COMPANY INFORMATION AND PROCESS DESCRIPTION

1. BACKGROUND

The location of the works, Leys Road, Brockmoor, Brierley Hill, West Midlands, DY5 3UJ. Grid Reference: SO905873.
The Company name was established in 1936 for the production of Malleable Castings. The primary production made at the company today is S.G. Castings for Off Road and Heavy Goods, Commercial Hydraulic. Currently the output of the plant is in the region of 8000 tonnes of finished castings per year, averaging approximately 35 Tonnes per day.

The foundry is currently operating a single shift plus overtime in our melting and moulding departments, a double shift system i.e. 6am-2pm & 2pm-10pm worked within our Core Department and Machine Shop with an additional Night Shift when required. There are approximately 120 people employed on site, the number will vary according to demand and complexity.

2. DESCRIPTION OF PRODUCTION PROCESS

Castings are produced by melting scrap metal, pig iron when this is molten, the molten metal is poured into sand moulds, sand cores are used to produce the castings that require cavity, after the molten metal has cooled, the castings is separated from the Sand the casting undergoes cleaning, finishing and machining techniques to meet the customers specifications.

The production process involves a number of steps; these are shown in a flow diagram (Fig 1) followed by further detail at each step.

MELTING, METAL TREATMENT AND DISTRIBUTION

Metal is produced in our 2 x 8 Ton 4.5MW medium frequency power shaker Induction Furnace from recycled scrap purchased in accordance to our ISO 9000 Quality Procedures, Pig Iron is also purchased to the same standard all materials are delivered to a predetermined point and stored internally awaiting use.

Material is transferred into an automatic charge car by magnetic crane to the correct weight, the transfer car moves forward and deposits the material into the melter; after melting is completed the unit are deslaged.

Molten metal is then transferred from the melter by a 2 ton ladle by overhead crane to the George Fischer Converter where 3 kg of magnesium is added, the ladle is the rotated inside a fume capture hood to allow the conversion to take place, after conversion the material is transferred into our Automatic Pouring Unit/Hold Unit ready for pouring our Disamatic Green Sand Moulding Plant. Alternatively the material can be transferred to half-ton ladles for pouring on our Air Set Unit.

GREEN SAND MOULDING

Moulds are produced on our Disamatic Automatic Moulding Machine using green sand, the sand is held in a storage hopper along with clay and coal dust holding hoppers, when required the sand is transferred by conveyor belt to Erich Sand Mill and weighed to the correct batch weight at the same time Coal Dust and Clay are added to the sand at the Erich Sand Mill the final additive being water after a predetermined mix time the sand is automatically discharged onto a belt and conveyor to the Disamatic Moulding machine, where the sand is then vacuumed onto the pattern and squeezed.

This comprises of a cope and drag mould, at this point a core may be added if required to the drag mould before the cope mould is placed onto the drag. The mould is then pushed automatically onto the casting/cooling conveyor where the mould is cast automatically by the Press Pour and continues for cooling. After cooling the mould is transferred to the Knock Out where is casting is separated from the sand; the sand is transferred by conveyor belt back to the storage hopper and the process is repeated.

COLD BOX CORE PRODUCTION

Silica Sand is stored internally and is blown into main storage hopper, 25 ton per delivery by road tanker, the sand is then blown pneumatically to machine day hoppers. The sand is fed into sand mixer by gravity to the desired weight where resins Part I and Part II are mixed with the sand after this operation. The sand is vibrated into the core machine where the mixed sand is blown into the core pattern, it is then injected with TEA to harden, after this operation the core is removed from the machine and stored on portable trolley ready for use or core coating, depending on product. The Core Coating is a refractory based coating designed to protect the core during the initial impact of liquid metal after this the core would go to the Disamatic Moulding line for use. Rejected cores are stored in transportable tipping skips and are sent to the Air Set Section for attrictic/Therm reclaim. The sand is then pneumatically blown to Air Set or Core Shop for reuse.

SHELL CORE

The volume made are very small, they are made from Resin Coated Sand this reacts through heat. Total production would not exceed 10-11 tonnes per annum.

AIR SET

This unit is used to produce low volume castings. The unit is 90% self-contained with the exception of some Cold Box Cores. The sand for the unit is mixed in a continuous mixer with a fixed mixing rate. The resins are mixed into the sand on a percentage to suit the sand flow along with the catalyst for hardening moulds, and cores are assembled, and cast with in the area. Sand is reclaimed and reused after Knock off.

WHEELABRATING/FETTLING

After the casting has been separated from the sand it moves down a cooling line at the fist stage of this line the feeder/runners are detached from the castings they proceed together to an inline rotary Shot Blast Machine where the casting runner, feeder are cleaned. When they transfer out of the Shot Blast the castings are inspected and put into steel bins for transporting to the fettling department, the clean runners, feeders are placed into steel tipping skips and returned to the melting department for re-melting.

HEAT TREATMENT

The heating of the casting to alter the as cast structure of the material to obtain specific customer requirements. This is achieved by heating the casting to a predetermined temperature and controlling the cooling rate. This process is only required on 7% of the total tonnage produced.

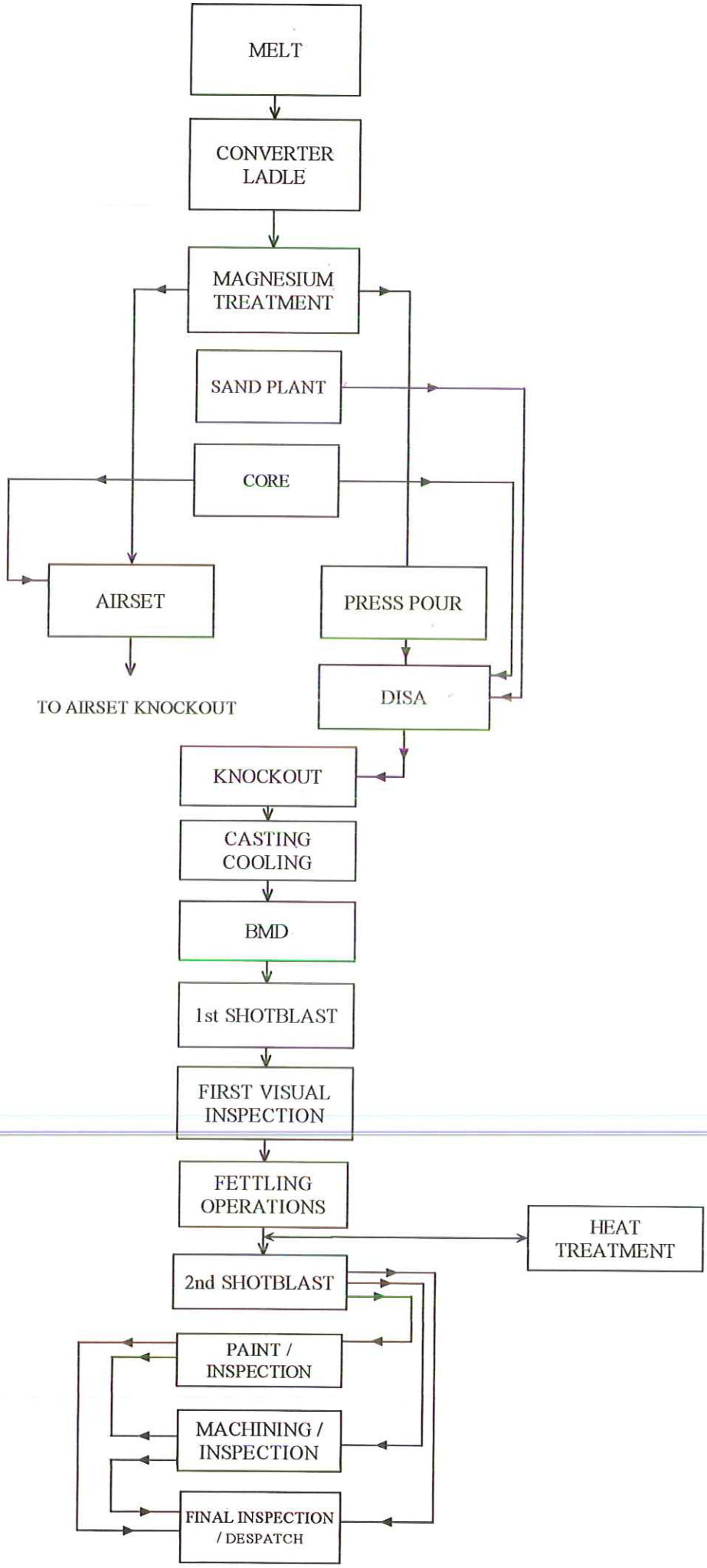
FETTLING/PAINTING

When the casting arrives within the fettling department excess material is removed by one the following methods, Pedestal Grinding, Bench Fettling or Robotic Fettling, after these operations the casting is inspected, reject would be returned to Melting Department, good product would be transferred for re-wheelabrating, painting or to despatch.

MACHINING

Castings are transported to the Machine Shop by forklift truck where they are machined to the customer's requirements. Swarf is collected into steel tipping skip and left for a period of time to allow the cutting oils to drain off.

INPUTS **COMPANY PROCESS FLOW** **OUTPUTS**



FLOW CHART No. 1

BROCKMOOR FOUNDRY COMPANY LTD

MELTING PROCESS FLOW

INPUTS | **OUTPUTS**

RAW MATERIALS

INPUTS:
- STEEL BALES
- SG PIG IRON
- STEEL PUNCHINGS
- MACHINE SHOP SWARF
- FOUNDRY RETURNS

OUTPUTS:
- TRANSPORT
- NOISE
- FUGITIVE
- IRON OXIDES FROM SG PIG IRON & STEEL BALES AND PUNCHINGS
- MINERAL OIL / COOLANT TO STORAGE
- CONCRETE FLOOR

CHARGE CARS

OUTPUTS:
- FUGITIVE
- NOISE

MELTER

INPUTS:
- GRAPHITE
- URNACE LININGS
- FERRO SILICA

OUTPUTS:
- FUGITIVE
- NOISE
- ABATEMENT - AIR
- VOC
- ARRESTED DUST FROM ABATEMENT TO LANDFILL
- SLAG TO LANDFILL
- USED LINING MATERIAL TO LANDFILL
- PALLETS - EURO TYPE - TBF RE-USE
- OTHERS - WASTE WOOD

MAGNESIUM CONVERTER TREATMENT LADLE

INPUTS:
- LINING MATERIAL
- GRAPHITE

OUTPUTS:
- FUGITIVE
- LINING MATERIAL - LAND FILL

MAGNESIUM TREATMENT STATION

INPUTS:
- PURE MAGNESIUM
- COPPER

OUTPUTS:
- FUGITIVE
- ABATEMENT - AIR
- ARRESTED MAGNESIUM OXIDE TO LAND FILL
- SLAG TO LANDFILL

TO AIRSET STATION

PRESSPOUR (AUTO - PRESSURISED MOULD POURING UNIT

INPUTS:
- SLAG COAGULANT
- FERRO SILICON
- NITROGEN
- GRAPHITE STOPPERS
- CLAY GRAPHITE NOZZLES
- LINING MATERIAL

OUTPUTS:
- SLAG TO LANDFILL
- FUGITIVE
- USED STOPPERS / NOZZLES TO LANDFILL
- LINING TO LANDFILL
- NITROGEN TO INTERNAL FOUNDRY ATMOSPHERE

POUR LINE TO MOULDS FROM DISA FORMA MOULDING MACHINE

KEY

- LAND FILL / WASTE STREAM
- RECYCLED MATERIAL EITHER IN-HOUSE OR EXTERNALLY
- NEW VIRGIN MATERIAL

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FLOW CHART No. 2

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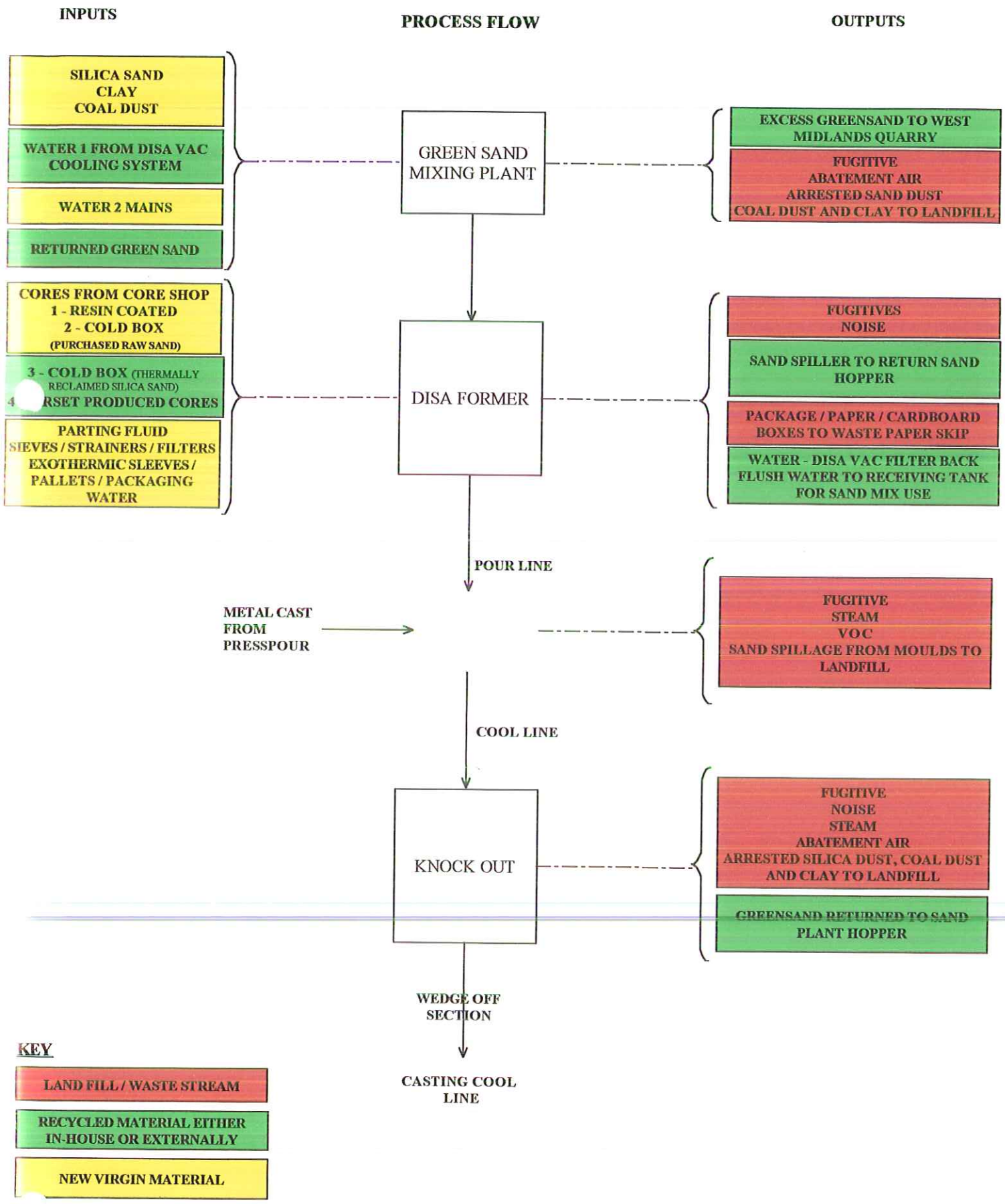

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FLOW
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No. 3

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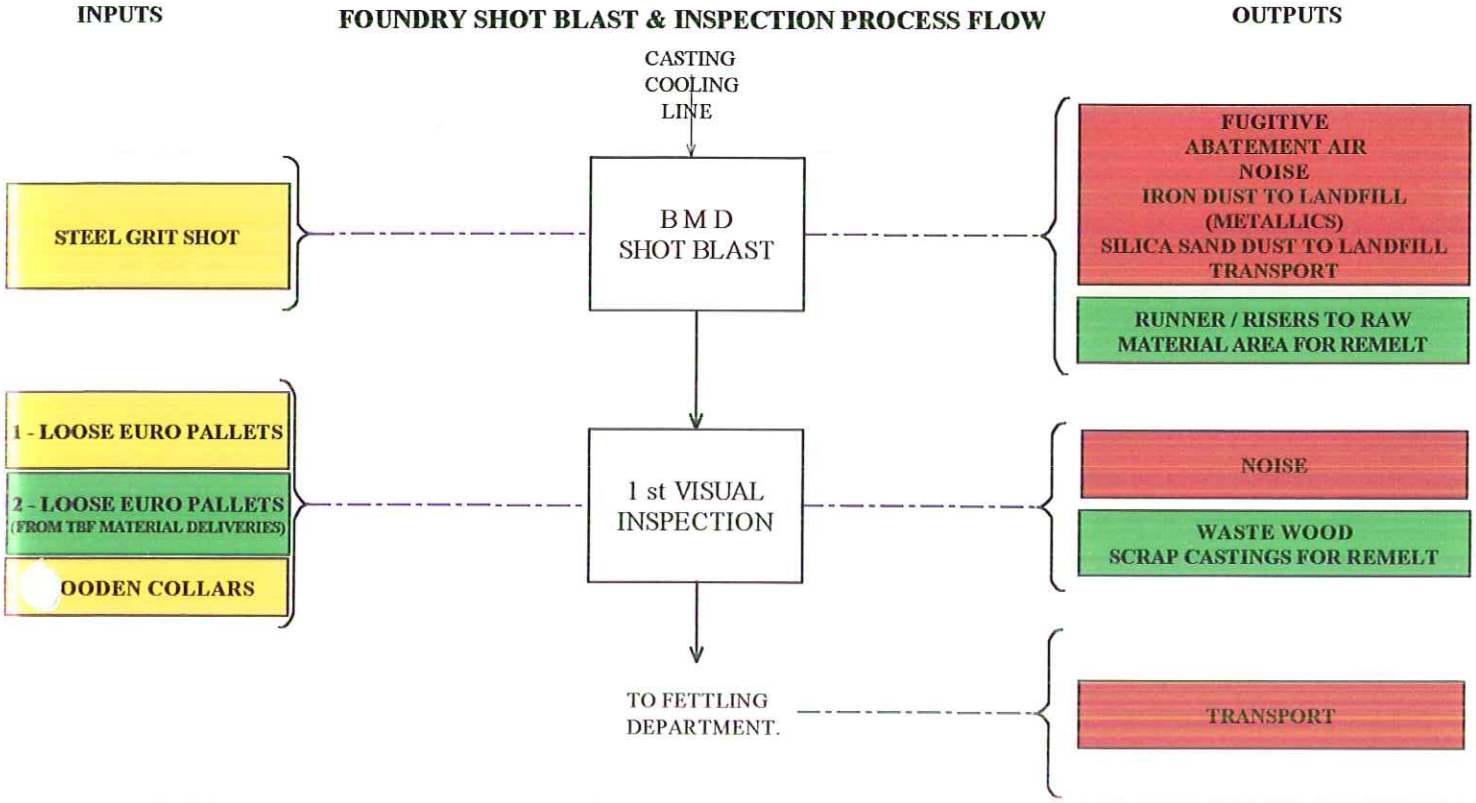
FOUNDRY SHOT BLAST & INSPECTION PROCESS FLOW



KEY

- LAND FILL / WASTE STREAM
- RECYCLED MATERIAL EITHER IN-HOUSE OR EXTERNALLY
- NEW VIRGIN MATERIAL

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FLOW CHART No. 4

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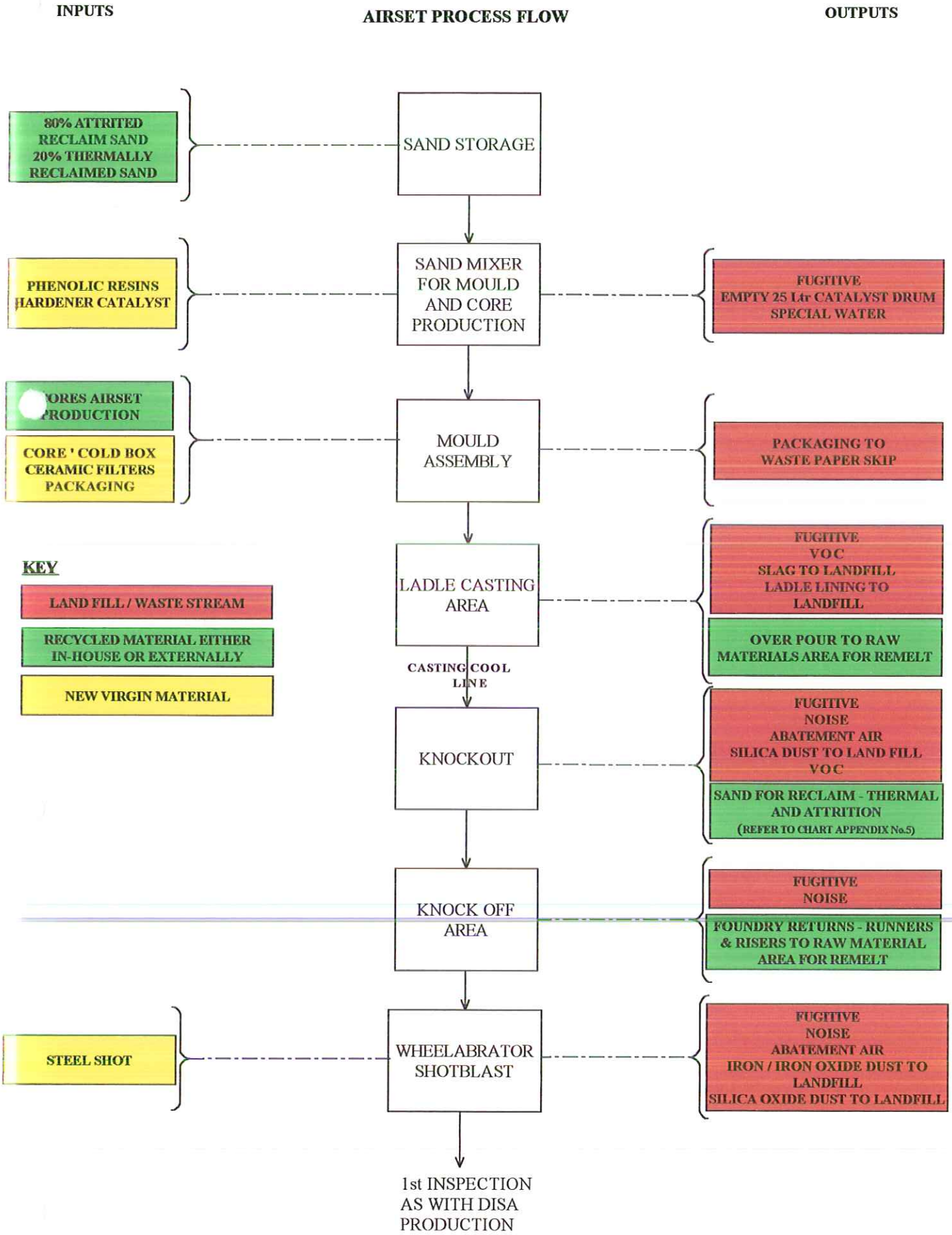

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FLOW
CHART
No. 5

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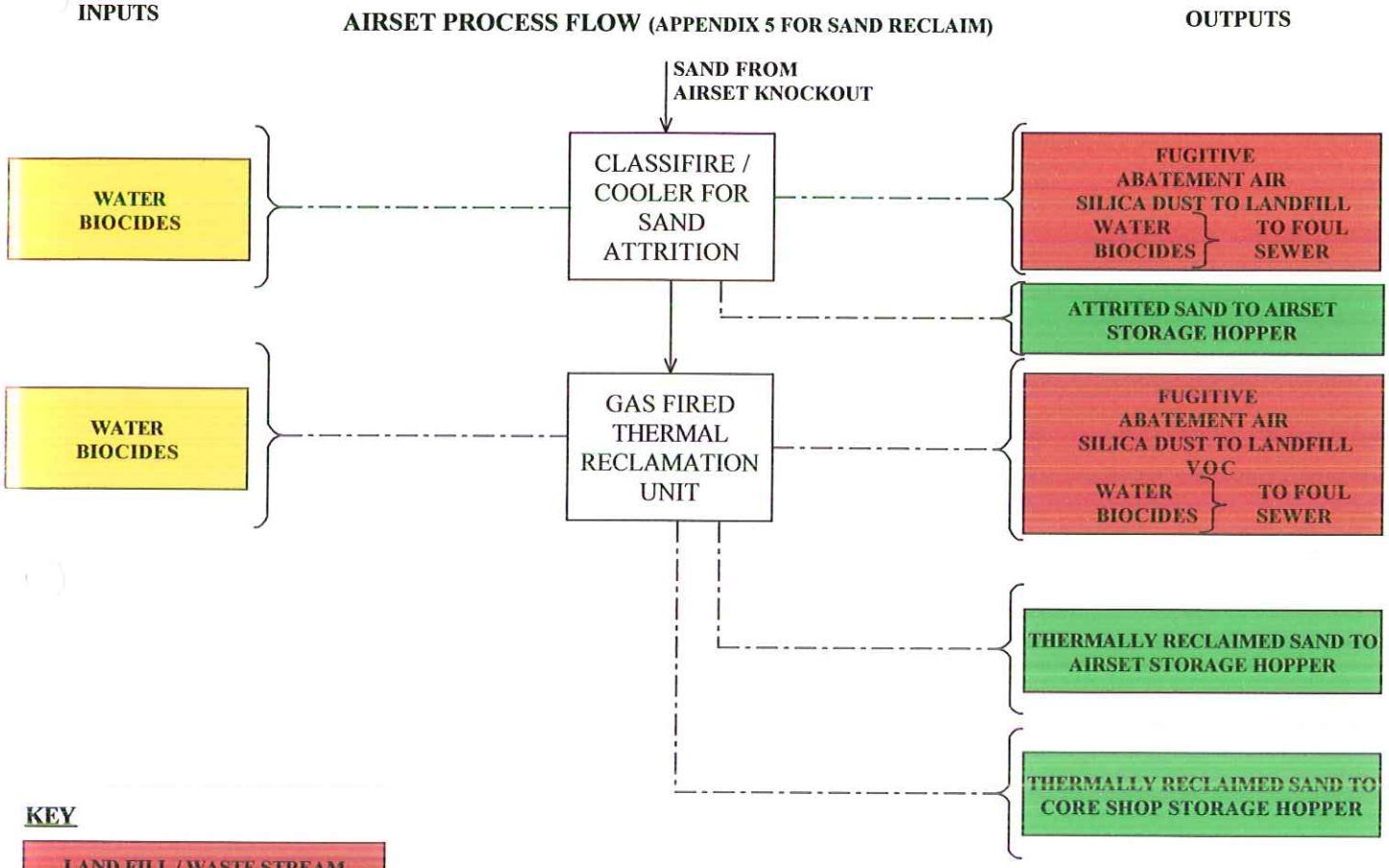

KEY

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- RECYCLED MATERIAL EITHER IN-HOUSE OR EXTERNALLY
- NEW VIRGIN MATERIAL

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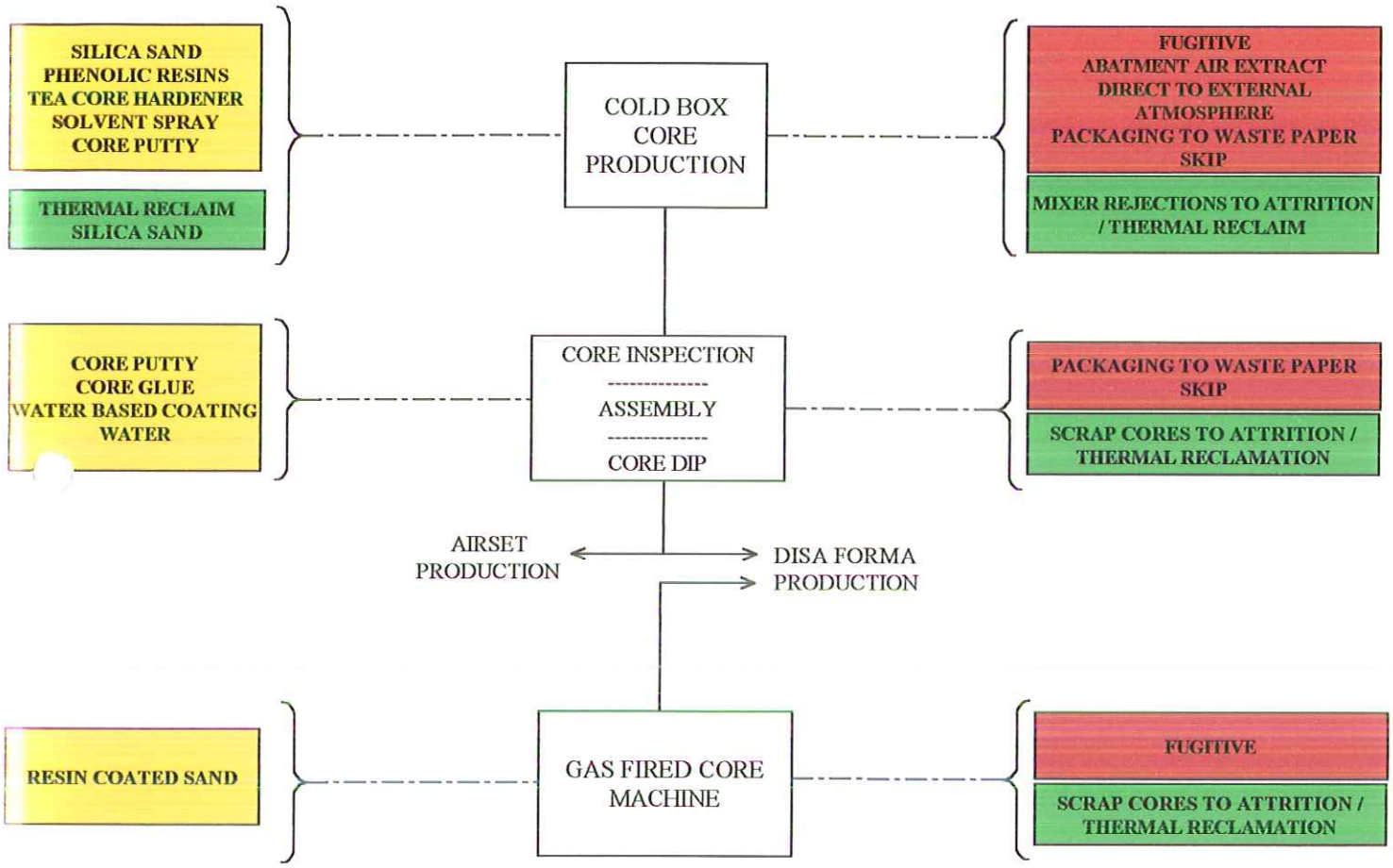
FLOW
CHART
No. 6

BROCKMOOR FOUNDRY COMPANY LTD

INPUTS | **CORE SHOP PROCESS FLOW** | **OUTPUTS**



KEY

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- RECYCLED MATERIAL EITHER IN-HOUSE OR EXTERNALLY
- NEW VIRGIN MATERIAL

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FLOW CHART No. 7

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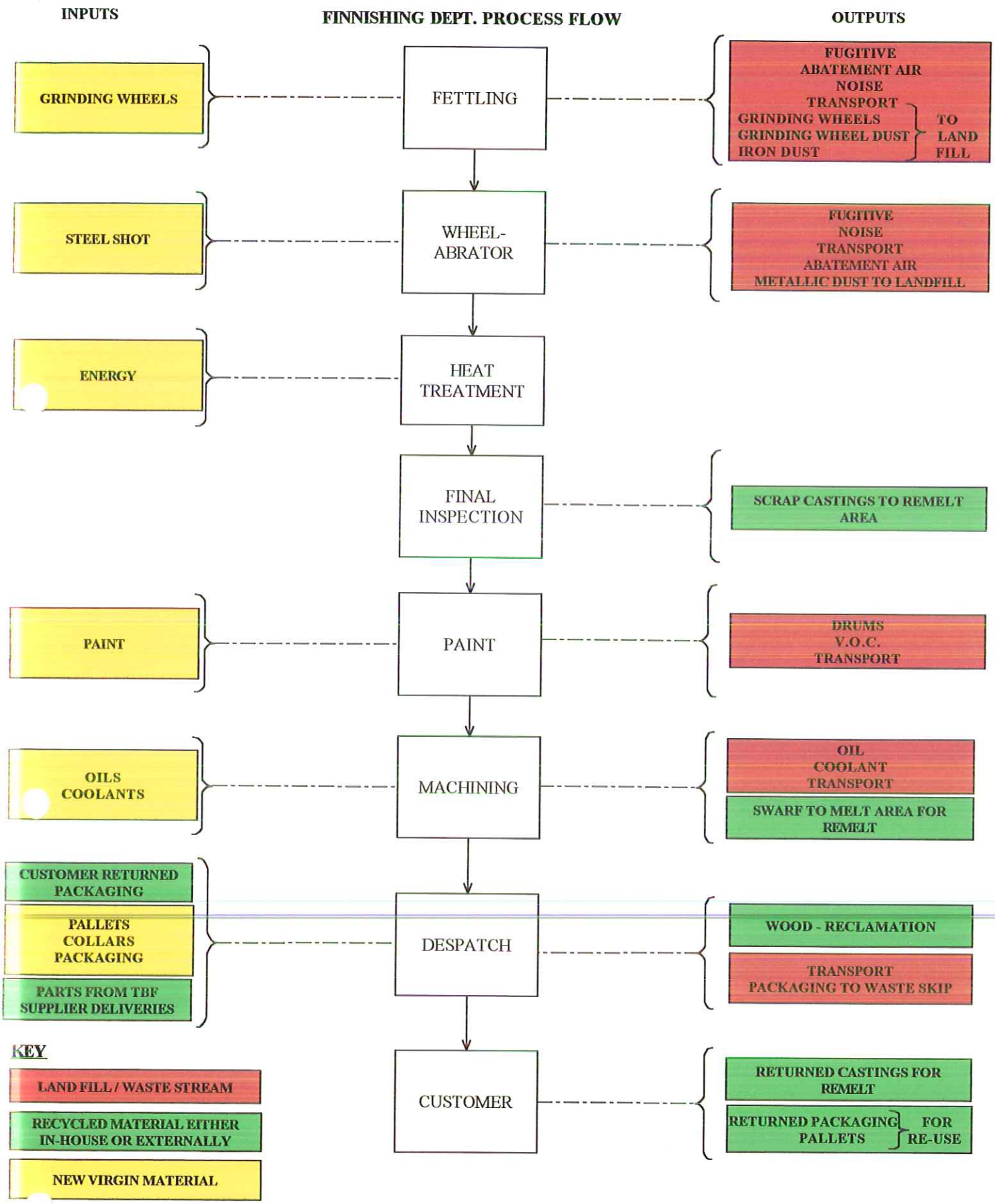

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