Chapter 1 introduction

1.1 weld to connect a technical application

It is a kind of manufacturing technique to weld, it is the demand that adapts to an industrial development, take modern industry as a foundation development to get up of, and directly Be served to machine manufacture industry.Weld a technical development is as close and related as the demand of manufacture industry, generally industrial advanced countries, 50% of steel yield is then or so to need to adopt to weld the craft can form a product, in the petroleum chemical engineering, the mineral mountain metallurgy, metal structure, rise the heavy conveyance, land-and-water transportation, aerospace aviation and bridge building, electric power energy etc. machine equipments manufacturing section, weld to all have an extensive application.The large structure in many equipmentses almost welds structure.Now, along with science technical progress, the production scale extends day by day and weld structure just toward super large, Gao capacity, Gao parameter, bear to whet, bear low temperature, direction development bear to carry, this not only need for weld production to provide quality higher, the function is various better Han machine, weld material and weld a craft, and ask for providing various welder with excellent function and equip have, make to weld production to carry out mechanization and automation, reduce artificial factor interference, attain assurance and stability to weld quality, improve a welder labor condition, raise rate of production, promote the purpose that the civilization produces.But, welding the production is a comprehensive sex production, in the process of welding to make in, in addition to welder preface, there is still before or after the match of a lot of work prefaces, if get the materials ready, transport, assemble, examine, correct etc. work preface.Therefore, the mechanization that welds production automated to not only only limit at a welder preface, but also include to connect up properly with welder preface of the mechanization of each work of top and bottom preface, automate.Only each work preface carry out mechanization, automation, just can carry out the comprehensive mechanization of welding the production, automate.

1.2 weld a machine material

Welding the machine material is to match each other with welder preface to match in the middle of welding production and be advantageous to realization to weld production mechanization and automate and be advantageous to raising assemble-weld quality, urge to weld the various assistance device and equipments that the production line acceleration carries on.Call here it for lends support to device and equipments for being mutually distinct

with Han machine.The Han machine is to weld a core within process material, it includes to welds the power and weld a control box and weld machine the first, there is own independent system, don't belong to the category of welding the machine material.But weld a machine to equip opposite Han machine to be placed in an adjutant position, is the device and equipments that matches with Han machine to carry on welding production.The scope that it includes is more wide, press the use for cent, mainly have welder to pack tongs and weld to become a machine and weld to transport a machine three, secondly still have already conducted electricity a device and Han to transport with recall equip, ascent the preparation and Han sew to clean up Jing the whole device etc..They again is weld a machine material of from belong to device.

Dividing from use scope, weld a machine material and is divided into in general use material and appropriation for welding a machine to weld a machine to equip two major types.Being in general use to weld a machine to equip in general use is strong, the adaptability is wide, the whole set machine can adapt to the variety of product structure repeated use.They can combine together an use as well as assemble at weld to produce on-line, become one that welds a production line to constitute part.Because this kind of equips in general use strong, so the mechanization, automation level isn't very high, mainly satisfy the demand that the many specieses, small batch quantity welds production.The appropriation welds machine material for the sake of orientation list species, large numbers of quantity weld the demand of production exclusively design manufacturing of.This kind of material profession is strong, rate of production Gao, control system forerunner, can nicely satisfy product structure, pack welder's skill and produce the request of batch quantity.For example:The appropriation welder packs tongs, appropriation to weld tool machine to belong to this material.

Automatically weld a special airplane is is a particular work piece and certain shape of weld to deal with contact but exclusively design of welding and automating equipments.Can pass an electricity control, annoy control and hydraulic to control a technique, carry out to move to carry out a revolving of component, hydraulic performance component or move to the electric motor, spirit, carry out a work piece the Han sew and opposite sport of the Han gun, thus and automatically complete to weld to deal with contact of weld a work.Automatically weld a special airplane is used for automating production, request artificial or the machine hand top and bottom work piece, the welder packs tongs auto work piece fix, fixed position, automatically start weld the electricity Hu of the power, automatically send the automatic ambulation of silk and Han gun or work piece,

automatically send back after welding completion, artificial or machine hand dismantle a work piece, it constitutes mainly from weld the system, machine system and electricity control system composing.

Weld system to include to weld the power and Han gun among them, mainly have argon Hu ion Han, such as, the Han machine, the CO2 Han machine and MIG/MAG Han machine, and etc. machine, cover up Hu Han machine etc..There is also electric resistance Han certainly, the flame Han, laser Han, and electron beam Han...etc. weld a form.Above few kinds welding the power, the argon Hu Han machine and etc. ion Han machine can adopt Han to sew metal oneself to blend and weld two work pieces together, can also plus an auto to fill silk machine and complete welding of thicker work piece.The CO2/MIG/MAG Han machine and cover up the machine of Hu Han all have an oneself of send silk system, pass a Han gun center to carry a department to send out Han silk.Weld parameter is regulated by the Han on board control knob.

The machine system is mainly packed tongs and work piece assistance by the bed body organization, work to prop up tiny etc. for adjusting organization, welder piece or Han gun to move organization of organization, Han gun.Bed body organization:the bed body mainly have already propped up a function to the equipments, can use to cast a piece or weld a composing.Because foundry piece the production period is long, the cost is high, so now basically adoption type material and steel plate after welding, through back fire and Jing to process but become, can quickly make and the cost is low, get a great deal of use.The work packs tongs and assistance to prop up organization:Can process noodles or fixed position bore according to the work piece, the opposite position of fixed work piece, can adopt to move, the spirit move, dynamoelectric, hydraulic control tongs sport, realization pack to clip and position a work piece.

The Han gun is tiny to adjust organization:Want a Han gun to aim at Han to sew, need the X to the Han gun\Y\Z to carry on 3D the direction of gun regulate, being a Han aim at Han to sew, at the same time according to welding a craft request, also need to carry out revolving of each direction function.

The ambulation organization of welder piece or Han gun:Want to complete straight line, circumference or curve Han to sew of weld, need then opposite sport of the track that the Han gun sews with the Han of work piece can complete to weld a request.Can choose the Han gun moves, can also choose work piece sport.This demand decides to design way of thinking according to shape and size of work piece.Its designing a principle is an organization the most simple, control most simple, the worker pack to unload a work piece most convenience is

lord.The wreath sews Han is that the work piece exercise, Han gun motionless, keeping sewing the Han machine is work piece motionless, Han gun straight line sport.What this text involves is connect a line box of keep sewing to weld, so adoptive of is to keep sewing to weld, namely work piece motionless the Han gun make straight line sport.So, welding of design accommodation support and weld tongs to step up, position we want to weld of length for the connecting of 6 ms line box, is assurance weld the important guarantee of quality.Want to carry out high quality of even weld, originally weld machine to need to adopt an automatic control of PLC, raise to weld an efficiency.

1.3 weld craft assurance analysis

This text welder piece material is a Q235, the Q235 is 1 kind of common carbon vegetable structure steel, it accepts defeat strength about 235 MPas, and will make it accept defeat value to let up with the increment of the thickness of material.Because containing carbon is just right, the comprehensive function is better, strength and Su with weld to etc. function to get more match, the use is the most extensive.

The Q235 contains amount of carbon low, the manganese, Huo content is also little, so, usually can't produce severity to harden organization because of welding under the circumstance or Cui fire organization.Low carbon steel after the Han of deal with contact Su is as good as impact resilience, generally don't need to be prepared while welding hot, control layer the temperature and empress is hot, the Han needs not adopt, either behind hot the processing improve organization, whole weld process need not adopt special craft measure, weld sex good.Don't have special request towards welding the power, generally hand over, the direct current Hu Han machines can weld.Process a request according to the dissimilarity of work piece in the middle of physically producing, can choose handicraft electricity Hu Han and CO2 air protection Han, cover up Hu Han etc. to weld a method.

Because of the restriction that welds a size, in order to weld a convenient beard realization to weld automation, so choice benefit in the realization weld process mechanization and the air protection of the automation Han.The air protection Han has a following characteristics:(1)Give or get an electric shock Hu and Rong pond of it is thus clear that sex good, weld can regulate to weld parameter according to the Rong pond circumstance in the process; (2)Weld process operation convenience, there is no Rong residue or hardly have a Rong residue, the Han basically receives not to need a pure residue behind;(3)Give or get an electric shock Hu while protecting the compression of current of air calories concentration, weld speed more quick, the Rong pond is smaller, the hot influence area is narrow, Han piece Han after transform small;(4)Be advantageous to the mechanization and automation that

welds process, especially the mechanization of space position welds;(5)Can weld chemistry alacrity strong with easy formation Gao the melting point oxidize magnesium, aluminum and Qin and its metal alloy of film;(6)Can weld lamella.

The air protection welds to operate ex- preparation:(1)Operating the personnel has to understand Han organization to build principle and acquaint with its machine system, electricity system, acquaint with power box and various switch on the operation keyboard, the function of knob, understand the main technique parameter of Han machine;(2)Should acquaint with diagram paper before operating and drive the material of welder's piece, the heap Han part waits to request concerning the technique;(3)Want to have a quality check to the Han silk and the Han before working, having the product the square who produces a qualified certificate can use.Want clearance to the greasy dirt and the rust of the Han silk, want to press the craft to request to carry on curing to the Han;(4)Heap Han front, clear to rust and greasy dirt of work piece last Han part clean;(5)Request and choose that the spirit that descends sex, even characteristic, even characteristic protects Han the power characteristic curve according to the craft of heap Han, and turn the conversion switch to to should of in the position.The pole that makes selection direct current the power is connecting a method to point a work piece to connect a cathode, the Han silk connects anode;Is anti- to connect method is contrary to this.Adjust the Han machine machine head, speak a machine head to follow a level direction to aim at Han to sew, regulate machine head rise and fall position, make Han run off tube of the cleft of bitter end and work piece take a 25~40 mms for proper;(6)Open Han supply valve, shut down a bitter end leak a Han, adjust the red switch to" Ⅰ " position, until rise Hu.In the heap Han process, cautiously adjust to weld parameter, mainly is to weld electric current and electricity Hu electric voltage, weld electric current of thick regulate can carry on on the power box, thin regulate to carry on in manipulating dish;(7)The check of Han silk.The Han silk surface should sweep, didn't oxidize a color, Han silk of horizontal low times organization up should not have crack, fold, pore, layering, shrink tail, metal or nonmetal admixture and other influence use of blemish.The Han silk should satisfy in the auto or the half to automatically weld equipments in even request for sending into.

The air protection checks after welding the Han:

(1)Break to break to experiment a check:The work piece that will finish welding incises into small piece and carries on a degree of hardness check, and welds to break to break a check:Mainly is see weld whether is complete, the Han sews in whether have a bubble.

(2)The external appearance checks:1.Cave pit:Sew back formation in the Han after

welding of is lower than the partial low-lying and damp part of the material surface of mother;2.Don't the Han is full:The Han sewed surface to form to live to break continuous groove in a row;3.Weld crack:BE welding in response to the dint and other weld to deal with contact to the frailty factor under the common function medium partial metal yard of region's combining dint is broken but form of the blind side produced by noodles in New Territory.It has sharp indentation and bigger long breadth compare of characteristic;Weld process in, the Han sews and hot influence area metal to cool off solid phase line of the heat area of neighborhood produce of weld crack;4.Cold crack:Welding of creation while welding to deal with contact to cool off lower temperature to descend crack;5.Delay crack:The steel welds to deal with contact to cool off indoor temperature to combine to just appear after an incubation period of crack;6.Han root crack:Follow sew in response to dint the Han of the concentration root form of weld cold crack.

(3)Have no Sun to check:1.The super voice wave explores wound:Make use of super voice wave to probe into having no of material internal blemish Sun examination method;2.Shoot line to explore wound:Adopt X to shoot line and Y to shoot line irradiation to weld to deal with contact to check having no of internal blemish Sun an examination method;3.The Ci powder explores wound:Just in the magnetic field, iron magnetism material surface layer blemish leaks the phenomenon of the magnetic field daughter-in-law Ci powder but carries on of have no Sun examination method;4.Permeate to explore wound:The adoption takes to have permeating of fluorescence dyestuff or red dyestuff of osmosis, having no of realistic blemish trace Sun examination method;5.Seal completely sex examination:The check contains the experiment to have no to leak and leak air and leak phenomena like oil,etc.

Automatic control air protection's welding is 1 kind to efficiently weld a method, it has an air protection, so using it can carry on Gao quality to weld, again in order to adopting PLC automatic control, as a result the Han sews even, weld an efficiency Gao, and use PLC as to control core, dependable sex Gao, control the function is strong, plait distance convenience, be applicable to bad industrial environment anti- interference ability strong, have various conjunction that connect and external equipments to maintain also very convenient, so this kind of air protect automatic Han machine drive extensive application.Mainly this text introduction connects a line box the design that welds special airplane machine part.

Chapter 2 machine spreads to equip a design

2.1 spread the assurance of project

Request according to the equipments technique and various establishment that spread the function that the motive reaches spreads a project:

Spread project analysis:The equipments is used for connect line box etc. spare parts of keep sewing to weld, the speed welding is lower, weld of speed of quality make decision and weld rate of speed and stability.Decelerate the machine adoption list class the cylinder keep Chi cylinder wheel gear, the big wheel gear outputs stalk as the low speed stalk that decelerates a machine, can make to output stalk of become soon stable.The whole system spreads not too and greatly, electrical engineering beard multifarious start, to system's adjusting soon function request Gao, for the sake of realization better of have no the class adjust soon and choose direct current motive and make use of direct current electric circuit to adjust soon system realization have no the class adjust soon.Decelerate the machine adoption list class the cylinder keep a Chi cylinder the wheel gear decelerate a machine to get to definitely spread a ratio and make use of two associately adjust soon can get a little bit well and adjust soon function.

2.2 The silk Gang Luo mother's choice

1, silk Gang Luo the mother spread of characteristics and application:

Using to a little bit smallly twist Ju to turn silk Gang(or Luo mother) can make Luo female(or silk Gang) to acquire bigger lead dint;Can attain to higherly decline to soon spread a ratio, make to decline soon the organization greatly shorten for simplifying, spreading the chain canning;Can attain to higherly spread accuracy, used for into can also used to measure a component for organization, pass to engrave one degree dish to read one the straight line moves of size, the least reads that the number can reach to 0.001 mms;Spreading is steady, have no Zao voice;Under the certain condition ability from lock, namely silk Gang Luo the mother can not carry on negative spread, this characteristics is applicable to make parts rise and fall to spread, can prevent° fro parts because of hold with dignity but automatically land.

Owing to above advantage, have the reference ② silk Gang Luo way and its application of spreading of mother see table 5.7-1 of silk Gang Luo the mother spread a sketch plan:

Figure 2.2.1 silk Gang Luo the mother spread a sketch plan

2, silk Gang Luo mother pair of choice:

From reference ② table 5.7-6 primary election silk Gang Luos are female vice- silk Gang Luo mother pair of basic parameter the following form:

Table 2.2.1 silk Gang the Luo is female pair silk Gang Luo mother pair of basic parameter

2.3, the electric motor choose

1, make sure to drive to load the outside dint needed and turn Ju

The ambulation speed of the Han gun v, being requested by the design can know the Han gun moves speed scope v=0.5 ms/ms min-1.5s/min;

Silk Gang's turning soon n silk the pitch of the Gang is a 4 mms, from reference ② type:

When v=0.5 ms/min, turn soon n:

n===125r/min

When v=1.5 ms/min, turn soon n:

n===375r/min

So the silk Gang changes the speed scope into the 125 rs/rs min-375s/min

2, electric motor type and structure form choose

Is low because of this equipments operation speed, it is wide to adjust soon scope, periodic circulate, slice operation to want steady credibility for the sake of getting a little bit well and adjusting soon function, choose the Z2 series direct current motive, make use of to adjust soon electric circuit to carry out system of have no the class adjust soon and install the form choice lie type.

3, the electric motor capacity is certain

(1).This equipments loads small, belong to inertial revolve organization, solid press revolve to exercise to compute to drive power.

(2).Compute to move the parts friction resistance Ju:

Move the friction Ju of parts consumes for main power so other frictions can suddenly not account, because of move parts of the gravity settle for the 500 Ns so move the friction been subjected to by parts for from reference ② table 5.7-3 know coefficient of friction f=0.1;

=500f=5000.1=50N

Rub resistance Ju the type is from the reference ⑥ 5-32, get:

Among them, the pitch of L-silk Gang;

The i-wheel gear deceleration compares to 4;

η -Spread an efficiency to settle to 0.7;

==11.4N.m

When the silk Gang makes to revolve to exercise, overcome to rub the power that the resistance Ju needs:

=0.1047 ns/η =0.1047 ×s 11.4 ×s 375/0.7=s 639.5 Ws

From reference ⑦ table 2-4 machines spread of the efficiency get:The machine of the shut type cylinder wheel gear spreads the efficiency as η 1=0.97;A rightness of the machine that rolls over bearings spreads the efficiency as η 2=0.99;The machine then spreads the total efficiency η of chain BE:

η =η One η 2 η 3=0.97 ×s 0.99 × 0.99=0.95

Drive power for:

P ===673.2W

Process scope for the sake of the extension equipments, driving of equipments' turning Ju should have enough amount of remaining.Is another because spread a little bit greatly, adjust soon scope breadth, solid should choose higher electrical engineering, from reference ① table 13-65, choose that the series turns a direct current motive 5 M type.The electric motor technique index sign the following form:

(3)The calculation spreads a ratio:

The reference ③ knows, can choose that the electric power drags along the system waits to adjust soon system for adjusting soon scope for winning:

D==4

===500r/min

I=/=500/125=4

When the silk Gang turns soon for the 375 rs/min, turning of electrical engineering soon for 375 ×s 4=1500 rs/mins.So request adjusting of electric motor soon the scope is a 500 rs/rs min-1500s/min so can satisfy a request.For getting a little bit greatly and adjusting soon scope, with the crystal Zha tube direct current adjust system realization to have no class to adjust soon, adjust soon scope=4, the machine deceleration makes use of wheel gear list class decelerate machine realization, spread a ratio=4;

I=×

(4).The calculation spreads the sport and power parameter of device:

Compute each stalk to turn soon:Press tallest turn soon calculation:

The Ⅰ stalk turns soon:n1=n=1500r/min;

Ⅱ The stalk turns soon: n2=n1/=1500/4=375r/min;

The silk Gang turns soon: n3=n2=375r/min

Compute each stalk importation power:

The Ⅰ stalk inputs power:P 1= P × η s unite × η crystal=800 ×s 0.99 × 0.9=712.8 Ws;

Ⅱ The stalk inputs power:P 2= P1 × η s Chi × η accept=712.8 ×s 0.97 × 0.99=684.5 Ws;

The silk Gang inputs power:P 3= P2 × η s accept=684.5 × 0.99=677.7 Ws

The importation that computes each stalk turns Ju:

The Ⅰ stalk importation turns Ju:T 1= T × × η s are allied=5.9 ×s 4 × 0.99=23.4 Ns.m;

Ⅱ The stalk importation turns Ju:T 2= T1 × × η Chi × η s accept=23.4 ×s 4 ×s 0.98 × 0.99=90.7 Ns.m;

The silk Gang importation turns Ju:T 3= T2 × η s accept=90.7 × 0.99=89.76 Ns.m

Tidied up above-mentioned calculating sport and power parameter to see form:

Chapter 3 machine decelerates a machine design

3.1 The design and calculation of wheel gear

Press the diagram the project, make selection to keep a Chi cylinder wheel gear to show of spread.Move the parts as general organization, the speed isn't high, the past wheel gear makes selection 8 class accuracies.The wheel gear chooses easy to manufacturing and low-cost material, from reference table 3-2 materials is No.45 steel, HBS 1=240, big wheel gear material is No.45 steel HBS 2=200.Select by examinations the denticle number Z 1=20, big wheel gear number Z 2= iZs 1=s 4 × 20=80.Tooth face degree of hardness less than 350 HBSs shuts type spread, so press the tooth face contact tired strength design, then pit root of tooth in the school curves tired strength.

3.1.1, press the tooth face contact tired strength design

From reference ⑧ type(3-24) design formula BE:×()2 mms

1, the number of each parameter inside the assurance formula:

(1)Try to choose to carry lotus coefficient Kt=1.3;

(2)Compute a denticle round deliver of turn Ju, press the high speed stalk of lowest turn soon a calculation:

T 1=95.5 the ×s 105 ps/ns are 1==13614.5 Ns.mm=13.6N.m

(3)From table 3-9 selection Chi breadth coefficients: ϕ D=0.8;

(4)From table 3-7 check flexible influence coefficient:ZE=189.8;

(5)From reference ⑧ table 3-59 check get in touch with tired strength extreme limit σ Hlim 1=590 Mpas;From

Table 3-59 check get in touch with tired strength extreme limit σ Hlim 2=470 Mpas;

(6)From type 3-29 calculations in response to dint circulating number of times:

N 1=60=60 ×s 500 × one × 16 ×s 300 × 15=21.6 ×s 108;

==21.6 ×s 108/4=s 5.4 ×s 108

(7)From figure 3-57 check of life span coefficient:;

(8)Compute to get in touch with tired to use in response to the dint:Take to lose efficacy the general outline as 1%, the safe coefficient is a S=1, from type 3-30 get:=590 MPa ×==470 MPas

2.Compute each quantity of having never known:

(1)Compute a denticle round degree for cent circle diameter:

=2.32 ×s=38.3 mms

(2)Compute circumference speed:

V==1m/s

The calculation carries lotus coefficient:

Basis, from the figure in the reference ⑧ 3-10 check=1.08; Because is to keep Chi cylinder wheel gear, take=1;At the same time from 3-5 check=1;From figure 3-12 check=1.12;=1.25.

The coefficient that is past to carry a lotus is:

(4)Press to physically carry the cent degree computed for correcting lotus coefficient circle diameter, from 3-27 Bs, get:

(5)Compute a mold number:

From reference ⑨ table 7-2 take the mold number is worth for standard, m=2 mms;

(6)Compute the degree of cent circle diameter:

D 1= Z1 m=202=40 mms;

d2=Z2m=802=160mm

(7)Compute Ju in the center:A=(d 1+ ds 2)/2=(40+160)/2=100 mms;

(8)Compute wheel gear width:

B= ϕ d × d 1=0.8 × 40=32 mms;

Because the circle is whole, then take a B 2=35 mms, B 1=40 mms

3.1.2, the school pit root of tooth curve tired strength

From type(16-4) get root of tooth bent and tired pit formula in the strength school BE:

MPa

1, each parameter number in the assurance formula:

(1)Compute circumference dint: Ft=2 T1s/d 1=2 ×s 13614.5/40=s 680.7 Ns

(2)Check to take to correct coefficient in response to the dint.From table 3-8 check:

YFa1=2.8 YSa1=1.55; YFa2=2.22; YSa2=1.77

(3)The calculation carries lotus coefficient:K=the KA × KV × Ka × KF β =one × 1.08 ×s 1 × 1.25=1.35

(4)Check to take bent tired strength extreme limit and life span coefficient.From figure 3-58 check σ Flim 1=450 Mpas;From figure 3-58 check σ Flim 2=390 Mpas;From figure 3-56 check KFN 1= KFNs 2=s 1.

(5)Compute bent tired is used in response to the dint, take bent tired and safe coefficient S=SF=1.4, from type 3-28 get:

[σ]F 1= MPas

[σ]F 2= MPas

(6)The school calculates to calculate:

MPa

=46MPa

The design of 3.2 stalks

3.2.1 high speed the design of the stalk

1, choice stalk of material combine assurance is used in response to the dint

Because the decelerates a machine to don't greatly spread power, and as to it's weight and

size also have no special request.The steel that is past to choose No.45, positive fire processing.From table 10-1 check σ B=588 Mpas; σ δ =294 Mpas; σ -1=238 Mpas;The τ -1=138 Mpas;[σ +1 b]=196 Mpas;[σ ob]=93 Mpas;[σ -1 b]=54 Mpas

2, the first step estimate axial of minimum diameter, and choose allied stalk machine

For promise to output spare parts of stalk pack to dismantle convenience, install the diameter d of uniting the stalk machine stalk 1 is stalk of minimum diameter.

According to formula(10-2) d ≥

Among them from reference ⑧ table 10-2 get=35, C=110

D ≥ 110 ×s 12.4 mms

Consider there is key slot on the stalk's segment and enlarge week path 10%, then take d=12.4 ×s(1+10%)=13.6s Be whole to is a d=14 mms

The choice unites a stalk machine and press the stalk to deliver of twist Ju, from reference ⑦ table 17-4.Choose a flexible pillar sells to unite a stalk machine it stalk diameter is 14 mms, match with part of lengths as 32 mms with stalk, past the stalk's minimum diameter the assurance is d 1=14 mms.

3, dismantle project the following diagram on packing of spare parts of draw-up stalk:

VII VI V IV III II I

Pack to dismantle project diagram on spare parts of figure 3.2.1 stalks

Make sure stalk of each diameter and length

Ⅰ Segment:Is shown as ex-, is stalk of minimum diameter, is and allied the stalk machine match with, its diameter press

Stalk machine it inside the bore diameter make sure d 1=14 mms.The stalk segment's length is more slightly small than allied stalk machine bore length.Take a L 1=30 mms, can promise that the stalk carries to block a turn to compress tightly an allied stalk machine like this.

Ⅱ The assurance of segment diameter:For promise the allied stalk machine is left to carry to use a stalk shoulder of fixed position and fix, according to stalk shoulder high h=(0.07-0.1)d, take h=0.1 ds=0.1 ×s 14=1.4 mmses, the d then is 2= ds 1+2 hses=14+ is 2 ×s 1.4=16.8 mmses, the circle is whole to take d 2=17 mms.Match the standard diameter of sealing completely the Zhan turn like this.

Ⅱ The assurance of segment length:Should choose a bearings model number for this, from the reference ⑦ , the power delivered by the stalk isn't big, choose structure in brief low-cost deep ditch ball bearings 6004, checking the manual can get the path inside the

bearings as 20 mms, the width is also a 12 mms, should select the type and size that the bearings carries a cover at the same time, the bearings carries covers to choose according to the stalk path, its width size 20 mms.For the sake of easy to the machine packing to dismantle bearings to carry to cover into allied stalk Be left to carry the noodles length as 20 mms, consider an above factor L 2=20+20=40 mms

The assurance ofⅢ segment diameter:The gearing's bearings so diameter is 20 mms;

The assurance ofⅢ segment length:The gearing bearings' bearings width is 12 mms;

The assurance ofⅣ segment diameter:The fixed position stalk shoulder that is a bearings from reference ⑦ get diameter is 25 mms;

The assurance ofⅣ segment length:The length is 5 mms;

The assurance ofⅤ segment diameter:The diameter of bearings 44 mms;

The assurance ofⅤ segment length: The width of bearings is 45 mms;

The assurance ofⅥ segment diameter:The fixed position stalk shoulder that is a bearings from reference ⑦ get diameter is 25 mms;

The assurance ofⅥ segment length:The length is 5 mms;

The assurance of VII segment diameter:The gearing's bearings so diameter is 20 mms;

The assurance of VII segment length:The gearing bearings' bearings width is 12 mms;

Always growing of the stalk for:L=L 1+ Ls 2+ Ls 3+ Ls 4+ Ls are 5+ Ls 6+s=30+40+12+5+45+5+12=149 mms;

Can get propping up of stalk to across to be apart from to 137 mms through the analysis

3.2.2, the design of low speed stalk

1.Choice the material of the stalk, and make sure to use in response to the dint

Because the power delivering isn't big, and as to it's weight and size have no special request, so choose 45# steels.Positive fire processing, check σ B=588 Mpas; σ δ =294 Mpas; σ -1=238 Mpas; τ -1=138 Mpas;[σ +1 b]=196 Mpas;[σ Ob]=93 Mpas;[σ -1 b]=54 Mpas

2.The first step estimates axial of minimum diameter

For promise to output spare parts of stalk pack to dismantle convenience, install the diameter d of uniting the stalk machine stalk 1 is stalk of minimum diameter.According to the formula, according to formula(10-2) d ≥

Among them from reference ⑧ table 10-2 get=35, C=110

110= of d ≥ 13.4 mms

Consider there is key slot on the stalk's segment and enlarge stalk path 10%, then take

d=13.4(1+10%)=14.7 mms.The circle is whole to take d=15 ㎜ s.The choice unites a stalk machine and press the stalk to deliver of twist Ju, from reference ⑦ table 17-4.Choose a flexible pillar sells to unite a stalk machine it stalk diameter is 16 mms, match with part of lengths as 42 mms with stalk, past the stalk's minimum diameter the assurance is d 1=16 mms.

3.Draft packing of spare parts of stalk to dismantle project the following diagram:

VI V IV III II I

Pack to dismantle a project on spare parts of figure 3.2.2 stalks

(1)Make sure stalk of each diameter and length

Ⅰ Segment:Is shown as ex-, is stalk of minimum diameter, is and allied the stalk machine match with, its diameter press allied stalk machine it inside bore diameter assurance d 1=16 mms.The stalk segment's length is more slightly small than allied stalk machine bore length.Take a L 1=40 mms, can promise that the stalk carries to block a turn to compress tightly an allied stalk machine like this.

Ⅱ The assurance of segment diameter:For promise the allied stalk machine is left to carry to use a stalk shoulder of fixed position and fix, according to stalk shoulder high h=(0.07-0.1)d, take h=0.1 ds=0.1 ×s 16=1.6 mmses, the d then is 2= ds 1+2 hses=16+2 × 1.6=19.2, the circle is whole to take d 2=20 mms.Match the standard diameter of sealing completely the Zhan turn like this.

Ⅱ The assurance of segment length:Should choose a bearings model number for this, from the reference ⑦ , the power delivered by the stalk isn't big, choose structure in brief low-cost deep ditch ball bearings 6005, checking the manual can get the path inside the bearings as 25 mms, the width is also a 12 mms, should select the type and size that the bearings carries a cover at the same time, the bearings carries covers to choose according to the stalk path, its width size 20 mms.For the sake of easy to the machine packing to dismantle bearings to carry to cover into allied stalk Be left to carry the noodles length as 20 mms, consider an above factor:L2=20+20=40mm

The assurance ofⅢ segment diameter:The gearing's bearings so diameter is 25 mms;

The assurance ofⅢ segment length:The gearing bearings' bearings width is a 12 mms, blocking a turn of width is 5 mms;

The Ⅳ segment stalk wants to shrink into a 2 mms, so the of length is 19 mms;

The assurance ofⅣ segment diameter:The gearing stalk that is a wheel gear segment, so the diameter of the stalk is 30 mms;

The assurance of Ⅳ segment length:The length is a wheel gear width is 40-2=38 mms;

The assurance of Ⅴ segment diameter:The stalk blocks wreath for wheel gear, its diameter is 38 mms;

The assurance of Ⅴ segment length: The wheel gear blocks the width of wreath to 5 mms;

The assurance of Ⅵ segment diameter:The gearing's bearings so diameter is 25 mms;

The assurance of Ⅵ segment length:The gearing bearings' bearings width is 12 mms;

Always growing of the stalk for:L=L 1+ Ls 2+ Ls 3+ Ls 4+ Ls are 5+ Ls 6=40+40+19+38+5+12=154 mmses, Be canned get propping up of stalk to across to be apart from to 142 mms by analysis.

Choice and school of 3.3 keys check

3.3.1, choice and school of high-speed stalk key check

1.The choice of key type:

The stalk segment that the high-speed stalk up only matches each other with allied stalk machine to match contains key, its stalk path is 14 mms, allied the stalk machine stalk bore length is 32 mms.Check choice circle head common even key C type, the b is a 5 mms, the h is a 5 mms, key slot t=3.0 mms, its length L=B-(5~10)mm=32-(5~10)=22~27 mms;

The standard series form checks L=25 mms, so the model number that chooses key is a C5 × 25 GB1096-72s.

2.The school checks its strength:

It squeezes a strength condition from the type 10-35 σ P=2 Ts/dkl ≤ [σ P]Mpa, T in type=23.4 Ns.m=23400N.mm,d=14mm

L=the L-b/2=25-2.5=22.5 mms, k=the 2.5 mms of h/2=5/2=, [σ P from table 10-6 check:[σ P]=130 Mpas

The school then checks its strength σ P=2 Ts/dkl=2 × 23400/14 × 2.5 ×s 22.5=59.4 Mpa ≤s 130 Mpas

The past strength is enough.

3.3.2, choice and school of low speed stalk last key check

1.The choice of key type:

Is high-speed the big width of wheel gear is a 40 mms on the low speed stalk, the stalk path is a 30 mms, from table 10-5 check choice circle head common even key A type, b is 8 mms, h is 7 mms, its length L=B-(5~10)=38-(5~10)=28~33 mms.From table 10-5 check standard series length L=28 mms, the past key model number is 8 ×s 28 BG1096-79s

2.The school checks its strength:

It squeezes strength condition from type 10-35 get: σ P=2 Ts/dkl ≤ [σ P]Mpa, T in

type=90.7 Ns.m=90700N.mm,d=30mm

L=the L-b/2=38-4=36 mms, k=the 3.5 mms of h/2=7/2=, [σ P]check:[σ P]=130 Mpas;

The school then checks its strength σ P=2 Ts/dkl=2 × 90700/30 the ×s are 3.5 ×s 36=48 Mpa ≤ 130 Mpases, the past strength is enough.

Choice and school of 3.4 bearingses check

Roll over the life span of bearings on 3.4.1 high-speed stalks

Circumference dint Ft=1170 Ns, stalk to carry lotus FA=0 Ns, path to carry lotus FR=Fttan α =117020 ° s of × tan =425.8 Ns;

The certain Cr, Cor, checks the basic sum of manual 6004 bearingses to certainly move to carry a lotus:Cr=7.22 KNs, the basic sum settles to calm down to carry lotus Cor=4.45 KNs;

Compute a FA/Cor value, and make sure an e value, FA/Cor=0, then e=0;

Compute equivalent to move to carry lotus P:P=XFR+YFA, because of the FA/FR=0, from reference ⑧ table 8-9 check X=1, Y=0, hence:

P=XFR+YFA=1 × 213=213 Ns

(5)Compute bearings life span Lh=16667(ftC/fpP) ε /ns, from table 8-1 check ft=1, from table 8-8 check fP=1.0~1.2, take fP=1.2,6004 model numbers are deep ditch balls bearings, life span index number ε =3

Then Lh=h=47022.8 hs

Roll over the life span of bearings on 3.4.2 low speed stalks

(1)Circumference dint Ft=1134 Ns, stalk to carry lotus FA=0 Ns, path to carry lotus FR=Fttan α =113420 ° s of × tan=413 Ns;

(2)The certain Cr, Cor, checks the basic sum of manual 6005 bearingses to certainly move to carry lotus Cr=7.75 KNs, the basic sum settles quiet carry lotus Cor=4.95 KNs;

(3)Compute a FA/Cor value, and make sure an e value, FA/Cor=0, then e=0;

(4)Compute equivalent to move to carry lotus P:P=XFR+YFA, because of the FA/FR=0, from table 8-9 check X=1, Y=0, hence:

P=XFR+YFA=1 × 413=413 Ns;

(5)Compute bearings life span Lh=16667(ftC/fpP) ε /ns, check ft=1, fP=1.0~1.2, take fP=1.2,6208 model numbers are deep ditch balls bearings, life span index number ε =3,

Then Lh=h=63733.6 hs

3.5 Box body structure the size choose

Box the wall is thick δ =12 mms

Box the wall is thick δ 1=12 mms

Scaleboard P=2.5 δs=2.5 × 12=30 mms

Box convex good luck thickness B=1.5 δs=1.5 × 12=18 mms

Box cover convex good luck thickness B 1=1.5 δ 1=1.5 × 12=18 mms

Box bottom convex good luck thickness B 2=2.5 δ 1=2.5 × 12=30 mms

Ground the feet number of bolts n4=4

Ground feet bolt diameter dt=M16

The bearings unites to connect stud bolt diameter beside D 1=0.75 dfs=0.75 × 16=12 mms

Box cover and box allied connect stud bolt diameter D 2=(0.5~0.6) df=0.5 × 16=8 mms

The d that is allied to connect stud bolt 2 be apart from L=180mm

The bearings carries to cover bolt diameter d3=0.5df=12mm

The fixed position sells diameter D=0.8 × 8=6.4 mms

Df df d 2 go to outside box of wall to be apart from C1=22mm

Df d 2 go to a convex good luck edge to be apart from C2=20mm

Bearings side convex set radius R1=C2=20mm

The outside box of wall goes to a bearings to be apart from L 1= Cs are 1+ Cs 2+s(8~12)=22+20+10=52 mms

Circle outside the wheel gear with inside the box wall be apart from △1> is 1.2 δs=1.2 ×s 12=14.4 mmses take 15 mms

The wheel gear round Gu carries noodles with inside box the wall be apart from △2> δs=the 12 mms take 15 mms

Box the cover, box rib is thick M one ≈ 0.85 δ 1=0.85 × 12=10.2 mms

The m ≈ is 0.85 δs=0.85 × 12=10.2 mms

The bearings carries to cover convex good luck thickness T=(1~1.2)d 3=1 × 12=12 mms

Chapter 4 appropriation tongs structure designs

4.1 weld a tongs outline

The basic function that welds appropriation tongs is ability to carry on packing to clip to the work piece.The whole tongs designs a work be around pack to clip two words to launch.

Weld the function of appropriation tongs:The tool machine tongs processes in the machine pretty much extensive in the application.Main function is as follows:Promise to be processed superficial position accuracy, pack to clip a work piece with the tongs, can accurate assurance work piece and tool machine, the opposite position of of knife, as a result can be more dependable, the stability ground acquire higher position accuracy;Raise to labor rate of production, adoption tongs after, can save to seek to the pursuing of work piece positive with make to lend support to time to show Zhao decrease to the knife;When adoption mechanization, automate degree higher tongs, can also reduce to lend support to time further, make to labor rate of production to raise consumedly;The extension welds craft scope;Lower the technique request to the worker;Ease the labor strength of work.

Weld constituting of appropriation tongs:No matter what weld appropriation tongs, their work principles are basically same.Can chase each kind of component or organization in the tongs for the sake of the easy to research.Categorize according to the its function same principle, generalize to weld appropriation tongs of basic constitute part as follows:1.Position component or device:It is in the position in the tongs to use it certain work piece.2.Clip tight device:Use it to the work piece and carry on clipping tightly.3.To the knife, lead component or device:Make sure that knife's hasing is more opposite than tongs to contain a right location with it.4.The tongs is welding the component of appropriation top fixed position:Make sure with it the tongs is opposite to weld appropriation to contain a correct position.5.Tongs body:Used for link tongs up of various component and device, make it become a whole foundation piece.6.Other components and device:Some tongses also there is no cent degree equiping, automatically up, next anticipate device etc., return other components and device generally.

Clip tight device of constitute and design a request:The task that clips tight device, is promise that the work piece is in the process of positioning in obtain of right location, don't slice because of being subjected to the function but occurrence variety of paring the dint, gravity or inertial dint.

Clip tight the device is generally constituted as follows by several parts:

1.Dint source device:In order to the creation clips tight dint and usually has hydraulic, spirit to move, dynamoelectric etc. device.When the adoption hand moves to clip tight organization, don't need dint source device.

2.In the center spread dint organization:It equips output dint of dint source to pass to clip a

tight component.Is like in common use lever and pull organizations like pole,etc.From dint source directly the control had no to in the center spread dint organization while clipping a tight component.

3.Clip a tight component:It is the end performance component that clips tight device, is more general than a clipping of work piece to press surface direct contact.The design clips tight equip should satisfy a basic request as follows:①Assurance processes quality.The size that clips tight dint should be appropriate and promise that the work piece clips tight credibility, and makes to clip tight don't break a positioning of work piece or make work piece and the component creation of tongs disallow of transform. ② Promise rate of production.Request that clipping tight action is quick, with produce the green request wents with should.③Operation convenience, labor-saving, safety.④Have a good structure craft.

Above ask medium core problem to is how to with accuracy exert to clip tight dint.Then the first essentials reasonable assurance clips the direction of tight dint and put forth effort point and size, then again choice or design accommodation of clip tight organization.

Weld the basic request of appropriation tongs design:Can generalize a few aspects as follows to the basic request that welds an appropriation tongs design:1, promise the processing technology request of work piece; 2, raise to labor rate of production and decline low cost;3, operation convenience, labor-saving, safety;4, there is good structure craft.

4.2 The Han packs the fixed position principle of tongs:

Position principle at 1, 6:00:

The work piece could adopt a similar assurance just body to sat mark to fasten medium position to take into to analyze in the space right angle in the fixed position problem in the tongs.The work piece is aleatoric in the position in the space before having never adopted and positioning measure, there are total of six indetermination degrees, see figure 4.2.1:

Follow X, Y and Z stalk of arbitrarily move, be called follow the indetermination degree of X, Y and Z, use to mean;

Round the X, Y and Z arbitrarily turning of the stalk, be called the indetermination degree of rounding the X, Y and Z, use to mean;

Figure 4.2.1 spaces fasten by mark

According to the work piece is in the tongs of process the circumstance that accuracy and choice position a component, is usually divided into the fixed position of work piece a few

kinds as follows:

(1)Complete fixed position:The work piece is in the tongs if six freedom degrees all be limited, be called a complete fixed position.

(2)Parts of fixed positions:The work piece is in the tongs if six freedom degrees have no quilt all restrictions, be called parts of fixed positions.

(3)Owe a fixed position:Work piece is in the tongs, if physically the fixed position prop up and order or the fixed position of the work piece isn't enough, be called and owe a fixed position when the not certain degree piece physically limiting is less than a work preface and process and request the piece of not certain degree that should control.

(4)Repeated fixed position:(or once was called a fixed position)Work piece is in the tongs, if a few fixed positions prop up to order restriction together

Is an or a few not certain degree, be called repeated fixed position.

2, the car Han pack a tongs fixed position principle:

Is similar to other tongs, designing car Han to pack tongs should as well follow 6:00 fixed position principle.But complicated because of the car Zong beam shape, mostly is curved face structure, rigid bad, inconstancy form, as a result the Han packed tongs to differ from other tongses on the fixed position, the Han packed a tongs design to once adopt a fixed position principle.

Is pure adopt 6:00 fixed position principle fixed position, can not promise its position and shape, as a result need adopt a work piece surface or type the fixed position method that the noodles carries on a fixed position, order a neighborhood to all need to establish to position noodles in the Han, increase it rigid, amount and position of its tab stop will influence the function of the tongs and the quality of the Han piece.Han's packing the 6:00 fixed position principle of tongs to once add a fixed position principle is the most characteristics that discriminates between other tongses.

Fixed position principle points to limit six not certains degree that directions exercise at 6:00, while designing Han to pack tongs, often have two kinds of misunderstandings:One is think to certainly position at 6:00 the principle packs tongs obsolescent to the lamella Han, two is see the lamella Han pack tongs up have over the fixed position phenomenon.Producing the reason of this kind of misunderstanding is limit six not certains degree comprehensions that directions exercise in order to limit freedoms degree of six directions, welding the aims of tongs design is to limit six freedoms degree that direction exercises, this kind of restriction not only depend on the fixed positions of tongs to clip tight equip, and depend on the mutual check and supervision relation that makes an of piece.Only exactitude knew lamella blunt

press the characteristics that a Han packs production, at the same time again exactitude comprehend 6:00 fixed position principle, just can be correct to apply this principle.Saw from the fixed position principle, paid to accept is an essential to have to lamella of, can get rid of because of the work piece is clipped a tight dint function but arouse of transform.Leading fixed position to make contact to order is unsteady, the creation assembles the interference of position, but while adjusting tongs as long as hard fixing to whet to accept(fixed position) noodles, it lead the fixed position arouse of the bad result is to can control is allowing inside the scope.

4.3 The choice of basis

Packing a Han piece has to acquire a correct fixed position, initial problem how choice fixed position the basis , generally speaking, choose position the basis want to consider a following principle:

(1)While being packed current flat surface of spare parts or parts of Han and there being curved facing, is a main fixed position in response to the prior choice flat surface base level, avoid choosing curved face as far as possible, otherwise the tongs makes a difficulty.If there are a few flat surfaces, then should choose the area bigger flat surface is among them a main fixed position basis.

(2)Should choose as far as possible the design basis of spare parts or parts is to position basis and get rid of basis not to weigh to match an error margin and raise to position accuracy.

(3)For more complicated carriage blunt press a piece, can choose curved face shape, curved face up the platform, work piece after orthopedics through pull to stretch and press curved formation of step, through fix the window way and exterior edge, assemble of side to use bore and craft bore as main fixed position basises.

4.4 The Han packs the organization analysis of tongs

The angle that learns from the organization analyzes, the lever-pintle type tongs is substantial to is the basic type of flat surface four pole organizations:The crank joystick organization, double crank organization, double joystick organization, or the basic type turns into a type.

The simple and abstract model of tongs such as figure 4.4.1 show:

Figure 4.4.1 tongs abstract model

(4-1)

(4-2)

Namely (4-3)

In the type: The F-air cylinder ideal clips tight dint;

D-air cylinder diameter;

P-air cylinder average pressure;

η -Air cylinder- related parameter;

Pack in the Han the fixed position component in the tongs with clip a tight component to divide the work definitely, fixed position piece the fixed position face reading of spare parts that provides homologous assemble basis and is positioned matches.The constitution of component only provided a dependable fixed position of have to condition, but the spare parts being positioned can truely and dependablely carry out a space fixed position, usually have to have the emollient match to clip a tight component.But, clip tight component at clip tightly in operation is sport of, its work noodles isn't a fixed position to assemble basis, so fixed position component with clip a tight component to match with an use, constitute fixed position to clip a tight component.

4.5, weld the step of appropriation tongs design

1.Study original data, definitely design a task:

First should careful reading spare parts diagram and assemble diagram, understand the function, structure characteristics, material and technique request of spare parts.Craft regulations and tongs that secondly wants to study spare parts design a task book and well understand the work preface of this work preface contents and work preface request.Should also collect at last relevant weld the appropriation knife has of technique parameter and the production condition of the factory etc..Should also understand the tongs that the same kind spare parts uses when it's necessary and it use circumstance to make reference to while being design.

2.Draw up a tongs structure project, draw the tongs structure grass diagram:

Draw up tongs structure project to mainly consider a following problem:Process a craft according to the spare parts give certainly of fixed position basis and at 6:00 fixed position principle, make sure the fixed position method of work piece combine the design correspond of fixed position device;The certain knife has of leading and leading method, and design to lead to lead equip or to the knife device;The tight method of making sure the clipping of work

piece combines a design to clip tight device;Is certain other structure forms of components;Is comprehensive to consider the layout of various component and device, make sure to clip concretely total structure, in order to make the tongs of design advanced, reasonable and often need to draw up a few structure projects, more hereafter choose an optimization to use, while conceiving outline a tongs project, should draw the tongs structure grass diagram at the same time.It is in aid of to conceive outline, check the rationality and possibility of project.

Figure 4.5.1 weld tongs diagram

In this text, connect the line box is been welded by back by two U type iron back but become, because of the restriction of length, at up work before set weld, need to pack first to clip to be well, then put is working on the stage to directly weld and reduce a work preface, and raise to weld an efficiency.Therefore, is welding a both ends to need to move to step up organization to fix with the simple hand, saw diagram:

Figure 4.5.2 both endses step up an organization sketch plan

This kind of organization adapts to noodles widely and clips tight dint bigger, from lock function good, the helix turns a route of travel each time smaller, action slow-moving, used for more list piece and small batch quantity spare parts production.

Moreover, this text connects a line box to weld Han to sew top and bottom 2, carry out to weld success at a time, and then want to make to weld special airplane structure as far as possible simple, the decrease Han welding of gun orbit, here we consideration double the Han gun weld, needs to be set an along the straight line orbit of work piece, this since can promise to weld of even, and then can raise to weld an efficiency, lower to weld cost.

4.5.3 Han gun structure sketch maps

Chapter 5 sends the silk machine the design

Sending the silk is to weld a count for much operation link in the process, the handicraft welds of send to silk methods to adopt welder more the finger Nian move Han silk to complete to send silk process, the welder operates to send silk very inconvenient, therefore, the handicraft sends silk accuracy bad, the consistency is bad and send silk unsteady, caused to weld a production efficiency thus lowly, weld to model consistency to differ.Moreover,

welder's hand holds Han silk the length is limited, silk need to be multifarious to take to take Han while welding for a long time, weld an efficiency lower, and each Han silk weld completion will subsist a small segment Han silk can not use, bring about waste on Han silk.

5.1 miniatures send the design principle of silk machine

In the middle of sending to silk machine and designing how design to send the silk round the key place that is this design.Because welding what to use is 0, the Han silk with 2-0.4 mms, its characteristics is that the Han silk is thin, the degree of hardness is higher, therefore will send the sending to of silk round the silk slot to design the material of adopting the high degree of hardness.But compress tightly an adoption bearings, send silk round and the stalk of electric motor synchronous exercise, regulate pulse frequency to control turning of electric motor stalk soon, thus the control sends the speed of silk round.Get better the effect for sending silk.Principle diagram such as figure 5.1.1 show.

Figure 5.1.1 send the design principle of silk machine

Request and work according to the work the condition should choose three Xiangs the mixture type tread into electric motor and be to send to silk machine to attain biggest when speed and least sending silk send silk speed the pulse frequency is aller low than to tread into electrical engineering of empty carry to start frequency.Therefore, this electrical engineering can apply the power importation that the miniature sends silk machine.

5.2 drive the design of round

The electric motor stretches out stalk long send a silk round for 21 mms, the gearing position of electric motor at being partial to of base position, therefore willing drive a choice for descending.Next send to the round breadth of silk round to design to 7 mms.4.2 drive the design and calculation and structure arrangement of round.

Figure 5.2.1 drive the size and structure of round

The stalk conjunction that drives a round and electric motor, in the process of sending silk in request to revolve with synchronous the stalk of motor.Drive the round is in the process of sending silk in mainly bear bigger pressure and friction, the first step chooses a No.45 steel.The stalk of motor with drive the stalk of round to carry to sell a conjunction through a cone, can satisfy to drive round and motor synchronous operation, and don't take place opposite to move.

The stalk diameter of motor is a 6 mms, therefore drove the conjunction method of the

stalk of round and electric motor to design two kinds of projects.The stalk of electric motor is a light stalk, beat bore in the light stalk head, sell a conjunction through a cone.The method is easily simple, process.Is a kind of more economic choice, the most suitable suitable for use in twist low a Ju application in, particularly in the middle of being allied and connecting a step into electric motor and other lighter instruments.Sell to choose the cone sells and sell lead with bore the Ying match with.

Sell with bore for lead the Ying match with.The cross section that the following figure 5.2.2 stalks match with with bore shows:

The cross section that figure 5.2.2 stalks match with with bore

Up compress tightly the design and calculation and structure arrangement of round:Send the compressing tightly of machine machine the round to need to choose degree of hardness higher material, combine the people of the past's design experience, compress tightly a choice bearings.The bearings that is initial to choose deep ditch ball, the this kind of bearings deep ditch ball bearings rolls over the most common 1 in the bearings.The deep ditch ball of the basic type bearings from an outside turn, an inside turn, a set of steel ball and 1 set keep to configuring.

The deep ditch ball bearings is mainly useds for bearing pure path to carry a lotus, can also bear at the same time path to carry lotus and stalk to carry a lotus.When it only bears pure path to carry a lotus, contact Cape is zero.When the deep ditch ball bearings has bigger path to visit Xi, can bear bigger stalk to carry a lotus.The coefficient of friction of deep ditch ball bearings is smaller.

Roll over the choice of bearings model number:6012.

Choose 8000 deep ditch balls bearings according to driving the diameter size of round, it inside the path d is a 10.6 mms, the outside path D is a 26 mms, width B is 8 mms.In consideration of send the work environment of silk machine, if the bearings of choice uses in the bad environment, bearings' sealing completely a turn and sealing completely a cover is an essential to have of, because they can prevent ° from filth incursion, prolong bearings life span.Here the choice takes the bearings series of sealing completely the cover, can bear the incursion of strong impact burden, water and broken bits while using.

5.3 press the design of plank and scaleboard

Press the knothole material choice first step settle is BE aluminum metal alloy, model number is 7072.But in consideration of support and spring coil again and again rub contact,

change to 45 steels: the material of support and raise the degree of hardness of support.The product of design imitates and processes process and discovers that the arc part is being too many, resulting in processed difficult process, in consideration of the shape of spare parts adjusts towards sending to the shape that didn't influence, will send silk machine of efficiency and function of silk machine in the spare parts.

Figure 5.3.1 press knothole to finally design

The pressing plank anticipates foundry for 45 steel materials.The Zhu piece requests to have no obviously shrink loose, the trachoma waits to cast blemish.

Such as figure 5.3.1 show, shadow in diagram part is clipboard conjunction of position, rest part is hollow.The last surface of clipboard and spring coil contact because of iterative of the function of friction and pressure, this spare parts finally wants to carry on making to back very hot the processing bear to whet sex by the surface raising spare parts.

According to the size of spare parts total size, the bore linking with support chooses to carry on a conjunction for 6 stairs stud bolts for diameter.The function of stairs stud bolt is:After willing press a close conjunction of plank and support, the stud bolt can't bring big pressure to press plank and make to press plank to transform but influence accuracy that sends to silk's adjustment.

The stud bolt bore carries on a fixed position through this bore and limits three freedom degrees.The C place is hollow, press the pole is worn by the C junior high school empty part perpendicularity, press a pole of next carry to pass stud bolt and scaleboard conjunction, limit a support of two freedom degree.The support limited five freedom degrees on the scaleboard wall, the support still could round stairs stud bolt to do revolving of small range sport.

The total wall of support is thick to is a 16 mms, the stairs form stud bolt length of the support and base conjunction Lc=23 mms.

Trapezoid stud bolt the following figure 2.7 show, .

Figure 5.3.2 tightly solid stud bolts

Among them the segment in the stairs of long is 16 mms.The Luo is female in the right stud bolt carry of the A place is tight support and base wall Ning after, the of support and stud bolt still keeps existing cleft, the stud bolt can't bring big pressure to hollow support wall, in order to prevent the support once bears big pressure but transforms.

The fixed position bore of the support and scaleboard wall A diameter O 2=8 mms.The bore wall is thick to 1.5 mms.

The support is a hollow type, the its or so wall thick m is respectively a m=3 mms, the or so wall passes the thin wall conjunction of A bore and B bore and C place.

Primary election support with roll over bearings conjunction bore, then the diameter of the C bore in the bottom diagram O 1=10 mms.

BE smaller than deep ditch ball bearings of inside path d=16 mms.

The scaleboard chooses the aluminum metal alloy material model number is 7072.This material belongs to Al-Zn-Mg-Cu to fasten super hard aluminum for the hard 鋁 7075 aluminum planks, its characteristics BE, solid dissolve after the processing Su good, the hot processing enhances effect specially good, there is high strength in below 150 ℃ , and have specially good low temperature strength;Welding function is bad;Open crack to incline to in response to the dint corrosion;Need through wrap aluminum or other protection processing use.The double class time limited efficacy can improve the ability that the metal alloy anti-opens crack in response to the dint corrosion

The bottom of scaleboard is thick is thick with wall is all 4 mms.Install a motor the center in the scaleboard wall to be partial to the next position.The choice installs distance in the stalk center of motor bottom scaleboard distance as L 0=23.5 mms.

Check to calculate a L 0=20 mms, the motor is big apart from the distance of scaleboard at the diameter of driving the round.Gearing after driving a round, driving the round can work as usual.

The height of the convex good luck fixed position clipboard of scaleboard with compress tightly the height of keeping the pole.

For processing fixed position convenience, the initial design is to position the center in two bores at same height, but install show as a result if two high homologies, connect with each other with support of press plank will can not work as usual.The center of a circle position that adjusts convex good luck is shown as diagram below.Two center distances install the fixed position bore center of bearings to be apart from L 2=45 mms.

Two fixed position bore of distance in the center is L 3=70 mms;Two bores are apart from the distance c of scaleboard wall edge=15 mms

The design model of 5.3.3 scaleboards

Compress tightly principle:Keep in the pole and offend outside a thread in the A segment, will send silk on board compress tightly to keep a pole Be placed to a support of U type slot inside noodles, place with the last surface perpendicularity of support.Pass next carry of bore,

use stud bolt and scaleboard conjunction.Place spring coil both ends all in pack into the compressing tightly of top end to keep a pole to wind up a pole hat together in the spring coil tray, send to the silk machine works of time, move to press through a Ning pole hat is pressing an on the pole to move, can change, compress tightly the round of round heart position, change two clefts thus, regulate the scope of sending the silk diameter.