

Traditional Fire Boxes

- Are not “people proof.”
- Are difficult to fit and often require trial fitting.
- Can retain stem leaks and moisture.
- Access to equipment is limited, with normally only one small door.
- Incur logistics and installation cost.
- Need to be removed and refitted during maintenance.
- Promotes corrosion which can go undetected.
- Often never tested or certified to UL1709.
- Blast resistance?
- Only as effective as the person who fitted it, which is normally not the manufacturer.
- May contravene BS EN60079-14:2008.
- Take up a lot of space.
- Usually require ladders, platforms and support structures.



Intumescent Coatings

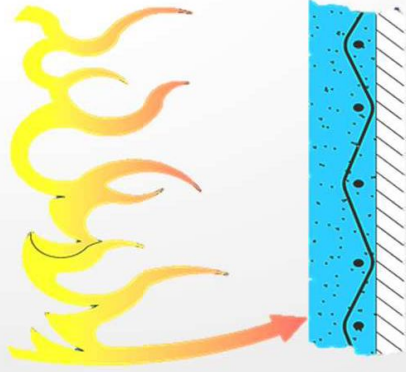
- Impossible to be left off.
- No fitting required on site and no invisible costs.
- Adds an extra layer of corrosion protection.
- Full access to equipment with no special tools required.
- Cannot store spills and chemicals have little or no effect.
- Does not effect the flame paths on explosion proof actuators.
- Blast resistant.
- Will last the life of the actuator if the paint integrity is maintained.
- Usually only applied to new equipment.
- Prior to detecting the fire it does not act as an insulator and so does not affect motor sizing.



Example of the difference between intumescent coatings and enclosures

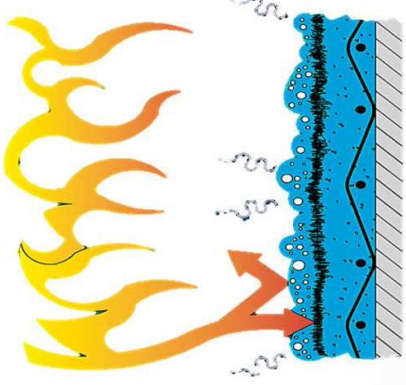


How K MASS® works



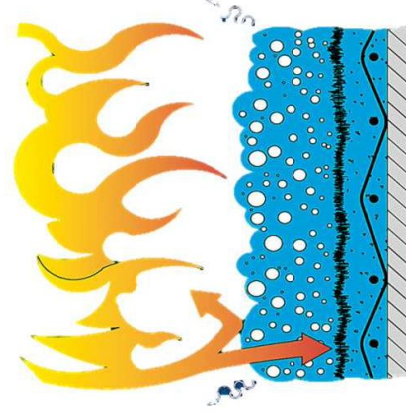
As the fire starts

- K-Mass® starts to react at 85.6°C.
- A chemical process causes the coating to expand (intumesce). Evaporation on the surface then takes place which also has a cooling effect.
- The outside surface then starts to char.



During the fire

- The surface char deepens reflecting 80-90% of the heat back into the fire.
- More intumescing takes place which forms a barrier which both insulates and has a cooling effect.



Long term exposure

- The 1093°C heat will penetrate this layer so that the K-Mass® below will start to react
- The next layer reacts as before.
- The layers react until the fire is extinguished or the material is consumed.

How KMASS[®] works in reality (UL1709)



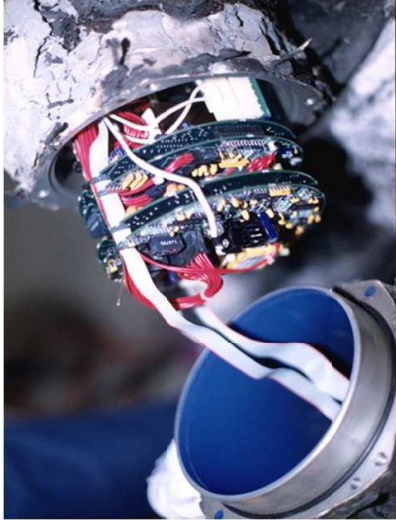
Before the fire

- The actuator looks and operates as a standard model.
- Take note of the burners directly pointed at the actuator. Not all tests are done in this way.



Externals after the fire

- You can see the expanded K-Mass[®]
- The outside surface then starts to char.
- You can also see the light grey parts which are the charred surface which helps reflect the heat.



Internals after the fire

- Notice that all the electronics remain undamaged.
- Notice how the "O" ring is still intact.
- In cases like this where the fire has been extinguished it may even be possible to replace the K-Mass[®] and put this actuator back into service.

Life cost of Passive Fire Protection

Type of fire protection	Capital cost \$	Shipping Cost \$	Fitting at site Cost \$	Additional Maintenance over 20 years cost \$	Cost of replacement 10 years	Cost of replacement 20 years	Total life cost \$
Blanket or bag (insulative)	\$1760.00	\$300.00	\$456.00	\$2000.00 Refitting the bag after each actuator maintenance	\$1760.00 life expectancy 10-15 year max	\$1760.00	Up to £8200.00
Stainless steel Enclosure (Insulative)	\$2130.00	\$700.00- \$100.00	\$642.00 This is due to fitting pipe work which normally requires modifications	\$2000.00 Refitting the enclosure after each actuator maintenance	\$0.00	\$2130.00 life expectancy 15-20 year max	Up to £7200.00
Epoxy Intumescent (K-Mass®)	£2515.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	£2515.00

Safety Features for Passive Fire Protection Types

Safety feature	Bag or Blanket	Box/enclosure	Intumescent Enclosure e.g. K Mass-Lite®	Directly Bonded Intumescent e.g. K-Mass®
Meets UL 1709	✓	✓*	✓	✓
Meets ISO 834	✓	✓*	✓	✓
Meets BS 476 pt 20	✓	✓*	✓	✓
Meets ASTM E1529	✓	✓*	✓	✓
Meets Jet fire ISO 22899 Part 1.	✓	✓*	✓	✓
Operational testing (done the item working inside)	✓	✓*	✓	✓
Weather resistance		✓*	✓	✓
Compliance with BE EN 60079-14:2008 (ATEX)				✓
Prevents storage of gases or liquids			✓	✓
Prevents build-up of heat in equipment				✓
Prevents Corrosion (by adding additional protection)				✓
20+ year life span				✓
Easy Maintenance of Actuator			✓	✓
People proof (cannot be left off after maintenance)				✓

* note that not all enclosures are tested as this type of protection is largely unregulated

Advance Types of Fire Passive Protection



Insulating bags or blankets:
These use insulation to prevent the migration of heat from reaching the critical item

K-Mass Lite® :

All panels are independently removable. Self supporting so no additional support structure is required. Tested to meet UL1709. K-Mass Lite® can be drilled then sealed with mastic. If required K-Mass Lite® can be vented to prevent build-ups from steam leaks.



Traditional fire box :
This uses both the insulation from the wall structure as well as the air gap to prevent the migration of heat from reaching the critical item.

Intumescent coating :

This does nothing until a chemical reaction is started by the addition of heat from the fire. This then uses an endothermic reaction to cool the surface which then chars to reflect 80-90% of the heat away from the critical equipment.



Why does the end-user get value for money

- FEED— They have no effect as they design the process only.
- EPC – They work to a tight budget; if they save money on capital costs it increases their profits.
- Valve manufactures – They have to bid the lowest price to gain the business. This will lead to specifications being changed to get the lowest capital costs.
- Actuator manufacturers – They will specify insulative products for two reasons:
 1. It's simple - they need do no extra work from them.
 2. Cost - they only win business when they have the lowest prices.

In summary the system is stacked against the end user getting the best product. In fact it's the worst protection at the highest cost which is normally supplied. The only way to prevent this is to.....

Insist on directly bonded intumescent coating in your specification.

Intumescent are being used all over the world just look at some of our customers....

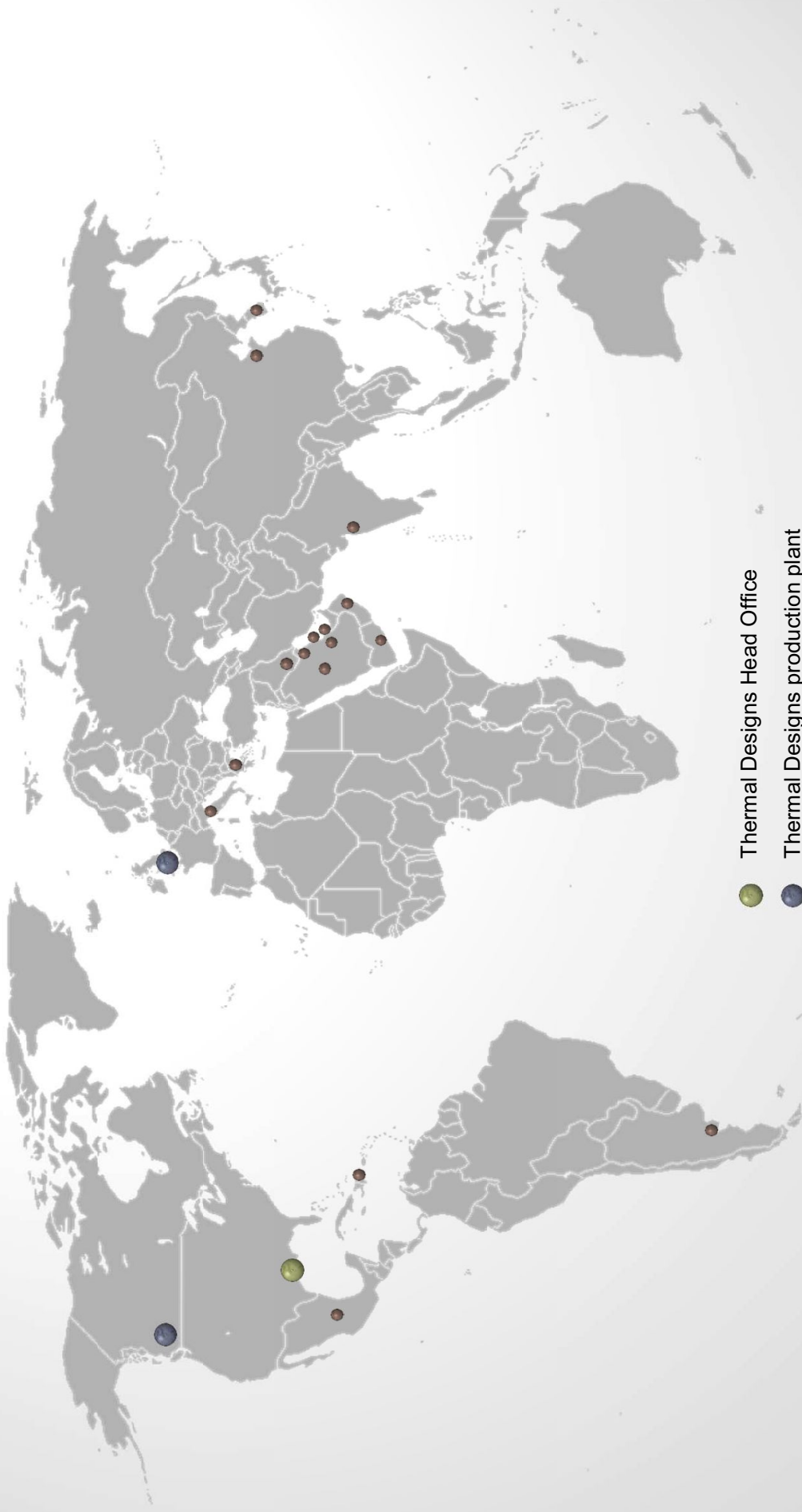
History of Thermal Designs UK



- Thermal Designs UK LTD is a direct subsidiary of Thermal Designs INC. The company was founded over 30 years ago in Houston TX manufacturing fire proof enclosures manufactured from Captive Ceramic Fibre(CCF). The then owner of the company decided that there must be a better way, and he bought the rights to a product from NASA. NASA used this product to protect the Apollo capsule from the heat of re-entry. We now call the product K-Mass®.
- Before K-Mass® there was no intumescent coatings, only enclosures and fire blankets and it was at this time the industry was catapulted forward.
- K-Mass® is currently in version 3, as we are continually improving the chemistry to enhance the performance as well as looking at new ways of improving fire safety.



Thermal Designs World Locations



- Thermal Designs Head Office
- Thermal Designs production plant
- Thermal Designs Agent

Project History for Thermal Designs UK

TATA cairn

Polimeri Europa

Mangalore Pet. & Ref. Co.

Gas Transfer Terminal Yuzhno-Sakhalinsk

Hilal b Platform Egypt

Shell Pernis

BS160 Kuwait

Khursaniyah

IOCL Paradeep

HDEC-Borouge Project 3

Foster Atmospheric Tenefire

Kayan

Raffineria Di Milazzo S.C.p.A

SECL CO2 (Saudi)

SATORP

Jamnagar J1 +J2 +J3

Yanbu

Reliance Butane

Bharat Oman Refinery

Wasit gas

BNFL Sellafield

Elefsis Project

BORL - Bina Refinery

Eurotunnel

Hellenic gas transmission

ADCO BAB HABSHAN 1

Cartagena

Uran-Chakan-Shikrapur-LPG

S/A Safaniya

Rabigh Phase 2

ISPRL India

Borouge2OCU project

HPCL AIL reef

Tupras

Antwerp gas terminal

Hawiyah Project

JCP Project

Khursaniyah project

Protezione Strumentail IISTEP project

Al Jubail

Habshan 5

KNPC LNG TANK FARM KUWAIT

La rabida Refinery

Shaybah NGL-1

Emarat termial

JUBAIL EXPORT REFINERY

El musel

RTIP/SADARA

ICHTHYS

Mangala development pipeline