Appendix 3
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Appendix 3
Calibration Control of the Cold Box Coremaking Operations

The cold box process mixes sand with a two part resin system (utilising a liquid phenol formaldehyde resin and a liquid polyisocyanate) in combination at between 1% and 2% by weight.

The resulting sand block is then hardened by polymerising the resins with a TEA (triethanolamine)

The volumes of resins used depend on the shape, size, complexity and application of the core being produced.

To optimise the resin usage and thus minimise the volumes used it is necessary to ensure the mixer is calibrated correctly and that the resin volumes are controlled within the specification range.

Calibration

1. The calibration of the mixers is carried our in accordance with the manufacturers operating instructions. 5.3 to 5.5
2. The calibration is done by TBF laboratory at a minimum frequency of one per week on each machine.
3. Amine flow is set by the core shop supervisor for each job taking into account the gassing pressure and time to ensure full permeation of the core.
4. The equipment used for the mixer calibration (Scales) is calibrated by external agencies against traceable national standards and check calibrated using certified weights internally before use.
5. The mixer calibrations are kept in the laboratory for a minimum of 3 years.
6. SPC control graphs are maintained in the core shop and any adverse trends acted upon.
7. The laboratory is responsible for actioning responses to SPC alerts an these are recorded on the laboratory records.
8. The core shop records are maintained electronically on the laboratory computer.
9.

MELT TRIMMING ADDITIONS USING STEEL BALES

(Only required if Carbon/Silicon contents are above melt specification)

The operation of this practice assists in obtaining the best melting practice to minimise electricity usage

SAFE WORKING PRACTICE

1. Tap metal out of furnace, to ensure melt weight is below 6500Kg
2. Turn power OFF
3. Charger operator to wear full PPE, operate charger from inside control cabin when possible.
4. Ensure all personnel working in the area are at a safe distance, or in the control cabin.
    a. All personnel on the melting deck must wear full PPE. While this operation is in progress.
5. Charge required bales with care.
    a. If the bales jam in the end of the charger chute move the charger back from the furnace before attempting to free them.
6. Turn power ON.

Appendix 3
Collection and Disposal of Foundry Dust

The practices used in the Environmental Operational Controls are those employed at 'The Brockmoor Foundry Company' to reduce the environmental impact of materials, processes and waste during the production of castings and their subsequent machining so far as is practically achievable.

Sand plant

Sand plant — bag extractor — skip

Dust from the sand plant is extracted from a series of points within the sand system into the EEF bag extractor. From there it is pneumatically transported to a discharge point within the foundry where it is screw fed into a tipping skip, in the screw barrel the dust is 'damped down' with a water spray to prevent airborne dust.

The skip is then transported by FLT to waste disposal skips managed by AWM.

While in the loading area, the skips are sprayed with a water mist every hour to prevent wind whip and keep airborne dust to a minimum.

Full skips are loaded by AWM onto RORO lorries and the skip is sheeted over with the lorries own automatic system. The skips are weighed off site with the correct waste designation and taken to the authorised landfill tip.

Furnace Plant

The melting furnaces have close capture hoods which contain the metallurgical fumes and dust generated during the melting and tapping operations.

This dust is collected directly from the extractor screw feed into polybags which are sealed and sent to Metal and Waste Recycling Ltd. This is controlled at TBF by a blanket order with the melting staff authorising and supervising the collection and loading.

This material is then reshipped for beneficial recycling to recover the metallic contents which accounts for some 70% by weight.

Converter Plant

The metallurgical fumes and dust generated by the Mg treatment converter is collected in an extraction unit, from which the dust is screw fed into plastic bags by the melting personnel.

These are then transported round to the furnace extraction plant by FLT where they are fed into the furnace extraction ducting to be collected and disposed of as part of that arising.

Appendix 3
Disa Parting Spray

The practices used in the Environmental Operational Controls are those employed at 'The Brockmoor Foundry Company' to reduce the environmental impact of materials, processes and waste during the production of castings and their subsequent machining so far as is practically achievable.

Disa Parting Spray

This process utilises the mixing of a Kerosene based product with air through atomiser nozzles to spray the material simultaneously onto the cope and drag patterns in a short bust immediately prior to the start of the greensand moulding operation on the Disa 30/30 moulding machine.

This helps the pattern plate to 'strip' from the sand block at the end of the compaction.

Operation

1. Transport the parting fluid bulk container, on its spillage bunding, round to the Disa by FLT.
2. Fill the Disa tank from the parting fluid bulk container using the air pump.
3. Transport the parting fluid bulk container, on its spillage bunding, back to its storage area.
4. Set the parameters on the Disa moulding machine to spray at the required intervals and times for the job being produced. This optimises to usage of the parting fluid.
5. Ensure there is good coverage on both pattern halves and that the moulds are 'stripping' cleanly.
6. Set the sprays at the largest possible interval and the shortest time to ensure minimum usage.
7. Monitor usage via fitters and record this on the sheet by the Disa.
8. Pass the sheet weekly to the Operations Manager or the Environmental/H&S Manager.

Appendix 3
Disa Parting Spray

Kerosol Spray Usage on the Disa

Week No ____________ Date ____________

Day and Date	Kerosol usage (litres)
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Kerosol Spray Usage on the Disa

Week No ____________ Date ____________

Day and Date	Kerosol usage (litres)
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

Kerosol Spray Usage on the Disa

Week No ____________ Date ____________

Day and Date	Kerosol usage (litres)
Monday	
Tuesday	
Wednesday	
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Friday	

Appendix 3
Sand Mixing

The practices used in the Environmental Operational Controls are those employed at 'The Brockmoor Foundry Company' to reduce the environmental impact of materials, processes and waste during the production of castings and their subsequent machining so far as is practically achievable.

The moulding sand is mixed as per the operational procedures for that operation (Held by the Laboratory) which are constantly reviewed.

The main materials used in the 'Green sand' mix are

New sand	1.0-1.5%
Clay	1.2-1.5%
Coal dust	0.3-0.5%
Water	2.5-3.0
Return sand	Balance

Green sand

The water addition consists of circulated water used to cool the disa vacuum pump made up with mains water as required.

This beneficially reuses the cooling water which would otherwise have to be discharged to drains.

The material usage is monitored and controlled by the laboratory, the operational limits for the materials are under constant review as the sand properties are blended to the production control scheduling to minimise material usage. This is achieved by graphical records.

Appendix 3
Sand Mixing

Active and proposed environmental improvement programs

- The recycling of foundry sand spill through the keyvac and return sand system to allow this to be reused in tarmac manufacture instead of send to landfill. Saving 1000tonne year of landfill.

- Investigate the use of a liquid coaldust replacement which would reduce the plant dust burden. Summer 07

- Investigate the use of additives to reduce clay and coaldust consumption – what type of additives? – looking at Spring 07

- Review possibility of installing new recycling vacuum water plant to reduce the amount of mains water consumed on the sand mill – done Summer 07

- Investigate adjustments to the mill program to reduce the amount of clay and coaldust in sand sent for tarmac manufacture. → capital needed. Summer 07

Investigate the reuse of a % of the extraction dust back into the milled sand – looking at. 2008

Appendix 3
Electricity usage

The practices used in the Environmental Operational Controls are those employed at 'The Brockmoor Foundry Company' to reduce the environmental impact of materials, processes and waste during the production of castings and their subsequent machining so far as is practically achievable.

The use of electricity on the site is vital as it is the main source of energy for, metal melting, running machinery, heat treatment, running dust abatement systems and lighting

Electricity, due to the quantities used, has the largest environmental impact from the site contributing to global warming.

The majority of the electricity use on site is used for metal melting where Medium Frequency coreless induction furnaces are used to melt the metal.

This equipment and practice is regarded as the best practice for the industry.

The following operational procedures ensure that TBF are utilising this energy in the most efficient way

1. Electric Melting
    a. Maximum demand meters cover the whole site demand to allow power shedding at high demand periods
    b. Cold start program for controlled heat up whenthe furnace linings have cooled down allowing the furnaces to be safely emptied at nights and weekends
    c. Balancing furnace operation and production schedule to allow periods when only one furnace body is utilised
    d. Ensuring maximum efficiency on melting by careful selection of furnace charge material i.e. dense baled scrap.
    e. Continuous monitoring of power usage in the department by the laboratory with graphing of energy usage against tons of metal melted.

2. Heat treatment
    a. Use of low thermal mass linings in the furnaces
    b. PLC control of the heat treatment cycles
    c. Night and weekend operation to shed power at peak times.

Appendix 3
Electricity usage

3. Machine shop and dressing shop
    a. All machines are turned off when not in use.
    b. All machines are PLC controlled to maximise performance.
    c. Maximum use made of robotic fettling cell.

4. Site general
    a. All lighting being replaced with high efficiency bulbs as they wear out.
    b. Lighting controlled by timers
    c. Compressors have auto stop start to minimise their idling time
    d. Smaller compressors are cycled in at times of low air demand and the large compressors switched off

Appendix 3
Compressed air usage

The practices used in the Environmental Operational Controls are those employed at 'The Brockmoor Foundry Company' to reduce the environmental impact of materials, processes and waste during the production of castings and their subsequent machining so far as is practically achievable.

Compressed air is use in the plant as a vital service for most of the operational plant. The efficient supply of this service is controlled by the following procedures and practices.

1. All the compressed air is dried by desiccant driers to ensure that the air does not create problems in the processes for which it is used.
2. The oily condensate from the compressors is recycled as water feed to the sand mill.
3. The compressors and driers are serviced and maintained by sub contractors.
4. Compressors are shut down on non productive times and smaller compressors utilised at times of reduced demand.
5. Regular checks are carried out to identify and repair leaks.

Disposal of furnace cooling water after flushing out the system

The practices used in the Environmental Operational Controls are those employed at 'The Brockmoor Foundry Company' to reduce the environmental impact of materials, processes and waste during the production of castings and their subsequent machining so far as is practically achievable.

Periodically it is necessary to empty and flush out the furnace cooling water system.

This results in some 9000 litres of water being emptied and flushed through the system.

This water contains varying % if the antifreeze additions which the system runs with as normal.

The collection and disposal of this water must be carried out in the following manner to ensure there is no contamination to local water courses or drains.

- Before commencing the operation ensure that enough storage containers (IBC and drums) are collected to contain all the emptied water (approximately 9000 litres).
- Make provisions for the collected water to be temporarily stored on the bunds at the north end of the site.
- Pump the furnace cooling water and the flush water out into the containers reserved for the operation. Put clear identity of the material onto the containers.
- Carefully transport the full containers round and put on the reserved bunding.
- Make provision for this material to be pumped up to the mill water addition tank (for secondary use in the sand preparation) at a rate not exceeding 500 litres per day.
- Any metal drums used in this exercise can be re-melted in our furnaces
- Any IBC's used should be returned for use transporting waste cutting fluid or as emergency containers.

Keith Pashley.
20/4/2007

Circulation
Laboratory
Melting department

The practices used in the Environmental Operational Controls are those employed at 'The Brockmoor Foundry Company' to reduce the environmental impact of materials, processes and waste during the production of castings and their subsequent machining so far as is practically achievable.

Standby procedure for emptying Furnace main extraction 27/4/07

- Routine is that maintenance night man empties the unit when it is shut down (best possible time to do it)
- If the night man is absent for any reason the following must be implemented
- Night shift melt furnace operator to remove 3-4 bags when the unit is shut down
- Days shift maintenance men to remove rest of the contents whilst the unit is operational
- Above actions to continue until night man returns to work.
- Standby procedure to be implemented by the maintenance supervisor once he is aware that the night man will be absent
- Furnace night operators needs instructing to check that the night man is attending and that if he is not ,the furnace operator should remove 3-4 bags from the unit

Distribution

Maintenance *Tony Thomas*

Melting *Paul Reeves*

Keith Pashley 27/04/07

Machine Safety Isolation

The practices used in the Environmental Operational Controls are those employed at 'The Brockmoor Foundry Company' to reduce the environmental impact of materials, processes and waste during the production of castings and their subsequent machining while ensuring the safety of everybody so far as is practically achievable.

General machine safety isolation

For the safety of the machine operator/maintenance personnel and any other people who may be involved it is essential that any piece of machinery is made safe before entering within the confines of the guard.

1. To ensure that a machine is safe it MUST be isolated from all potential sources of stored energy.
    - Specifically these are.
        - Hydraulic power
        - Pneumatic lines.
        - Electricity
        - Gas.
    - This is usually accomplished by opening one of the safety circuits. I.e. an e-stop, or an interlocked door.
    - After isolating the machine in this manner carry out a check to ensure that the safety circuit has operated
2. Ensure that the area is safe and that there are no chemicals, fumes or other hazards. If in doubt consult the COSHH data within the department.
3. If necessary secure the area outside the machine to ensure that you are not in danger from Fork Lift Trucks etc.
4. If you are working out of sight ensure that the machine is clearly identified as isolated people working on the machine and if access is by keys take the key with you.
5. If required obtain a permit to work before entering the machine or commencing to work.
    - Permits to work are required for Working at heights, In confined spaces and Hot work involving cutting, welding etc
6. There are occasions when QUALIFIED people (Maintenance, supervisors, chargehands) are required to be inside a safety area, i.e. for setting up the machine and for some essential maintenance or breakdown functions.
    - In these instances the onus is on the QUALIFIED person to
        - Carry out their own risk assessment for the task involved.
        - Ensure that other people are aware of the actions and always have a "buddy" outside the machine.