG

Length of elements:

Today: 10 ft (3 m)

Future: extended length

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References per July '16

- Partial bag replacement testing
- Full scale testing

Continuous temp.: 480 °F

Peak temp.: up to 500 °F

Filter ΔP range: 6 – 8 inWG

Length of bags:

Today: 33 ft (10 m) (as conventional bags)

Conclusion

- FLSmidth has extended **process experience** and **know-how** within **air pollution control** and adapting to plant specific needs
- **CataFlex™** and **CataMax™** are technologies developed ensuring a unique single-step approach for multi-pollution control
- Securing compliance with the **strictest emission** requirements for **NO_x, NH_3, VOC, D/F** and **PM**
- We are looking forward to making **YOU** ready for meeting future requirements

…thank you for your attention