Aluminum extrusion process planning

1 Purpose

Norms hot extrusion profiles (base) production operations activities in order to achieve accurate shape, quality assurance and improve efficiency.

2, the scope of

Applies throughout our extrusion process.

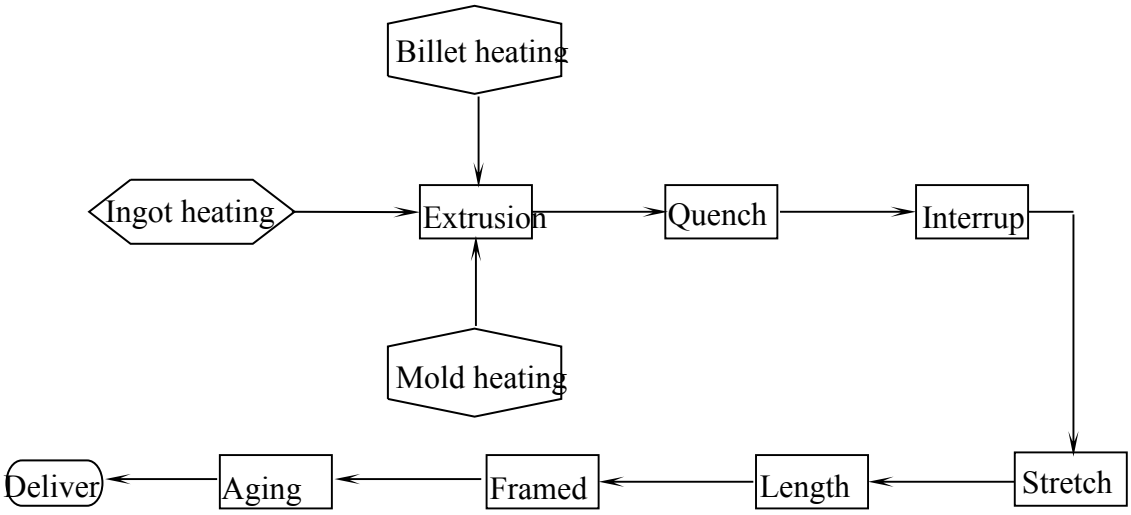
3, responsibilities

3.1 Workshop Director is responsible for directing and supervising shop floor employees operate according to the provisions of this Regulation.

3.2 Other staff positions in strict accordance with the provisions of this Regulation to operate.

4, Practice

4.1 extrusion production flow chart:



4.2 Preparation before production

4.2.1 mold preparation (responsible person: Extruded squad)

4.2.1.1 spare mold die pad should be neatly placed in the mold rack, mold and scrap unusable die pad should be promptly removed from the plant, to prevent misuse of the mold and die pad failed.

4.2.1.2 pie moulders received production plan instruction, organization qualified molds, send polishing Engineering Agency for polishing, complete distribution machine.

4.2.1.3 mold residence time in the furnace no longer than 8 hours.

4.2.1.4 mold heating and insulation control as shown in Table 1

Die diameter	Mold type	Heating temperature （℃）	Holding time （H）
Φ278-Φ330	Plane model	440-480	≥3
	Porthole die	440-480	≥5
Φ198-Φ248	Plane model	440-480	≥2
	Porthole die	440-480	≥2
Φ138-Φ148	Plane model	440-480	≥1
	Porthole die	440-468	≥2
Φ138	Plane model	440-480	≥1
	Porthole die	440-480	≥1.5

4.2.2 billet preparation (responsible person: Extruded squad)

4.2.2.1 billet must be kept clean and free of severe wear or belly, otherwise, there will be extruded products slag or bubbles.

4.2.2.2 billet and die with the end should be smooth and no damage and stick aluminum or extruded material will run.

4.2.2.3 billet heating element must be in good condition and have sufficient heating capacity. Otherwise, the billet will not be able to process the required temperature.

4.2.2.4 billet temperature was controlled at 380 ℃ -430 ℃ between prohibited out of range.

4.2.2.5 class before work, coping billet, once clear cylinder. In normal extrusion, every 20-50 branched spindles should be a clear cylinder to ensure ingot barrel clean.

4.2.2.6 billet should avoid thermal shock, under normal circumstances, billet, the temperature should be in the range of process requirements long-term insulation, do not power off when the shift.

4.2.3 Aluminum Ingot preparations (responsible person: Host hand)

4.2.3.1 According to the requirements of a single scheduling choose the appropriate grade of the alloy, the number determined by the number of production tasks.

4.2.3.2 The machine uses aluminum alloy round ingot must be a minor number of round ingot furnace.

4.2.3.3 round ingots into the furnace heated in, you should make the surface quality self-test charge by the host hand, where there are obvious slag, cold shuts, central crack and bending round ingots into the furnace should not be heated , it should be singled out to return casting workshop.

4.2.3.4 does not allow round ingot rolling on the ground, all surface sediment, dust should be cleaned and then into the furnace heating.

4.2.3.5 outlet end of the burner is mainly used for the control ingot temperature, but rely on the accuracy of thermal instrumentation constant temperature to control automatic burner ignition and flame failure to ensure the ingot temperatures meet process requirements.

4.2.3.6 furnace temperature setting heating stage set 300 ℃ -450 ℃, temperature control rod on the machine, according to T ≥ 1.4mm wall thickness shall comply with the temperature controlled at 440 ℃ -540 ℃, T <1.4mm temperature at 400 ℃ -540 ℃, specific circumstances depending on the species, the mold structure, depending on the type of alloy.

4.2.4 Other provisions: Extruded should be cleared before the saw cut knife, pincers, iron Zhao, calipers, drawings, samples with the cooling water, scheduling orders and other production tools ready.

4.3 squeeze (responsible person: Host hand)

Empty 4.3.1 examination prior to production, allowing the extruder and scaffolding are no-load operation once. Check the electrical machinery is functioning properly, sure no problem, before officially put squeeze.

4.3.2 in the boot to check before billet temperature reaches process requirements, confirm billet temperatures meet process requirements later, and then measuring the temperature and aluminum ingot mold temperature, when the temperature has reached the three

process requirements when we go Die-on squeeze.

4.3.3 mold machine, the application of portable thermometers measure temperature and record in the "extrusion plant production process original record" in the. Die process should be rapid and efficient, but also to prevent mold cooling.

4.3.4 preceded circular extruded ingot measuring temperature, the temperature does not meet the requirements of the extruded ingot allowed, the machine is best to take the ingot first predetermined high temperature limit, to prevent the plug mold .

4.3.5 ingot heating temperature monitoring: the extrusion process, extrusion ingot squad to every 10-20 portable thermometer with a temperature measurement and truthfully make records in order to keep abreast of the ingot temperature changes , maintaining a normal extrusion temperature.

4.3.6 extrusion, pay attention to changes in pressure. From the pressure does not exceed 210kg/cm2. Normal extrusion, the pressure drop over the process, if more than one minute after pressure from the pressure does not drop, you should stop squeezing, to prevent damage to equipment and tooling.

4.3.7 Exhaust: Each press an ingot from the pressure in the early stages of upsetting, when the pressure reaches 110-160kg/cm2 should relief deflated, and then re-starting normal pressure extrusion.

4.3.8 control the extrusion speed: To maintain smooth and straight profiles, extrusion process should be made before, during and after the extrusion speed is constant. Each machine extrusion speed according to the profile surface quality, depending on the surface quality guarantee compliance with the relevant requirements under the premise surface treatment as fast as possible.

4.3.8.1 should be based on the different characteristics of different alloy extrusion speed control, low impurity alloy extrusion speed can be higher, high impurity alloy extrusion speed will be slower.

4.3.8.2 If the rod temperature is high and should reduce the extrusion speed, if you want to increase the extrusion speed, temperature control rod should be lower.

4.3.8.3 In order to control the mechanical properties of the lowest temperature of the

discharge port must be ≥ 500 ℃.

4.3.9 First Article Inspection: upper die extruded profiles should be the first one first material cut 500mm long left the repair mode as a basis, the first one and the second two rods 500 mm long cross cut for inspection staff Dimensions and tolerance checks to confirm compliance with requirements of drawings dimensions and assembly relationships, thereby determining whether to continue production of the mold.

4.3.10 If you decide to remove mold, inspection staff should be expected on the head and samples marked with a marker pen mold model, serial number and model and inspection records indicated on the defect location.

4.3.11 To prevent mold face, face and billet aluminum extruded gasket face sticky, allowing the mold face and gasket surface coated with a small amount of mold release oil terminal, but painted or not painted as little as possible, but not painted and ingot mold cavity and the tube wall to prevent oil pollution profiles.

4.3.12 To properly use extruded gaskets, extruded gaskets are not protected bumps. Extruded gasket wear too much when it becomes rounded, clear cylinder is not clean, should be replaced with new gasket.

4.3.13 Each extrusion, should pay particular attention to whether the pads away, extruded gasket to prevent accidents caused by equipment not put away.

4.3.14 extrusion process should pay attention to the temperature of the hydraulic oil change: When the temperature rise to about 45-50 ℃, the pressure will be greatly decreased squeeze, squeeze chance to become weak, you should stop and try the oil temperature drop down, and then to re-boot squeeze.

4.3.15 a mold squeeze enough time in the ingot number listed in Table 3, it should take the initiative to put the second set of mold unloading extrusion die.

（Table 4）

Extruder Tonnage (t)	600	1000	1650
Each extrusion ingot mold a number of (a)	100-150	60-80	40-80

4.3.16 In order to prevent extrusion dead zone of the gas and dirt flows in order to protect aluminum and extruded rod without damage, limit the length of pressure I must not be too thick, not too thin, feed pressure I control 15-30mm thickness.

4.4 Quenching (responsible person: Host hand)

4.4.1 6063 T6 extrusions quenching using forced air cooling, T5 natural cooling, profiles outflow can not be less than 80 ℃ / min speed cooling to below 170 ℃.

4.4.2 6061 Extrusion quenching using a strong wind, fog or direct water-cooled, and in 2-3 minutes the temperature was lowered below 200 ℃.

4.4.3 other alloys according to its mechanical properties may be different.

4.5 Interrupt (responsible person: Interrupt work)

4.5.1 In normal extrusion profiles, traction and interrupt work to do. Interrupted, should the preceding sections (period before the split mouth profile) of 6 meters in length in multiples of Niagara straight margin.

4.5.2 squeezed between two sections of split mouth, allowed to remain in the finished product profiles, so the mouth should be split off profiles.

4.6 Straighten (Responsible: Straighten sawing work)

4.6.1 profiles to be cooled in the cooling bed to be below 50 ℃ straightened.

4.6.2 Wait straightened profiles, stepping mode or method of transport to the conveyor belt before straightening machine.

4.6.3 profiles straightened, straighten it should be controlled at about 1-2%, thick profiles straightened slightly larger amount of deformation allowed, but must not exceed 3%.

4.6.4 must look at before and after straightening opening size, to have the assembly relationship profiles assembled test must be done in order to adjust the amount of stretch.

4.6.5 The complex shape of the profiles, it should be identified with the matching pad to help clamp the material.

4.6.6 for a longer length of the profiles, when not clear whether the profiles easy to twist or

friction, the intermediate need someone to help straighten and measuring, checking straightened profile shape and position size to meet the requirements in order to keep the amount of adjustment to straighten .

4.6.7 straightened, pay attention to protect the decorative surface is not scratched, as possible to non-decorative surface contact scaffolding belt.

4.6.8 After straightening profiles should be no wave, bending, twisting, exist, while avoiding straightening caused by the shut mouth, orange peel, geometric size tolerance and roughness appears.

4.7 Length (Responsible: Straighten sawing work)

4.7.1 profiles cutting length should be strictly in accordance with the requirements of scheduling a single execution.

4.7.2 Profiles in length, you should clear its length tolerances. If customers have special requirements, they should be customer requirements; without special requirements, length tolerance shall be controlled by +15 mm to double length delivery, the total deviation of +20 mm.

4.7.3 Length of the school a good bit, cut out sections of a length when the test meets the requirements, must be a positive deviation, negative deviation allowed to confirm no mistake, start batch length sawing.

4.7.4 Length, attention should be straightened profiles caused by deformation of the chuck portion of a section cut out, and then cut to length.

4.7.5 length before checking the surface profile by supporting quality, there will be from the skin, bubbles, waves, bending, twisting, scratches, bumps, debossing and other substandard parts cut out, and then cut to length products.

4.7.6 To prevent scratches profiles, do not stack up cutting profiles, profiles forward, should first saw the stage aluminum scrap purged.

4.7.7 sawing should lubricate the blade oiled, but to prevent oil from getting into the aluminum surface.

4.7.8 After sawing kerf profiles should be perpendicular to the axis, Jukou should be no burrs and twisted deformation. In order to have a beautiful Jukou should always keep the blade sharp, attention should be clear on the plot aluminum blade when the blade is not sharp enough, it is timely for sanding down jagged or replace it with new blades.

4.7.9 Length of the profiles after application of compressed air blown clean aluminum scrap, and then framed.

4.7.10 length after inspection (responsible person: Patrol Officer)

4.7.10.1 profile length, the aniseed-by-branch inspection, the small proportion of 10% expected by random, and truthfully fill out the "extrusion plant inspection original records."

4.7.10.2 check the contents of the flatness, bending, twisting degree, mouth, shut, surface quality.

4.7.10.3 inspection qualified products can be loaded box, substandard products can be qualified plastic blank installed with a special plastic boxes, plastic surgery is not immediately scrap.

4.7.11 Plastic (Responsible: Plastic Engineering)

4.7.11.1 plastic profiles to understand the model, why plastic surgery, what defects and measurement confirmed the severity of defects.

4.7.11.2 understand the substrate internal control standards and requirements for product drawings to confirm the extent to which should be corrected in order to ensure product quality to meet the requirements.

4.7.11.3 ready to measure the magnitude data before and after plastic surgery gages.

4.7.11.4 decision shaping method, the installation can be achieved corresponding shaping rollers and auxiliary equipment.

4.7.11.5 shaping a first test, the pressure should be from small to large and repeated 2-3 times shaping, which should be used to confirm wheel and how much pressure should be loaded in order to ensure qualified profiles.

4.7.11.6 recognition shaping method, the shaping may be large.

4.8 framed (Responsible: Straighten sawing work)

4.8.1 Profiles and check the length after passing to the two gently placed on the material carrying the box, carefully placed neatly, do not collide with each other and friction. Framed yarn should wear clean gloves, gloves, absolutely can not have oil, water and other dirt.

4.8.2 framed, the long expected, heavy material in the lower frame, the short material, light material in the box top.

4.8.3 After release layer, according to the profile length and weight to withstand the extent appropriate to put 4-8 horizontal gutter, add a second layer profiles, vertical profiles allow bending and stackable.

4.8.4 Any fines, can not ventilate solid vertical profiles should be used with ventilation holes on the small side gutter pipe cross stratification separated in order to ventilate heat aging.

4.8.5 The top layer is lower than the expected flat profile frame of the plane, to prevent the stack frame when crushed profiles.

4.8.6 mounted on the frame of the profiles is the result of self-test or inspection shall be identified as qualified products.

4.8.7 After framed logo

4.8.7.1 Each Zhuangwan a frame material, you should fill the frame material production inspection accompanying card, as a product and inspection status identification.

4.8.7.2 Production Inspection accompanying cards were completed by the following persons and their responsibilities related content:

a) extrusion squad responsible for completing content: material frame number, number extruder, extrusion team, squeeze the entire contents of the column. Completed, the pressure in the upper sections of the frame with the material down process flow.

b) Division pound member responsible for completing the content: The total weight of the feed box weight, gutter heavy weight profiles.

c) aging squad responsible for completing content: Aging Date, aging furnace, into the furnace time, released time, set temperature, aging hardness.

d) QC inspection staff responsible for completing the extruded product inspection status (ie, signature confirmation pass).

e) the inspector responsible for completing the shelves before the inspection status, including hardness, and qualified retirement reasons count.

f) into the inspector responsible for completing the finished product inspection status, including color number, thickness, rework reasons, causes and qualified retirement count.

5, forms and records

5.1 "aluminum production inspection accompanying Card"

5.2 "extrusion process the original record."