1 Topic:

Aluminum alloy extrusion process and die design

2 Design basic elements:

Design a solid profile products and a hollow section of craft products and mold design process, including the extrusion process parameters, mold structure, manufacturing processes and other requirements

3 Payable after the completion of information:

Description of a course design

Solid profiles mold parts diagram

Hollow profiles mold mold parts diagram

Hollow profiles mold lower die part drawings

Hollow profiles mold assembly drawing

1 Design completion date:

June 11, 2007 ------ June 22, 2007

Instructor ________ Date of issue ____________

Department Director ________ Approval Date ____________

Curriculum design reviews:

Scores:

Design instructor ___________

______ Day of ______ month

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Directory

1 Introduction

Nearly 20 years, with the rapid development of the construction industry, China's aluminum industry is also civil scratch, from weak to strong ground rapidly advancing. So far, Guangdong Province architectural aluminum products accounting for about two-thirds, aluminum production capacity exceeds the needs of society, how to improve product quality, reduce costs is to get the key to win the market competition.

Aluminum alloy with high strength, light weight, strong stability, corrosion resistance, plasticity, deformation is small, non-polluting, non-toxic, fire resistance, long life (up to 50-100 years), recyclability , and can be recycled heavy refining. 6063 alloy as the main alloying elements of magnesium and silicon, with excellent processing properties, good weldability, extrusion resistance and plating resistance, good corrosion resistance, toughness, easy to polish, on the envelope, anodizing effect of the fine , is a typical extrusion alloy is widely used in building materials, irrigation pipe, for the vehicle, bench, furniture, lifts, fences etc. with the tubes, rods, profiles. Over the years the world are made of 6063 aluminum alloy (aluminum hundreds of species) as window and door frames. Mainly to the metal surface anodic oxidation effect, start anodizing is white, after further changes in the electrolyte to reach the bronze, the two main colors in the country with more than a decade.

Aluminum in the extrusion process, such as extrusion die is not very good or extruded aluminum die too, will produce extruded aluminum surface marks, hand to touch the aluminum surface may be uneven, so in modern large-scale production implementation of extrusion processing technology, the key to success is to mold, mold design and its quality is related to product quality, costs.

In the extrusion process of designing extrusion process conditions: Consider the extrusion

temperature, extrusion speed, lubrication, mold (type, shape, size, etc.), I cut pressure, quenching, cooling, cutting head cut tail, and many other factor. Among them, select the extrusion cylinder diameter D0 is a core of the problem, have the following selection principles: 1) to ensure the product surface quality principles; 2) ensure that the principles of extrusion die strength; 3) the principles of internal quality assurance products; 4) economic optimization principles - the lowest production costs; finished product rate maximum; highest yield.

The design task is to design a solid profiles and a hollow profiles mold, mold using single-mode solid profiles, hollow profiles mold using porthole dies, all of the material is extruded products 6063. Because of its high strength, light weight, good processing performance, in the annealed condition, the alloy has excellent corrosion resistance and mechanical properties, is a possible limitation enhanced AL-Mg-Si alloy is widely used in basic construction industry as well as some machinery manufacturing.

The chemical composition expressed as follows:

6063AL ingredients: GB/T3190-1996:

Table 1:

NO.	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Other elements	
									Each	Total
6063	0.2～0.6	≤0.35	0.10	0.10	0.45～0.9	0.10	0.10	0.10	0.05	0.15

60 63 Mechanical properties: ("aluminum alloy and application")

Tabl3:

Common extrusion tool steel and its mechanical properties:

Steel number	Ingredient (%)	Test temperature ^{o}C	σ_b /MPa	$\sigma 0.2$ /MPa	ψ /%	δ /%	HB	Heat Treatment
5CrMnMo	0.55C	300	1150	990	47	11.0	351	850 ^{o}C Oil quenching 600 ^{o}C Tempering
	1.51Mn	400	1010	860	61	11.1	311	
	0.67Cr	500	780	690	86	17.5	302	
	0.26Mo	600	430	410	84	26.7	235	
3Cr2W8V	0.30C	300					429	1100 ^{o}C Quenched in oil，550 ^{o}C Tempering
	0.23Cr	400	1520	1373			429	
	8.65W	500	1430	1363		5.6	405	
	0.29V	600	1280		15	8.3	325	
4Cr5MoSiV1	0.37C							1050 ^{o}C The first oil quenching and tempering 600 ^{o}C
	4.74Cr	400	1360	1230	49	6		
	1.25Mo	450	1300	1135	52	7		
	1.05Si	500	1200	1025	56	9		
	1.11V	550	1050	855	58	12		
	0.29Mn	600	825	710	67	10		

2 Introduction to the total design process

2.1 Extrusion Process:

→ heating → extrusion ingot cutting pressure I → → cooling → cut head and tail quenching or (cut length) → aging → surface treatment → packing → Factory

2.2 extrusion process conditions:

1). Ingot heating temperature

6063 aluminum is the maximum allowable heating temperature of 550 ℃, the minimum temperature of 320 ℃, in order to ensure product, properties, extrusion billet heating temperature is not too high, should try to reduce the extrusion temperature.

2). Extrusion heating temperature

Mostly steel mold component, because of poor thermal conductivity, in order to avoid thermal stresses, extrusion cylinder to be preheated prior to extrusion, in order to ensure the quality of the extruded product, and has good effect extrusion, extrusion barrel temperature of preferably 400 ℃ ~ 450 ℃.

3). Extrusion temperature

Hot extrusion, the heating temperature is the absolute melting point temperature is generally 0.75 to 0.95 times, the design of the extrusion temperature of 450 ℃ ~ 500 ℃, the extrusion process the temperature controlled at about 470 ℃.

4). Extrusion speed

Consider metals and alloys can be extruded resistance, product quality requirements and equipment capacity constraints, the design of the extrusion speed to take 0.7 ~ 0.8m / s.

5) The workers die lubrication

Because the design uses hot extrusion, it is not lubricated.

6) The mold

Mold should have sufficient fatigue strength and high-temperature hardness, high tempering resistance and heat resistance, sufficient toughness, low expansion coefficient and good thermal conductivity, workability, and economy, the design 4Cr5MoSiV1 as the mold material, heat treatment hardness of

HRC40 ~ 47.

7). Cutting pressure than

Determined according to the selected devices.

8) quenching

In this process, the article can be extruded products for the hair to set the fan to achieve the purpose of air quenching.

9) cooling

Set directly exposed to cool in air to reach the natural aging purposes.

10) Cut the head and tail

Organizational performance due to uneven head and tail, in order to ensure product quality, the unification process to the head and tail of the 300mm.

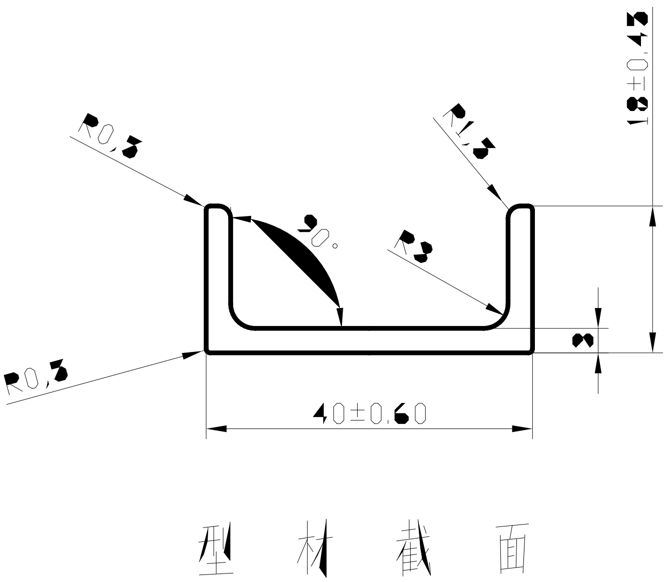
3 Die Design Solid Profiles

3.1 To design a solid shaped products:

The shape and size of this product is as follows

Figure

1:



Grades (XC311)

Products, the cross-sectional area F = 212.9mm2 system

Profile circumcircle outer diameter D = 43.86mm

Existing equipment:

Table 4：

Equipment Tonnage		500T	800T	1630T
Extrusion cylinder diameterD0		Φ95	Φ125	Φ187
Extruded cross-sectional areaF0		7085	12266	27451
Ingot size Dd x Ld		Φ90x270/320	Φ120x400/450	Φ178x540/600/660
Length cooling bed		26m	32m	44m
Fill factor		1.114	1.085	1.104
I pressed thick		20	25	30
Maximum extrusion ratio		97.4	82	73.6
Processing range	Maximum circumcircle diameter	Φ65	Φ95	Φ147
	Products squeeze a minimum cross-sectional area F system min	72	150	372

3.2 Choice blanks and sorting equipment:

Range according to the processing requirements (F Built ≥ F system min, and D ≤ D outside the outer max) with 500T, 800T optional, according to the highest principles of the finished product rate, further optimization calculations list:

Table 5:

NO.	D_0 (F_0)	D_d (mm)	L_d (mm)	W_d (kg/Root)	Fill factor K	After filling length L_d'	I pressed thickh$_y$ (mm)	After the effective length of the cutting pressure IL_d''	Extrusion ratioλ	Length products L (m)	Finished numbemx6 (m)	Finished weightW制 (kg)	Finished product rateW制/Wd (%)
1	Φ95	90	270	4.62	1.114	242	20	222	33.29	7.39	1X6	3.44	74.40%
2	Φ95	90	320	5.47	1.114	287	20	267	33.29	8.89	1X6	3.44	62.77%
3	Φ125	120	400	12.20	1.085	369	25	344	57.61	19.82	3X6	10.32	84.95%
4	Φ125	120	450	13.73	1.085	415	25	390	57.61	22.47	3X6	10.32	75.38%

Finally select the highest rate of 84.95 percent finished corresponding Scenario 3

3.3 Calculation of extrusion pressure:

According to squeeze pressure equation:

P = 11.775 × [(D / d) 1/2-0.8] × D2 × ΣB

P - extrusion pressure as a unit, N

D - EXTRUSION BARREL DIAMETER, MM

D - PRODUCTS OF EQUIVALENT DIAMETER, MM

ΣB - AN EXTRUSION TEMPERATURE TENSILE STRENGTH, MPA

THEREFORE, P = 11.775 × [(125/16.46) 1/2-0.8] × 1252 × 16.2

= 5829.21KN

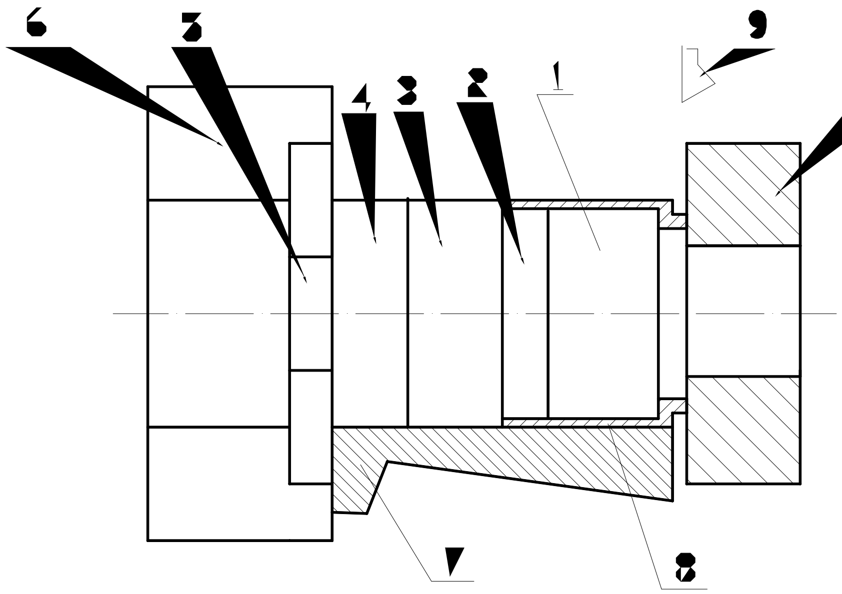
CONVERTED INTO TONNAGE: APPROXIMATELY 595T

P <RATED TONNAGE OF 800T, EQUIPMENT SELECTION TO MEET THE REQUIREMENTS, NAMELY THEORY TECHNICALLY FEASIBLE.

3.4 SOLID PROFILES MOLD CONCRETE STRUCTURE DESIGN:

MODULE STRUCTURE AS SHOWN

Figure 2



1 mold 2. Die pad 3. Former ring 4 ring after 5. Protection plate 6 front rack 7. Die holder 8 die sets 9. Scissors 10. Extrusion cylinder

Module structure:

For different tonnage extrusion machine, the main structure of the figure dimensions are matching set, you can look up from the relevant data. Module's main structural dimensions shown in Figure 3

Module size as follows:

Table 6：

Equipment Tonnage	500T	800T	1630T
Φ1×Φ2×H	Φ160×Φ180×190	Φ210×Φ250×240	Φ310×Φ350×340
H1	20	30	30
H2	80～90	90～100	110～150
H3	50～60	50～60	60～80

Extrusion die size as follows:

Table 7：

Equipment Tonnage	500T	800T	1630T
Φd1/d2	Φ135/Φ145×20～25	Φ165/Φ175×25～30	Φ250/Φ260×30～40
h1	12	12～13	12～13

3.5 - solid die size data Design:

1). Select blank and select the device

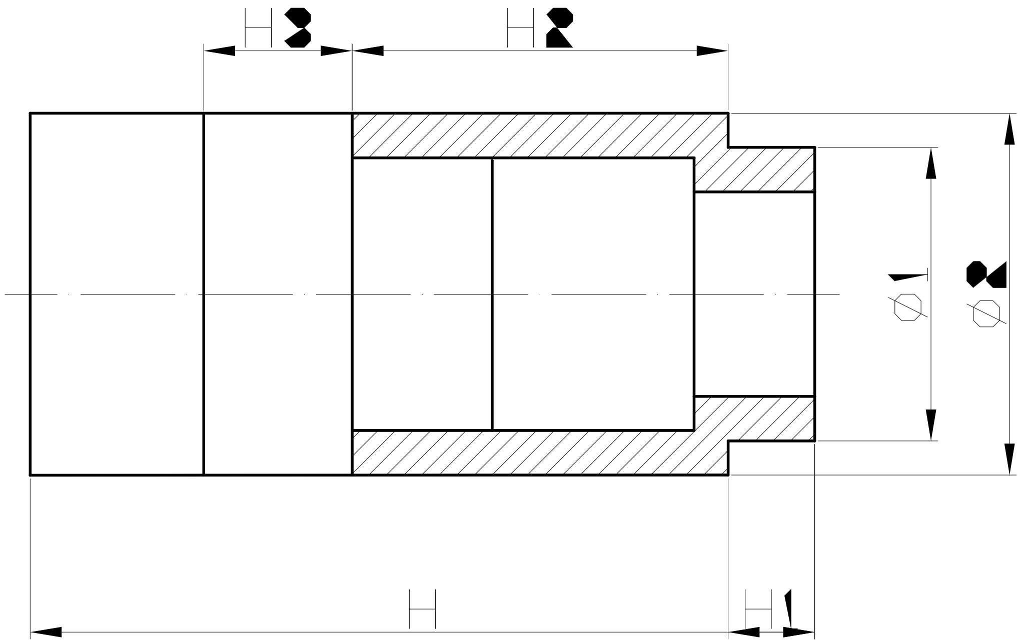
Based on the previous

Extrusion barrel diameter D0 = 125mm billet size: Dd × Ld = Φ120 × 400

Extrusion ratio λ = 57.61

2). Modules and calculate the shape of the mold size

Figure 3:

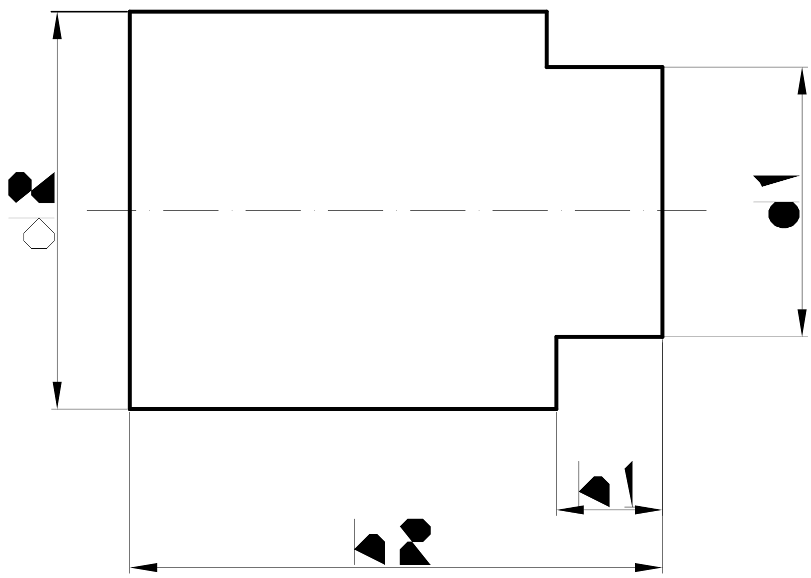


According to the previous calculation, select from Table 6

$H_2=100$ $H_3=60$ $H_1=30$

Determine the size of the mold shape (Figure 4 below)

Figure 4:



Based on data in Table 7 can be determined

$d_1=165$ ㎜ $d_2=175$ ㎜ $h_1=12$ ㎜ $h_2=30$ ㎜

3) determine the size of the mold shape within

Extrusion ratio $\lambda = 57.61 < \lambda MAX = 82$, it does not require porous squeeze

Determine die hole size:

Profiles Dimensions formula: $A_k = A_m + (1 + C_1) + \triangle 1$

A_k - the actual size of the die hole

A_m - nominal size profiles

C_1 - For Coefficient (For 6063, $C_1 = 0.017 \sim 0.010$, taking the design C_1 0.010)

$\triangle 1$ - profiles Dimensions positive deviation

Calculated:

$B_k = 40 (1 +0.010) +0.60 = 41.00$mm

$H_k = 18 (1 +0.010) +0.45 = 18.63$mm

Profiles wall thickness formula: $S_k = S_m + \triangle 2 + C_2$

S_k - die hole size of the actual wall thickness

S_m - the nominal size of wall thickness profiles

C_2 - For volume coefficient, aluminum and generally 0.05 to 0.15, 0.10 to take this design

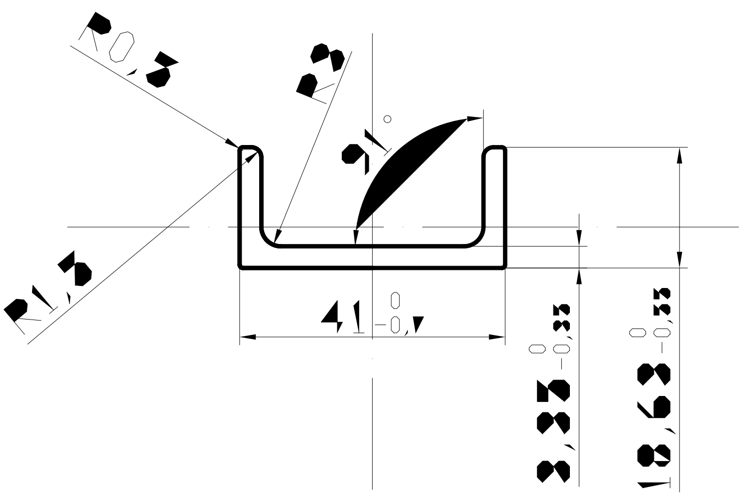
$\triangle 2$ - positive deviation of wall thickness profiles

Calculated:

$S_k = 3 +0.25 +0.10 = 3.35$mm

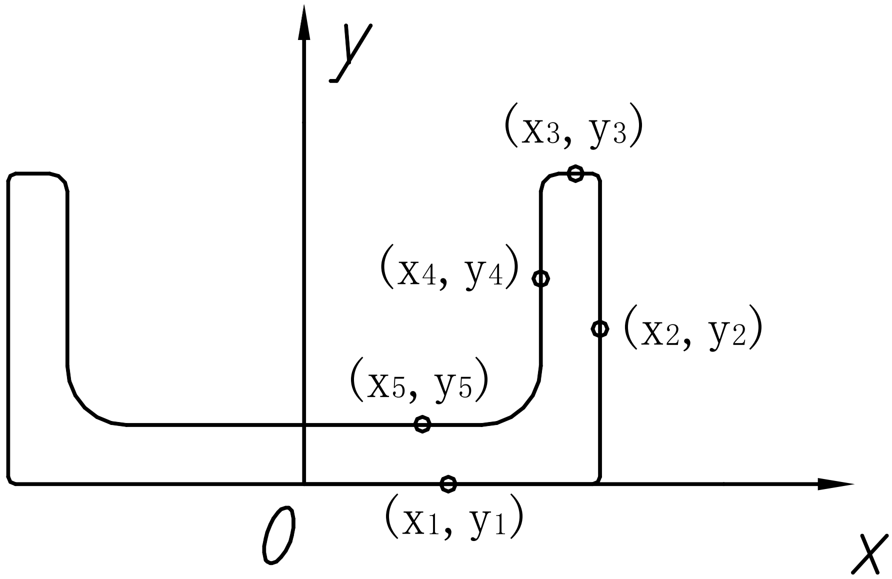
Die hole as shown five main dimensions

Figure 5:



4). Shaped hole in the end determine the location of the mold

As the thickness profiles for the other profiles, profiles of the geometric center of gravity and therefore set the mold in the center of the center of pressure is calculated (as shown below)



$X_0 = 0$

$Y_0 = (l_1y_1 + l_2y_2 + l_3y_3 + l_4y_4 + l_5y_5)\times2/(l_1 + l_2 + l_3 + l_4 + l_5)\times2$

$Y_0 = (20\times0 + 18\times9 + 3\times18 + 17\times10.5 + 8.5\times3)\times2/(21 + 4 + 17 + 32 + 17 + 4 + 21 + 40)\times2 = 6.32$

Pressure center $X_0 = 0$, $Y_0 = 6.32$

5) Working with the determination of the length of

Because it is such wall sections, so the entire bearing length hg equal access this design

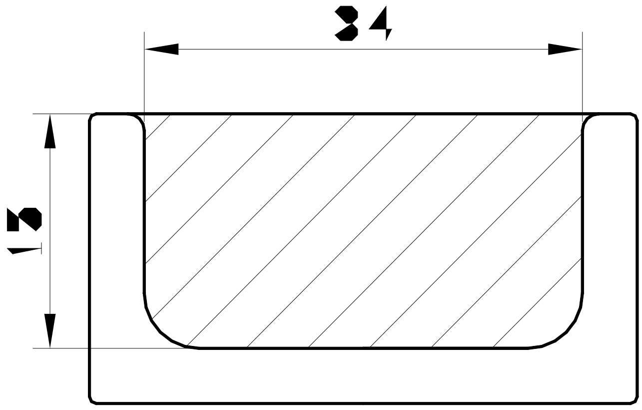
hg = 5mm

6). Hinder angle

Since hg ≤ 10 ~ 15 mm, it does not hinder the angle using

7). Checking the strength of the mold

Profiles mode is its main strength than nuclear cantilever portion AB is dangerous to take the top end profiles, strength check.



①、Find unit pressure p: p = P / F0 (P for the extrusion pressure, F0 for the extrusion cylinder basal area)

吨 P = 800, p = 800 × 1000 × 9.8/12266 = 639.17Mpa

Tongue load Q = pFsh (Fsh tongue that is shaded area)

Q = 639.17 × 32 × 15 = 306801.6N

○ 2, tongue bending stress σw calculation: σw = Mw / W

Where Mw - moment, Mw = Qe (e centroid of the shaded section of the distance from the dangerous);

W - section modulus, W = bshH2 / 6 (H for mold thickness).

bsh = 34mm

Mw = 306801.6 × 7.5 = 2301Nm

W = 34 × 302/6 = 5.1cm3

σw = 2301/5.1 = 451.2MPa

○ 3, the calculation of the shear stress τ: τ = Q / bsh × H

τ = 306801.6 / (34 × 30) = 300.79MPa

○ 4, the calculation of equivalent stress σe: σe = [σw2 + (1.73τ) 2] 1/2

σe = [451.22 + (1.73 × 300.79) 2] 1/2 = 688.74MPa

500 ° C at 4Cr5MoSiV1 yield strength of 1025MPa, much larger than σe, mold strength so qualified.

8). Mapping

(See drawing)

4. Die Design hollow sections

4.1 To design products:

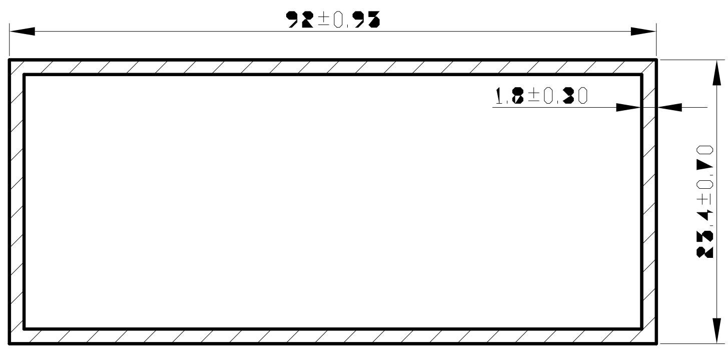
The design of product grades for I529 series of back-tube

Specific parameters for the

B＝92mm，H＝25.4mm，T＝1.8mm,重量：1.09Kg/m

Specifically as shown

Figure 6



4.2 Choice blanks and sorting equipment:

Products, cross-sectional area: F = 409.68 mm2 system

Circumcircle die hole outside diameter D = 95.44 mm

Range according to the processing requirements (F Built ≥ F system min, and D ≤ D outside the outer max) known from Table 4

Available only 1630T

The principles taught by the highest rate in the further optimization of calculation to calculate the list below

Table 8

NO.	Do (Fo)	Dd (mm)	Ld (mm)	wd(kg/根)	Fill factorK	Le	hy (mm)	Ld	λ	L (m)	nx6 (m)	W(kg)	W/Wd (％)
1	Φ187	178	540	36.15	1.10	491	30	461	67.01	30.9	5X6	33.06	91.5
2	Φ187	178	600	40.16	1.10	545	30	515	67.01	34.5	5X6	33.06	82.3
3	Φ187	178	660	44.18	1.10	600	30	570	67.01	38.2	6X6	39.67	89.8

FINALLY SELECT THE HIGHEST RATE OF 91.5 PERCENT TALENT PROGRAM A CORRESPONDING

Namely 1630T extrusion equipment

Billets size: Dd X Ld = Φ178 × 540mm

Extrusion ratio λ = 67.01

4.3 Calculation of extrusion pressure:

According to squeeze pressure equation:

$$P = 11.775 \times [(D / d) 1/2-0.8] \times D2 \times \sigma b$$

P - extrusion pressure as a unit, N

D - extrusion barrel diameter, mm

d - products of equivalent diameter, mm

σb - an extrusion temperature tensile strength, MPa

Therefore, P = 11.775 × [(187/22.84) 1/2-0.8] × 1872 × 16.2

= 13750.3KN

Converted into Tonnage: Approximately 1403.1T

P <rated tonnage of 1630T, equipment selection to meet the requirements that the selected device viable theory

4.4 module and mold dimensions determined by:

Module size structure diagram shown in Figure 3 as previously

According to the previous calculation, select from Table 6

H2 = 150 H3 = 70 H1 = 30

As the mold dimensions diagram according to Figure 4 can determine the data in Table 7

d1 = 250 mm d2 = 260 mm h1 = 13 mm h2 = 150 mm

Because of the design using pore type Porthole Die

Therefore: Take on H = 80 mm H = 70 mm lower

4.5 Combination mode parameters to determine:

1). Taking the number of vent holes 4, the shape of fan

2). Fan-shaped area to determine:

Because shunt hole area ratio of the area with the products off ΣF points / F type = K, K is the split ratio, generally K for hollow sections, should be equal to λ1 / 2. This design take K = 8 .. 19

Porthole area ΣF points = K. F-type = 8.19 × 409.68 = 3355.28 mm2

And the size of the area by porthole in F / F = f Large Small / f small

Where, F --- vent hole area, f ---- corresponding profiles area

ΣF points = 2X (F + F Little Big)

Therefore F major = 1329.58 mm2 F = 348.06 mm2 small

3). Shunt hole to determine the location

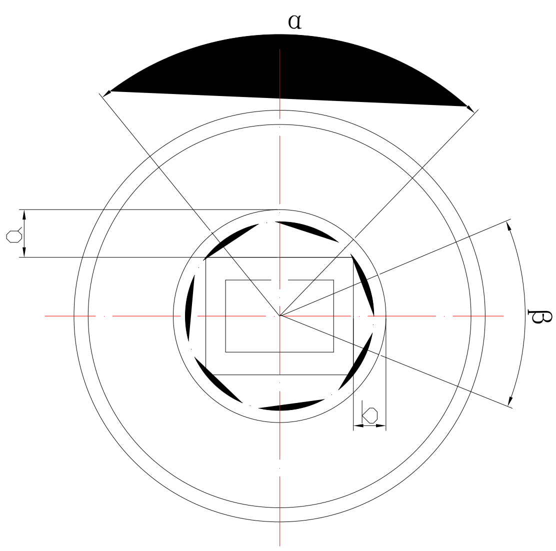
① shunt hole center circle of diameter D = 0.7D0 = 0.7 × 187 = 130.9mm

② should ensure maximum circumcircle diameter porthole scope than the device can process maximum circumcircle diameter small hole 5mm. The design of the device can process maximum circumcircle diameter Φ147, therefore porthole maximum circumcircle diameter ≤ Φ142mm

③ Taking all factors into consideration, whichever is first temporarily circumscribed circle diameter Φ132mm

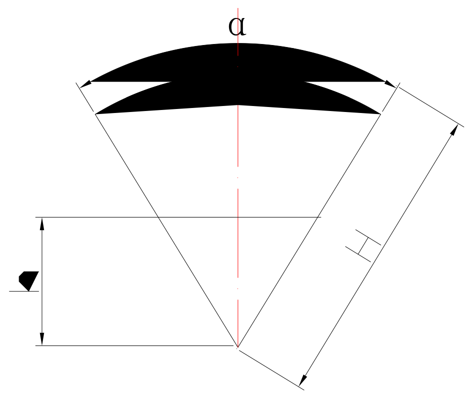
④ determining a, α, β size as

FIGURE 7



Where a, b of the die hole of the mold cavity a minimum distance, according to experience a, b and generally 3 to 8 mm, the design taking a = 8 mm, b = 7.5.

Figure 8

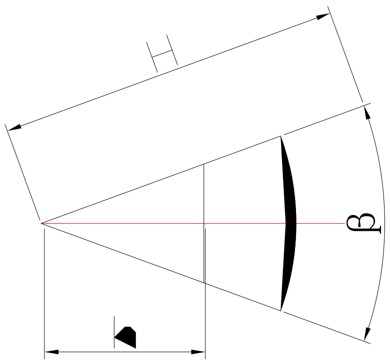


The h = 25.4 / 2 +8 = 20.7, H = 132/2 = 66, the equation can be obtained from the knowledge of geometry:, with the relevant data can be drawn into α ≈ 40 °,

Similarly, draw β ≈ 30 °, the AutoCAD menu bar "Tools" → "Query" → "Area" function

Checking the outcome can be basically correct.

Figure 9



4). Vent hole shape

Vent hole by a certain inclination of the taper, which can improve the quality of the weld, with the axis of the bore taper angle of 2 ° ~ 4 °, 4 ° take this design

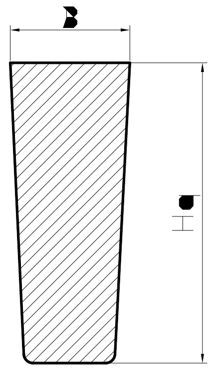
5). Shunt bridge

The width of the bridging and strength of the mold and the metal flows, from the split ratio increases, lower extrusion pressure to consider the bridging width B should be chosen smaller, but in order to improve the uniformity of the metal flow, die holes are preferably obscured by the diversion of the bridge, then B should be chosen to be more wide, general admission:

$$B = b + (3 \sim 20)\ mm$$

The design uses a trapezoidal structure, take B = 45 shown below

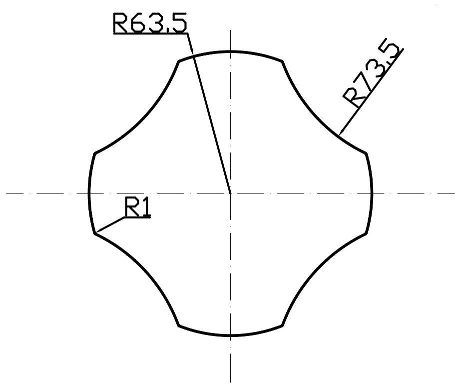
Figure 10



6). Welding chamber

Welding chamber shape and size of the quality of the weld has a great influence. Press the empirical formula: When D0 = Φ190 ~ 200 mm when, h = 20 mm, welding chamber shunt exit hole diameter than about small 5mm, this design take h = 20mm, circular shape as shown:

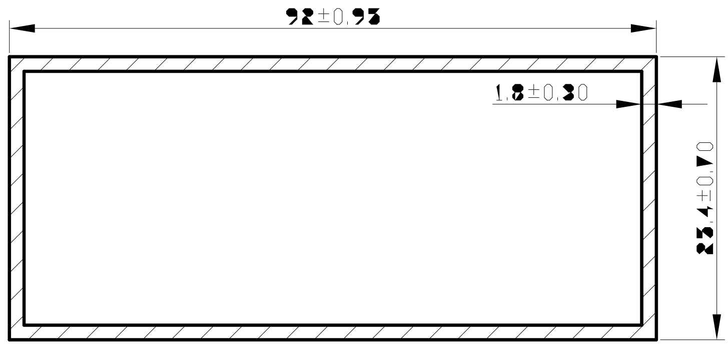
Figure 11:



4.6 determine the size of the mold inside shape:

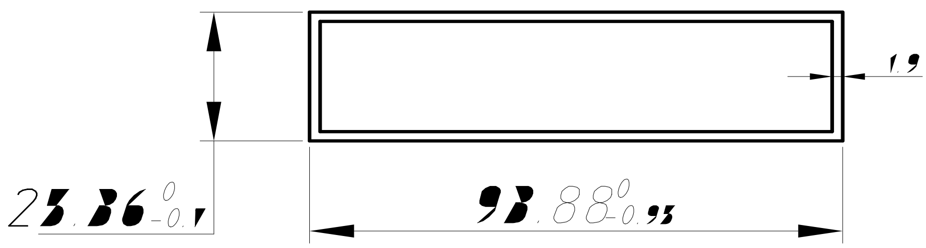
Workpiece as shown:

Figure 12:



Mold is as follows:

Figure 13:



Press the empirical formula A = A0 + K A0

A - product shape of the die hole size

A0-products form the nominal diameter

K-empirical coefficient, since the design competition for 6063, taking K = 0.010

Get BK = 92 (1 +0.010) +0.95 = 93.88, HK = 25.4 (1 +0.010) +0.7 = 26.36

Product profile wall by the empirical formula B = B0 + △ OK

Since B0 = 1.8 mm. This design △ = 0.1

Therefore Tk = 1.8 +0.1 = 1.9 mm

4.7 Working with the length of the die hole hg to determine:

Since the symmetry of the profile products better shape is relatively small, generally preferable 2 to 6 mm.

This design take hg = 5mm

4.8 Design of the core:

Generally work with extended lower mold 3-5mm, the design take 4mm, hollow sections according to the cavity shape hollow portion OK.

4.9 Design of the upper mold Boss: Boss Takatori upper die 7mm, diameter Φ256mm, positioning for assembly

4.10 dowel pins, screws (according to GB standard selection of standard parts):

Take two locating pin diameter: Φ8x75, screw using M10x85, details, see the assembly drawings

4.11 mold strength check:

This mold under load at work is the most adverse circumstances and diversion channels have not yet entered welding chamber filled with metal and metal after welding chamber outflow bores on the occasion, it is mainly for checking the strength of the mold split bridge, bridge mode bending stress and shear strength:

① shunt bridge bending stress check

Hmin = L [P / (2 × [σb])] 1/2, where:

Hmin - the minimum height of the bridging

L - shunt bridge two dangerous section of length L = mm calculated

P - role in the extrusion unit pressure on the gasket

[σb] - mold material at temperatures allowable stress.

At 450 ~ 500 ° C, for 4Cr5MoSiV1 take [σb] = 1000MPa

Substituting the data obtained:

P = 1630x9.8x1000/27451 = 582MP

Hmin = 125 [582 / (2 × 1000)] 1/2

Hmin ≈ 67.43mm

Since the thickness of the upper die on H = 80mm> 67.43mm, it meets the requirements

② check diversion channel shear strength

τ = Qq / Fq ≤ [τ]

Qq - split the total pressure on the bridge;

Fq - the bridging of the total area of the shear stress;

[τ] - allowable shear stress, τ = (0.5 ~ 0.6) [σb], 450 ~ 500 ° C, for 4Cr5MoSiV1 take [σb] = 1000MPa

Substituting into the formula are:

τ = (1630 × 9.8 × 1000/27451) × 9918 / (80 × 45 × 4) = 399MPa ≤ 500MPa

Therefore strength to meet the requirements.

4.12 Parts assembly diagram (see drawing)

5、Summary and Experience

EXTRUSION DIE IN TWO WEEKS NEAR THE END OF THE CURRICULUM DESIGN. A FEW DAYS BEFORE DESIGN BEGINS, YUAN LAOSHI WITH US TO EXPLAIN THE APPLICATION OF ALUMINUM ALLOY, COMMONLY USED PROCESSING METHODS, PROCESSING AND EXTRUSION DIE OF THE BASIC STRUCTURE, THE SECOND STEP OF THE DESIGN AND THE DESIGN OF

ATTENTION PROBLEMS, WHICH ARE FOR ME THIS COURSE IS DESIGNED TO PROVIDE A GREAT HELP, OF GREAT SIGNIFICANCE. EXPOSED ME TO A LOT OF KNOWLEDGE ABOUT THE EXTRUSION DIE DESIGN, SUCH AS SOME OF THE BASIC STRUCTURE OF EXTRUSION DIES, ETC., AND LEARNED A LOT ABOUT NOT GO TO SCHOOL TEXTBOOK KNOWLEDGE OF ALUMINUM ALLOY MATERIAL!

THE DESIGN PROCESS, EXCEPT FOR THE LAST THREE DAYS DRAWING OUTSIDE THE DRAWING ROOM EVERY DAY I ARRIVED ON TIME, EVEN IF SOMETHING DID NOT COME TO THE SAME TEACHER! IN COMPUTING, THE DESIGN PROCESS ENCOUNTERED A LOT OF DETAILS. I ACTIVELY DISCUSSING WITH THE STUDENTS, AFTER PONDERING THE PROBLEM OR DO NOT UNDERSTAND THE TEACHER FOR ADVICE. UNDER THE GUIDANCE OF THE TEACHER A LOT OF PROBLEMS SOLVED!

IN ADDITION, THE DRAWING PROCESS ALSO ENCOUNTERED SOME PROBLEMS, FOR EXAMPLE, I PRACTICE THIS SEMESTER PRO / E SOFTWARE MORE, BUT THIS DESIGN I USE AUTO CAD, MAKE ME CONFUSED WITH SOME COMMANDS, RESULTING DRAWING SLOWER, BUT LATER, WITH THE DRAWING PROGRESSES, THE SITUATION GRADUALLY IMPROVED, I BELIEVE THE FUTURE WILL BE MORE PROFICIENT!

THE DESIGN I HAVE BASICALLY COMPLETED, ALTHOUGH THERE ARE MANY DEFICIENCIES, NEEDS SOME MODIFICATION. THROUGH THIS DESIGN, BUT I HAVE BASICALLY LEARNED HOW TO DESIGN A BASIC PROCESS OF EXTRUSION DIES, WATCHING THEIR LABOR WAS VERY HAPPY. MORE IMPORTANTLY, IT MAKES ME DIE DESIGN HAD A STRONG INTEREST IN THE FUTURE WILL BE IN THE MOLD DESIGN TO CONTINUE TO STRENGTHEN THIS AREA!

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