

# Environment, Health & Safety

## EHSA committee

Introduction

Environmental issues in manufacturing carbon and graphite products

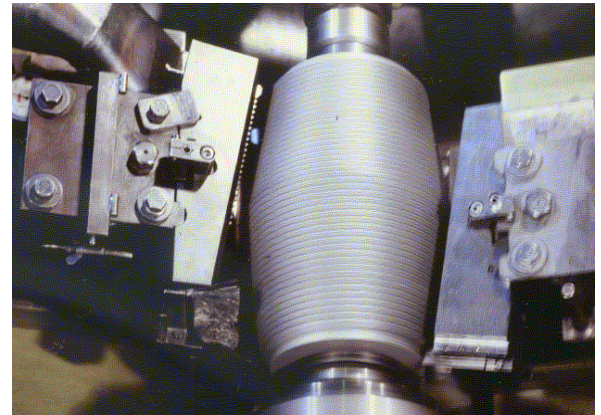
## Recommendations when machining



# Recommendations when machining (1)

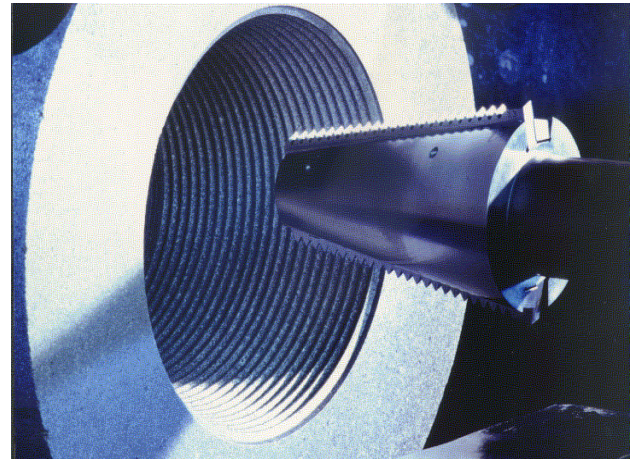
*When machining graphite following steps should be taken to insure economical and safe machining:*

1. Wear adequate eye protection
2. Provide adequate dust collection. This may vary from the use of common shop vacuum canisters from single machine collection to highly sophisticated central vacuum systems for a series of machines. Graphite chips and dust should be collected as near the generating source as practical. This generally is accomplished through collection guides and cups directed at vacuum collection. Where dust collection systems are not available or not adequate to facilitate dust collection, graphite has been machined using a fine water mist to minimize airborne dust. This procedure has been effective on short-run or temporary machining situations. The graphite should be adequately dried after any wet machining.



# Recommendations when machining (2)

3. Suitable hoods and guards prevent dust from getting into slides, gears, and feed screws. Since graphite acts as a lubricant, it generally will create little, if any, wear of machine parts. However, normal precautions in preventing excessive dust accumulations should be used.
4. All electrical equipment should be totally enclosed. Graphite dust is electrically conductive. Care should be taken to properly ground electrical equipment used in the machining area. Highly sensitive NC and CNC control systems should utilize positive pressure or vacuum systems to keep sensitive digital control panels dust-free.



# EHSA committee

## **Introduction**

- The key objective of the EHSA committee is to apply an integrated EHSA-oriented production technique and advanced abatement technologies in order to reduce the impact of the carbon and graphite industry on the environment. This has been successfully achieved by the ECGA members.
- There is a vast range of carbon and graphite products and techniques of manufacturing that are in use. They range from large electrodes to small brushes, carbon bearings and other carbon and graphite specialities such as carbon fibres and carbon composites. Due to these circumstances there are specific environmental issues, which have to be looked after for different type of product manufacturing processes respectively applied manufacturing techniques.

## **Environmental issues in manufacturing carbon and graphite products**



# Environmental issues in manufacturing carbon and graphite products

- The main environmental issue for the production of carbon and graphite is the use of poly-aromatic, complex mixtures of binder and impregnation pitches, which cannot be replaced due to the specific properties needed in the final product. Therefore all activities in improving the environmental situations are focused first on possibilities to avoid or at least reduce the formation of pollutants respectively to apply most efficient, tailored abatement techniques.
- The main environmental impact of manufacturing carbon and graphite processes is the impact of emissions to air of hydrocarbons and PAHs, sulphur dioxide from coke, carbonised binders and fuels and VOCs from impregnating agents used in the carbon and graphite speciality production. A variety of new and advanced abatement processes have been developed to abate hydrocarbon and PAHs using i.e. energy recovering after-burning systems and dry scrubber adsorption technologies.



# Environmental issues in manufacturing carbon and graphite products

- The pitches release **poly-aromatic hydrocarbon compounds** while being carbonised. Benz(a)pyrene is used as guideline substances to monitor the character of the emissions. Hydrocarbon emissions occur during the storage of pitch, mixing and forming, while carbonising in the baking furnaces and during impregnation.
- **Dust or particulate emissions** are in general of minor significance. Fine-grained materials are normally not used for paste, anode and electrode production, but are for other products. The major sources for inert carbon and graphite dust emission are coke storage and handling, milling and sieving, graphitisation and machining.
- Special manufacturing processes may lead to **special emission situations**, which are only relevant for these processes respectively certain raw materials used.
- **Fluorine compounds** (mainly as HF) may be formed during anode production, if used anodes are recycled or during the purification graphitization process.



# Environmental issues in manufacturing carbon and graphite products

- If cokes with increased sulphur content or sulphur additives are used during the production of carbon speciality products **sulphur dioxide** might be formed and released.
- **Combustion gases** like  $\text{NO}_x$  and  $\text{SO}_2$  may be formed and released during baking at very high temperatures and by combustion processes in abatement units.  $\text{NO}_x$  is also formed and released during the production of graphite foils, a carbon speciality.
- **HCN** is only released during the production of PAN (Poly Acrylic Nitrate) based oxidised and carbon fibres.
- The progress in the applied techniques to control the impact on the environment has been significant.
- **Water pollution** is in general a minor issue of the carbon industry, production processes are dry and generally use contained cooling water systems. Exceptionally, surface water for cooling may be used where it is suitable due to local conditions.



# Environmental issues in manufacturing carbon and graphite products

- Most successfully are the efforts of the carbon and graphite industry in **recycling** carbon materials (used and unused) and to open new fields of applications of these materials, replacing other natural sources.
- The carbon and graphite industry has already followed the principle of an integrated EHSA-oriented production technique and to develop most advanced abatement technologies for many years and has in the past significantly reduced the impact on the environment. The carbon and graphite industry voluntarily has set itself the objective of reducing the impact on the environment, as set out in the EU's Integrated Pollution Prevention Control regulation, years before it became obligatory. Even starting from a low level of impact, the latest efforts of the carbon and graphite industry have led to an impressive further reduction over the past years, as demonstrated in the annual reports of the ECGA.

