Wax Process Flow

Wax Molding* Machines inject pattern wax to create pattern tools. The unique pattern tools are then combined into a mold assembly, called a 'gate'. No emissions from the room. Investing Wax mold (gates) go through a repeated dipping in wet slurry, then sand application and then drying process to create ceramic forms around the assembled wax molds Climate controlled room - no emissions. **Drying Tunnels** (2, 3 & Final Dry) A series of curing rooms kept around 70 degrees. Recirculated air goes through a dehumidifier to lower humidity and dry molds. Climate controlled room - no emissions. Dewax FlashFire Dewax Natural-gas powered furnace melts wax out TEU of the ceramic molds. (point emissions controlled by afterburner on the furnace stack) (fugitive emissions)

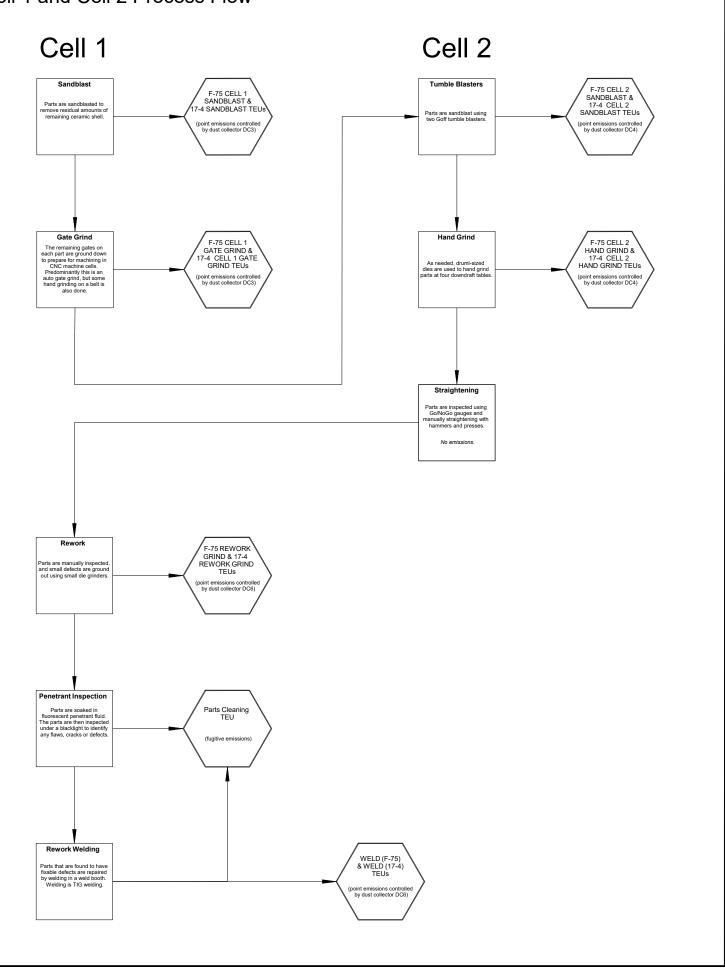
*Note that any general cleaning activities with acetone or isopropyl alcohol (IPA) in this room is still conservatively included as fugitive emissions in the material balance (MB) portion of AQ520 as their use was considered facility wide.

Natural Gas TEU

Casting Process Flow Pre-Heating Ceramic molds are wrapped in fiberglass insulation and pre heated in open ovens (fueled by natural gas) to 1600-1900°F. Natural Gas TEU (fugitive emissions) Casting Metal is heated to 2,900°F in electric induction furnaces (EIFs). Molten metal is then manually poured into the pre-heated ceramic molds. Freshly cast molds are placed on pallets and allowed to cool for 45-60 mins. F-75 Cast & 17-4 Cast TEU (fugitive emissions)

Knock Out and Cutoff Process Flow Knockout After cooling, molds are placed one by one into a pneumatic jack hammer tool "knockout booth" to break and crack the ceramic shell off the metal casting. Knockout TEU (point emissions controlled by dust collector DC2) Cutting F-75 Cut & 17-4 Cut Two power saws are used to cut off individual parts from the gate assemblies. TEUs (point emissions controlled by dust collector DC1)

Cell 1 and Cell 2 Process Flow



Heat Treat Process Flow Heat Treat Natural Gas Castings are placed in heat treat and heated up under vacuum to enhance metallurgical properties. TEU (fugitive emissions) OVER 90% OF CASTINGS SENT OFF SITE FOR FINISHING

Machining Process Flow Machining Parts are placed into a CNC machine and milled to bring it much closer to finished dimensions. Each mill is equipped with a mist buster to eliminate aerosolized coolant **Machining Oil** TEU (fugitive emissions) escaping the machines. **Auto Chlor** Parts are cleaned in an industrial dish-washer style mahcine after machining to remove any coolant and machine oil No potential to emit.

Finishing/Polishing Process Flow Belting / Polishing Parts are manually belted and polished on buffing wheels and polishing belts. No emissions from the room-dust is collected at machine sources, filtered by DC5 and recycled back into the controlled environment room. **Robot Polish** Robot Polish An automated robot arm belts and polishes parts in an enclosed booth. TEU (point emissions controlled by dust collector DC9) Drag Finish Parts are fixed to a rotating arbor that drags them through a trough of media that creates a highly polished surface. Wet process - no emissions. Polishing **Water Treatment** Water used in polishing processes is treated to remove polishing compound in preparation for water treatment disposal. No potential to emit. Vibratory Mill Parts are placed in a large container of media and vibrated to achieve a high polish finish. Wet process - no emissions. Sandblast Finishing Sandblast Parts are sandblasted manually in sandblast cabinets using finer media than previous sandblast treatments. TEU (point emissions controlled by dust collector DC6)

Cleaning/ESMA **Parts Cleaning** Parts are cleaned and disinfected in a dishwasher style machine. No potential to emit. Dip Seal Parts are dipped into a wax-consistency solution that quickly hardens to protect the parts surface during additional work. No potential to emit. **Final Clean** Parts Cleaning Parts are hand inspected and cleaned and then packaged in protective packaging. TEU (fugitive emissions)

NDT Process Flow Digital Xray Parts are inspected using digital x-rays. No potential to emit. Fluorescent Penetrant Parts are soaked in fluorescent penetrant fluid. The parts are then inspected under a blacklight to identify any flaws, cracks or defects. No potential to emit. **Manual Inspection** Personnel use black lights and minimal touch up grinding on parts using die grinders in a booth setting (for using the black lights). De minimis emissions.

Coating Process Flow Coating* Specialty parts have metal beads manually applied and glued into place. Parts are subsequently cured in an electric oven. Climate controlled room - no emissions. *Note that parts cleaning by hand with isopropyl alcohol is included as fugitive emissions in the material balance portion of AQ520 as their use was considered facility wide, however the air in this room is recirculated.

