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GtB Components Ltd – Variation to a bespoke Environmental Permit Application

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**Contents**

Non-Technical Summary ......................................................................................................................................... 1. What activities are you applying for? ............................................................................................................

1a Type of Activity .............................................................................................................................................. 2. Emissions to Air, Water and Land .................................................................................................................. 3. Operating Techniques ....................................................................................................................................

3a Technical Standards .......................................................................................................................................
3b General Requirements ...................................................................................................................................
3c Types and Amounts of Raw Materials ...........................................................................................................

4. Monitoring .....................................................................................................................................................
4a Describe the measures you use for monitoring emissions ............................................................................
4b Point source emissions to air only .................................................................................................................

5. Environmental Impact Assessment ................................................................................................................ 5.1 5a Have your proposals been the subject of an EIA under Council Directive 85/337/EEC? .................
6. Resource Efficiency and Climate Change ....................................................................................................... 6a Describe the basic measures for improving how energy efficient your activities are ...................................
6b Provide a breakdown for any changes to the energy your activities use up and create ...............................

6c Have you entered into, or will you enter into, a climate change levy agreement? If not, describe the specific
measures you use for improving your energy efficiency. ...................................................................................
6d Explain and justify the raw and other materials, other substances and water that you will use. .................
6e Describe how you avoid producing waste in line with Council Directive 2006/12/EC on waste...................

7. Environmental Risk Assessment .................................................................................................................. 8. Appendices...................................................................................................................................................

**Non-Technical Summary**

GtB Component’s have operated an existing facility at the St Helen’s site for the production of sintered components since 1988. Following the operator completing an EA questionnaire in Early 2018 and further communication with the local inspector, the view of the EA with respect to regulation of the facility has changed. Through dialogue with the operator the EA have determined that the GtB Components manufacturing process should be regulated and drawn into the Environmental Permitting regime under Section 2.2 Part A(1)(a) Non-ferrous Metals. Further discussions with the environment local inspector have deemed that gtb should apply for a variation to the bespoke permit to include additional equipment purchased and additional processes. The inspector is still of the opinion that gtb easily meet the criteria for a low impact installation.

GtB manufacture sintered components and this is a powder metallurgy process, which involves the mixing of precise amounts of raw material in the form of iron powder and other secondary alloying powders to produce a homogeneous blend and applying exacting temperatures at different stages to create specific alloys. The process involves:

* Mixing and blending of metal powder’s
* Sintering and heat treatment
* Powder coating
* Storage of raw materials and wastes
* Physio-chemical treatment of effluent prior to discharge to foul sewer
* Quality inspection

Emissions to air from the process consist of exhaust air from LEV extraction which is in place on powder mixing, and powder coat oven areas for the protection of employees, and the furnaces. There are no emissions of effluent, noise or odor, and the likelihood of fugitive emission to air and water is very low as the process operates entirely within the building.

GtB Component’s have an existing environmental management system in place which is certified. to ISO14001:2015.

A small number of raw materials are used in the process, consisting of metal powders. Rejected products and powders collected in LEV systems can generally be reused and wastes from the process are minimal consisting mainly of raw materials packaging. The process uses energy in the form of electricity to power machinery and furnaces, with gas being used to ignite burn offs from the furnaces.

The process is considered to meet the Low Impact criteria.

**1. What activities are you applying for?**

 **Table 1a Types of Activities**

PROJECTS

|  |
| --- |
| **Schedule 1 listed activities**  |
| **Installation** **Name**  |  | **Description of the activity**  | **Activity daily** **capacity**  | **Annex IIA or IIB (disposal and recovery) codes**  | **Hazardous waste** **treatment capacity**  | **Non-** **hazardous waste** **treatment capacity**  |
| GtB Component’s Ltd  | Section 2.2. Part A(1)(a)  | Manufacture of sintered components  | N/A  | N/A  | N/A  | N/A  |
| **Name of DAA** Powder coating |
|  | Powder Mixing  |
|  | Raw Materials Storage  |
|  | Waste Storage  |
| **For** **installations** **that take** **waste**  |  | N/A  |
|  |  |

**Schedule 1 References**

**Total storage capacity**

**Annual throughput (tones each year)** N/A

**1a Type of Activity**

GtB have operated an existing facility at the St Helen’s site for the production of sintered components since 1988, Following the operator completing an EA questionnaire in early 2018 and further communication with the local inspector, the view of the EA with respect to regulation of the facility has changed. Through dialogue with the operator the EA have determined that the GtB manufacturing process should be regulated and drawn into the Environmental Permitting regime. This is as a result of the detailed review of the interpretation of the EPR schedule qualification criteria below and summarized in the following paragraphs for reference in the permit determination process:

*Non Ferrous Metals Section 2.2. Part A(1)(a)*

*Unless falling within Part A(2) of this Section, producing non-ferrous metals from ore, concentrates or secondary raw materials by metallurgical, chemical or electrolytic activities.*

It is understood by the operator that the EA’s rationale is that a small part of the GtB process generates a composite material of pre alloyed stainless steel which meets the regulators interpretation of what is meant by the ‘producing non-ferrous metals’ that is usable in a metallurgical sense. The operator accepts that this is the criteria set out within RGN 2 – *Understanding the meaning of Regulated Facility*, Note 2.2.3. The GtB products therefore meet the definition of a ‘non-ferrous metal’ in that it does not contain iron (ferrite).

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Liquid phase sintering (the process of adding an additive to the powder which will melt before the matrix phase), has been determined by the local inspector upon review to be a metallurgical process that involves heat (meeting note 2.2.4 of RGN 2). Stainless steel and Copper powder meet the definition of ‘secondary raw materials’ i.e. ‘material arising from the production or use of metals, metal compounds, or products comprising or containing metallic components.

 Other than the mixing of the powders prior to sintering and raw materials and waste storage there are no other directly associated activities on site relating to stainless steel. It should be noted that the Stainless components are not machined on-site with the option for 3rd party machining for customers undertaken downstream of the manufacturing activities at the GtB Site. There is therefore deemed to be a technical break in the process at the end of the sintering stage.

**2. Emissions to Air, Water and Land**

**Table 2 Emissions**

**POINT SOURCE EMISSIONS TO AIR**

**Emission Point Ref.Parameter Concentration Unit Source**

LEV 7Exhaust Air N/A N/A Mixing/ powder coat LEV

LEV 8Waxy vapor N/A N/A Furnace Vent

LEV 9 exhaust air in

 emergency only N/A N/A Furnace vent

LEV 10 Heat from offtake

 door N/A N/A Furnace offload door

**POINT SOURCE EMISSIONS TO WATER (OTHER THAN SEWERS)**

N/A

**POINT SOURCE EMISSIONS TO SEWERS, ETP’S OR OTHER TRANSFERS OFF SITE**

N/A

**POINT SOURCE EMISSIONS TO LAND**

N/A

**3. Operating Techniques**

**3a Technical Standards**

**Table 3 Technical Standards**

PROJECTS

**Description of the Schedule 1 Activity**
**or DAA**

**Relevant Technical Guidance Note Document Reference**

Production of Non-Ferrous Metals
Section 2.2

*Process Overview*

EPR 2.03 How to Comply

 Non - Ferrous Metals and the Production of Carbon and Graphite

EPR 2.03, March 2009, EU BREF Note as adopted 2017

GtB manufacture is a powder metallurgy process which involves the mixing of precise amounts of raw material in the form of pre alloyed stainless steel and other secondary alloying powders to produce a homogeneous blend and applying exacting temperatures at different stages to create specific alloys. GtB components process is a net shape process so further machining is not required.

The process is summarized below and should be read in conjunction with the process flow diagram:

1. Powder mixing – Pre alloyed stainless powder is mixed with other lower melting point metal powder such as Copper to achieve the desired grade required by the customer and industry standards
2. Pressing and rolling – The powder mixture is pressed or rolled to bind it into a solid block. Various shapes and sizes are
produced at this stage in line with the finished item requirements
3. Sintering/ heat treatment– Compacted parts are sintered in a furnace which converts the pressed powder into the solid composite metal alloy. Parts can shrink by around 15% but no mass is lost which increases the density of
the material. This is the end of the process as it is described in the regulations. Parts can then be processed through our sealed quench furnaces to increase surface hardness as required.
4. Parts can be powder coated in house in our self contained powder coat unit.
5. Quality control – Prior to dispatch, all parts are inspected for dimensional tolerances, traceability and
density, as well as mechanical testing as agreed by the customer

EHS 80

At GtB the production of Powdered stainless sintered components is part of a much wider portfolio of products produced at the facility. The installation is therefore served by centralized utilities for compressed air systems, lighting and waste handling in addition to the provision of equipment maintenance and general site services.

All powders are delivered to site in 100kg drums and are stored internally within a dedicated location in the warehouse. The materials are transferred to the weighing area as required for a specific batch. Operators carefully weigh exact amounts of each of the powders by hand, according to the customer specification or industry standards for the production of specific alloys.

Raw stainless powder is mixed using a mechanical conical mixer with other lower melting point metal alloying powders such as copper to produce a homogeneous blend that will achieve the desired grade of alloy once further processed. There is one conical mixing machines which accepts upto 300Kg when loaded. Secured end plates are fitted to the mixer whilst it spins for approx. 20 minutes.

The powder mixture is pressed to bind it into a solid block. Various net shapes are produced at this stage in line with the customer requirements. A Mechanical press is used to cold press the powder into green compacts holding the items under specific pressures for a set amount of time. The size, quantity and component complexity are the main factors in determining how the pressing operation is precisely carried out using dies and punches. The process applies pressure uniformly over the compacted material and increase’s its density so an initial compacted shape can be handled.

In any of the processes where there are powders being decanted from one container to another the operator must wear a full face mask with a filtered forced air supply to protect from any dust inhalation. Around the mixing area are local adjustable hoses which can be moved to the appropriate position over the mixing drum. The sieving area has slot type extraction around the top of the sieve. All extraction is extracted to an enclosed hopper unit located outside of the factory walls, close to the powder mix area (LEV 7). The extraction unit has filter bags which are monitored daily and changed as required. Powder collected by the extraction units is reused in the process where possible.

The green shapes are stacked onto trollies that are then loaded onto a continuous mesh belt furnace. All furnace’s have cyclones attached to extract any loose powder prior to sintering, these are emptied daily and the powder is recycled for use. The sintering process is completed in closely controlled electric furnaces at temperatures around 1130deg max for 10 mins, cycle time is approx. 2 ½ hours. The furnaces use a nitrogen gas to purge at the beginning and end of cycle, and a mix of hydrogen / nitrogen for the sintering process. Emissions from the furnaces are extracted via LEV 8 as marked on plant layout and consist of the waxy vapor’s being drawn off the furnace. The exposure of the powder to the heat allows bonding to take place between the porous powder particles which once cooled form a denser solid component retaining the form of the original green shape. The increase in density occurs as rather than

PROJECTS

completely melting the mixed powder, particles diffuse into each other creating a fully bonded alloy. During this process, the volume of components can shrink by upto 15% as the density of the material increases.

No further machining is required as components are net shape.

At all points throughout the process the activities are subject to quality control and inspections. The operator seeks to identify and reject components as early as possible through the process to reduce material usage, and energy cost’s. Finished products are packed on site prior to dispatch in line with the customer’s requirements.

In the event of any failure at any point within the process the equipment, including the mixing, press and furnaces, can be shut down either automatically or through operator intervention. The process does not involve exothermic reactions and is not chemically reactive. As all activities are carried out internally, from an environmental perspective they are judged to be intrinsically safe as there is no potential for release of materials that can pollute during normal, shutdown or abnormal conditions.

EHS 83

**3b General Requirements**

**Table 4 General Requirements**

Are fugitive emissions an important issue?No

Is odour an important issue?No Is noise and vibration an important issue?No

**Fugitive Emissions to Sewer, Surface Water and Groundwater**

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The process is entirely dry with no additions of chemicals or water required for the mixing, pressing and sintering activities or routine clean down of this equipment. Operators are fully trained in the relevant SOPs including handling of chemicals, oils and responding to spillage of materials. To prevent the unlikely event of a spill reaching the ground during deliveries, vehicles are unloaded inside the factory on concrete hard standing where no drains are present.

There is therefore very little potential for aqueous releases to the environment fugitively or otherwise.

**Fugitive Emissions to Air**

There is little potential for fugitive emission to air as a result of the operation of the GtB process. In the event of failure of the LEV any powder emissions would drop down into the building.

**Odor**

There is no potential for fugitive odor emissions as a result of the operation of the GtB process. There is no history of odor complaints at GtB Component’s St Helens facility.

**Noise**

The process is carried out internally within the main GtB components factory. There are no external noise issues associated with the operation of the installation.

EHS 83

**3c Types and Amounts of Raw Materials**

**Table 5 Types and amounts of raw materials**

PROJECTS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Schedule 1 Activity**  | **Material**  | **Maximum** **amount stored** **on site (Kgs)**  | **Annual** **throughput (Kgs per annum)**  | **Description including any hazard code**  |
| Section 2.2. Part A(1)(a)  | Stainless steel  | 1500kgs  | Up to 7000kgs  | No hazard classification  |
|  |  |  |  |  |
| As above | Copper powder | 1500kgs | Upto 8000kgs | H228,H400,H12 |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

EHS 83

**3d Management Systems**

PROJECTS

An Environmental Management System is in place which is certified to ISO14001:2015 The system has been developed using the Plan, Do, Check, Review approach and includes the following elements:

An Environmental Policy is in place setting out GtB’s approach, vision and commitments in relation to environmental management. GtB commits to legal compliance as a minimum, the prevention of pollution and the setting of objectives and targets for improvements in environmental performance.

An environmental risk assessment has been carried out to identify any activities which have the potential to impact on the environment. These are documented, along with relevant environmental legislation, in the Aspects and Legal Registers. Environmental aspects have been evaluated for significance and considered under normal, abnormal and emergency conditions. Where gaps in control have been identified, objectives and targets for improvement have been documented in the form of Improvement Programmes. Emergency Response plans are in place for identified potential emergency scenarios.

Management and operational control procedures have been developed in order to manage and control the risks identified.

All environmentally critical equipment has been identified and scheduled for regular inspection and maintenance on the PPM system. In addition, environmental parameters such as emissions, energy use, waste production, raw materials and water use are included in a scheduled monitoring programme which is part of the EMS. Progress with objectives and targets is monitored and discussed at management meetings. Internal and external audits are carried out on the system itself and identified legal requirements. All records relating to environmental compliance and performance are held within the EMS.

EHS 83

**4. Monitoring**

**4a Describe the measures you use for monitoring emissions**

PROJECTS

No extractive sampling or monitoring is undertaken or proposed. LEV is only in place for the protection of workers from dust and the draw off of vapours from the furnace is not considered significant or harmful. No process effluent or other contaminant is deliberately discharged to controlled waters or sewer from the installation.

No further emissions monitoring is proposed.

**4b Point source emissions to air only**

No sample monitoring is routinely undertaken for emissions to atmosphere. None are considered significant. It is proposed to continue the existing regime with regard to the maintenance and inspection of LEV equipment.

Carbon dioxide emissions from combustion processes, namely the use of gas for igniting burn offs on the furnaces, and electricity consumption, are measured indirectly through energy consumption data collected. It is not proposed to monitor other emissions from the installation.

Whilst activities that generate releases to atmosphere are controlled and predictable as a result of operating to strict process controls and maintenance schedules, relevant personnel receive necessary training and instruction in their duties relating to control of the process and emissions to air. GtB believes that the monitoring and maintenance practices proposed are effective for the releases associated with the installation.

EHS 83

PROJECTS

**5. Environmental Impact Assessment**

**5.1 5a Have your proposals been the subject of an EIA under Council Directive**
**85/337/EEC?**

No

**6. Resource Efficiency and Climate Change**

**6a Describe the basic measures for improving how energy efficient your**
**activities are**

Electricity is used to operate the furnaces, and other process equipment. Gas is used for lighting small burn offs on each furnace when in production.

All plant and equipment is regularly maintained in order to ensure optimum efficiency.

Energy use is closely monitored in order to meet corporate and environmental targets. Techniques are periodically reviewed as a part of a holistic energy management plan. Due to the configuration of the process, location of potential heat sinks and heating/cooling requirements of the wider site operations techniques such as heat recovery are not currently a viable option. Opportunities assessments and a rolling CI program is in place for the business allowing the review of strategic and reactive energy efficiency improvement opportunities. There are no plans to substantially alter GtB’s energy supply and generation systems however through an effective change management process the impact on the cost/benefit of energy options will be reviewed upon any proposed significant alteration to the operations.

**6b Provide a breakdown for any changes to the energy your activities use up**
**and create**

The table below shows energy use for the year 2022 (Jan – Dec) for the GtB site. The non-ferrous process uses a small amount of gas. GtB allocate 95% of gas usage to normal GtB process with the remaining 5% being allocated to site services. Based on the perceived usage in non ferrous production for lighting small burn offs on each furnace when in production it is estimated that they would use 2% of the total.

The process operates 24 hours a day, 7 days a week. Energy use in the highest usage month was 583 MWh in August, used over a period of 744 hrs. This equates to an average power demand of 0.78 MW per hour.

EHS 83

PROJECTS

**Table 6 Energy Use – 2022**

**Period Electricity (kWh) Natural Gas (kWh) Total Energy (kWh)**

1 252514 325390 577904
2 253884 318287 572171
3 240179 322173 562352
4 233192 328067 561259
5 245874 313214 559088
6 231404 343773 575177
7 257999 338754 596753
8 243367 339844 583211
9 236688 326923 563611
10 252133 325822 577955
11 232818 339466 572284
12 219250 339444 558694

**6c Have you entered into, or will you enter into, a climate change levy**
**agreement? If not, describe the specific measures you use for improving your energy efficiency.**

The operator is not part of a CCA.

Energy management is important at GtB. Site data is captured and reviewed regularly in order to identify where the opportunities are for reductions to be made. Due to the diversity of the operations carried out at the site, energy efficiency is difficult to benchmark as its driven by volume and product mix, which is in turn driven by customer demand.

**6d Explain and justify the raw and other materials, other substances and water that you will use.**

Process optimization and control philosophy of the plant is focused on minimization of material and product losses. Raw materials and utilities are monitored closely and reviewed no less than on a period (monthly) basis analyzing production data against forecasts. Gtb works in close consultation with suppliers, stakeholders and customers in the development and introduction of new materials and processes. Any alterations to raw materials or the process would be implemented on site through an effective change management procedure taking account of technical guidance and environmental compliance requirements.

EHS 83

PROJECTS

**6e Describe how you avoid producing waste in line with Council Directive 2006/12/EC on waste.**

The use of all materials on site is regularly reviewed and the process is optimized to minimise waste production. The nature of the manufacturing process allows for the majority of any rejected materials to be recovered back into the process, including powder and dust captured in the LEV systems.

Reworks and finished product loss is constantly monitored and compared against anticipated losses. A monitoring and measurement KPI plan identifies loss areas for investigation and improvement, plans for which would be put in place as part of the EMS if needed. This has both financial and environmental benefits for the site.

Waste reduction, increased production efficiency (process optimization) and minimising of product losses is subject to an ongoing review and assessment. This is led by a dedicated team who meet weekly on site at a production meeting.

All waste streams are characterized and quantified in line with waste management standards and procedures, defined in the EMS. The site holds a waste register detailing each waste stream, how it is segregated, the EWC code, and approved waste contractor.

The waste hierarchy of minimization, re-use, recycling, recovery, and disposal has been part of the culture within the GtB for a number of years and the operator has a good record in this respect. The recovery/disposal route of each waste stream has been identified and a justification for why the waste is disposed of in the chosen manner provided within the application. Where possible, waste materials are recovered and re-used or recycled.

**Table 7: Waste Streams, Tonnages and Fates (2016)**

**Description Weight (t) Disposal/Recovery Code**

Stainless metal drums 0.18t R4 – recycling of metals
Copper nylon bags 0.012t general waste

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EHS 83

PROJECTS

**7. Environmental Risk Assessment**

The following section provides justification as to why the operator considers GtB to meet the criteria of a Low Impact Installation in accordance with the guidance provided in Appendix 1 of Part B1 Standard Facilities permit application form. Due to the nature of the installation and activities described above the process is assessed as having an intrinsically low impact at all stages of operations including start up, shut down and in the event of any abnormal operations without the need of significant management effort. Specifically:

• There is no aqueous waste generated as a result of the operation of the process. There is no effluent
requiring discharge to either controlled water or sewer. The installation does not release more than 50
m³ per day of water from process activities.

• The process does not rely on active abatement in order to comply or manage releases outside of the
building to prevent adverse impact. The mixing and handling of powders is provided with LEV which
passes through a filter to remove any materials prior to exhausting to atmosphere. The equipment is
specified only for the prevention of exposure of the operator to dusts and not designed to meet ELVs
set out in any guidance or best practice documents. The abatement system is therefore installed solely
for the protection of workers and not to attenuate external environmental releases. All other
engineered releases to the environment from the process are for furnace vapors only and can be
released unabated.

• The installation is located entirely internally and on hard standing within the main manufacturing
facility. There is no planned or fugitive emission from the installation into the ground and no engineered
soak way’s.

• Solid waste produced by the installation will only be generated through disposal of empty raw materials
packaging (metal drums), the rejection of sintered products and the machining of components post
sintering (after a technical break in the process). The volume of waste generated by this annually is
small (see Table 8). Total non-hazardous waste for the year totals 0.192 tones. The installation does not therefore give rise to more than one ton of Directive waste per day, averaged over a year and not more than 20 tones of Directive waste being released in any one
day.

• See Table 6 Energy consumption: The process operates 24 hours a day, 7 days a week. Average monthly Energy use in 2022 was 571mwh This equates to an average daily power demand of 18.8 MWH. This figure is for the whole site and the non-ferrous production is a very small percentage of this.

• All activities including the handling and storage of raw and ancillary materials is carried out internally
in areas of hard standing that are not served by drains. There is therefore very limited potential for an
accident to occur that could impact the environment. All site activities are covered by a certified EMS
which has procedures in place and trained out to deal with spillage, protection of drains and inspection

EHS 83

PROJECTS

of storage facilities. For all materials stored in any quantity there is adequate containment measures to
prevent fugitive emissions to surface water, sewer or land that are adequately maintained at all times.

• There is minimal potential for causing offence due to noise beyond the installation boundary. All the
activities are carried out internally and occupational noise surveys have not identified the need for
hearing protection near the GtB process, There is no history of noise complaints arising from the
Gtb process.

• There are no emissions of polluting substances released to the environment that will be significant.
There are no aqueous releases. Releases to atmosphere consist of LEV extraction from the furnaces
consisting of waxy vapors and heat, and LEV exhaust air from the powder LEV. All dust is removed by the filter
cartridges. In the event of a failure of the filter cartridge, dust would drop down into the building and
could not escape to atmosphere.

• There is no potential for fugitive odor emissions as a result of the operation of the GtB process.
There is no history of odor complaints at GtB St Helens site.

EHS 83

**8. Appendices**

**Plant layout**

**Site location plan**

**Process flow diagram**

PROJECTS

EHS 83