

# **RAINFINE<sup>®</sup>**

***Irrigation Solution.***

**Technical Features of Rainfine Center  
Pivot and Lateral Move Irrigation  
System.**

BEST QUALITY PRODUCTS FOR IRRIGATION 



## 1. Basic dates

### The Specification of the Rainfine Centre Pivot

| Items                  | Specification             | Items                        | Specification   |
|------------------------|---------------------------|------------------------------|---|
| Pivot length           | 41.1~791.2m               | Land covered                 | 0.53~196.7ha  |
| Qty. of spans          | 1~16                      | Span length choice           | 41.1 / 47.8 / 54.5 / 61.3m  |
| Overhang length choice | 6.7 / 13.4 / 20.1 / 26.8m | Pivot clearance              | 2.91~3.75m  |
| Span dia.              | 141 / 168 / 203mm         | Pivot Height                 | 4.62~5.46m  |
| Span thickness         | 3mm                       | Surface                      | Hot dip galvanization   |
| Flow rate              | 15~1080m <sup>3</sup> /hr | Water pressure at pivot base | 1~7.5 Bar   |
| Friction Loss          | 0~2.5bar                  | Tire                         | 14.9x24 tubeless tire with hot dip galvanized 8x24 rim irrigation special |
| Max speed              | 142m/hr                   | Sprinkler                    | Nelson / Senninger  |
| Regulator              | 10 / 15psi                | Type of drops                | Flex 5.5-ft drops   |
| Gear box:              | 50:1 heavy duty           | Gear motor                   | 33rpm (full loaded ) at 380V.3/4HP 40:1 Ratio. Over-heating protection    |
| Control panel          | Standard                  | Required run power           | 0.7~11.5Kw  |
| Power supply           | 415V 50Hz                 | Irrigation Hours/Day         | 0~24hr/day  |
| Daily application rate | 0~50mm/day                | Pressure gage                | 0-60psi   |

## **2. Manufacturing**

### **2.1 Truss design**

Truss design is the most important parts on pivot irrigation system. The structural mechanics are precise calculated by computer and tested in tough road. It can stand 20 years long lasting work without any bending or breakings. The quality of the truss structure can't be judged by eyes of the people but by the longer life of working in field.





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All welded steel parts are international standards and conform to high performance and durability.



The high yield strength overhang cable is used in longer overhang. This design can help farmers to increase yield with less investment.



Rainfine 500 meters towable pivot in Kazakhstan is used in 3 different fields and is designed to tow every one or two weeks in 400mm high potato fields . After 4 years working, the structures and truss rods have no any distortion

## 2.2 Truss rod



Truss rods are the key parts for holding the total weight of the pivot like the bridge sling. The way of processing is very important because if the processing is not correct, the truss rods would be broken when the pivot is working and cause the falling down of the complete machines.

We use high frequency electric heating system to heat the end of the steel rods and use head punching machine to punch both end of the steel rods.

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When the rod being cut as the picture below , you can find that the steel rod and the headed part are exactly the same Molecular.

The quality standard is that this truss rod can stand 60,000psi yield strength.

We use 22mm diameter rods instead of 19mm to make it stronger than American manufacturers.



(Truss rods after galvanized)



### 2.3 Galvanizing process



**Hot dip galvanized structures with 141 / 168 / 203mm diameters:**

All the steel parts are galvanized by hot dip galvanization in the top leading galvanizing plant in China. The thickness is 2.0 – 2.5 mil, which is the US galvanization standards of pivot manufacture ASTM A123/123m-02.

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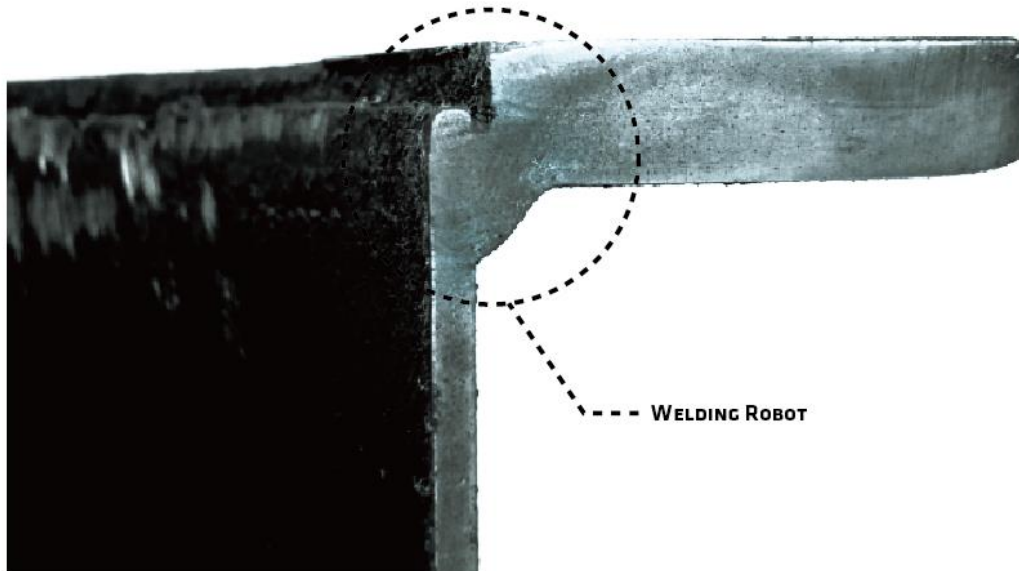
(parts after galvanized)

**2.4 weldment**



□ 焊接机械手 Welding Robot

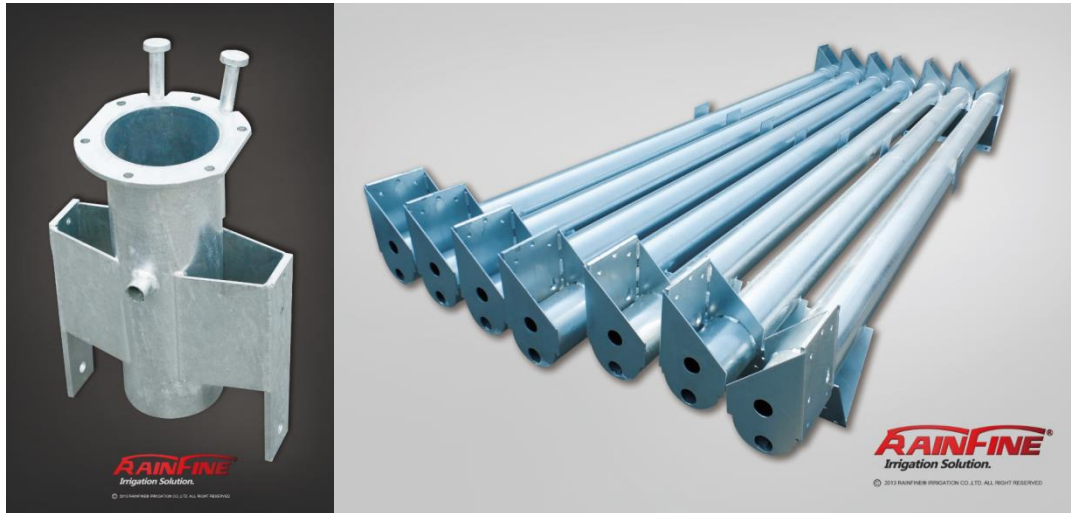




We used automatically controlled welding Robot to do the welding for pipes to ensure the quality.



(The welding line is perfect quality for the span pipe welded by Robot .)



(Welded span joint)

(welded drive tube)

### 2.5 Quality mould is used for all the spare parts



(tower box、gasket、drive tube protection tube, gooseneck )



Technical Features of Rainfine Center Pivot and Lateral Move Irrigation System.



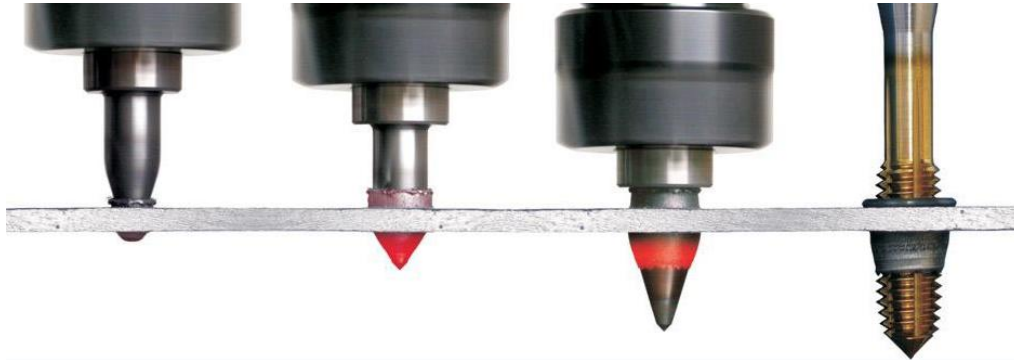
(Rubber seals)

(joint for pipes)



(collector ring)

### **2.6 Fdrill technology**

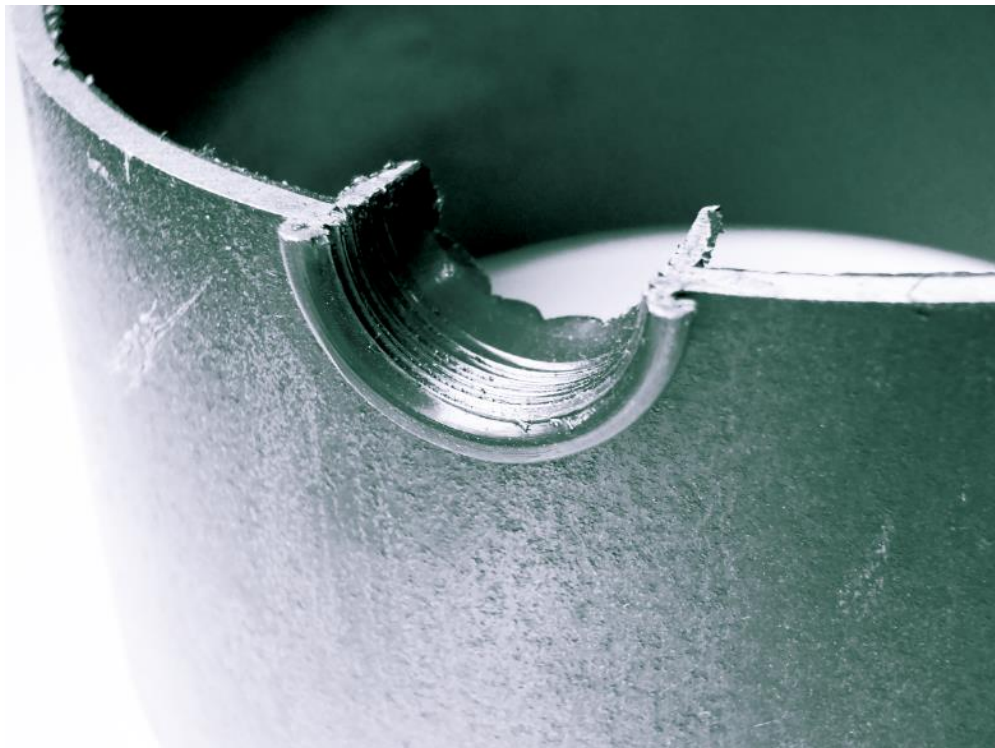
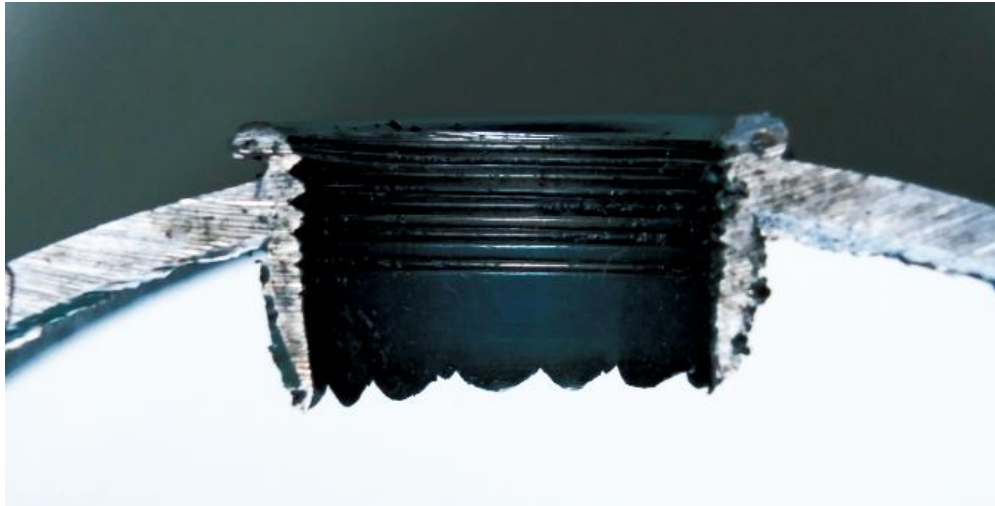


We introduce F drill technology from Germany and use it in our pipe drill processing system.

This technology can help the gooseneck to have a maximum connection to the pipe outlet holes and reduce the gooseneck damages during the sprinklers vibrating







(Picture 1、2 ,section of the pipe hole)

(Picture 3, automatic f drill holes , 3 holes are in the strength line)

### 3. Design feature

#### 3.1 pivot joints



This hard but flexible joint design can support all the strength of the pivot and maximum the flexibility of the pivot joint in case that the pivot system can walk properly in waving land.





This aluminum coupler can be broken when the spans are not in proper alignment. This will cause the water leak and the water pressure loses. The control panel will switch off the system when the water pressure is low and stop the machine. This is a good design to protect the system being damaged when no people keep eyes on the machine.

The rubber boots inside the aluminum couplers can help to reduce the water friction and resistance and reduce the electric power consumptions.

### 3.2 Rainfine Heavy duty gearbox:

special designed for Sudan market where the pivot can be used 300 days per year.



b.

#### The gearboxes we use:

a. The worm consists of high strength forged steel with a Brinell hardness of 210 while the worm gear is manufactured from ductile cast iron with a relatively wide variation of hardness. This is totally different from other manufacturers who make it by grey pig iron.

c. The worm and gear pressure angle have been designed at 14-1/2 degrees. This angle was selected based upon review of

extensive engineering information and has been borne out by extensive testing and proven field result. The 4-1/2 degree pressure angle exceeds the necessary strength requirement while providing a greater efficiency than would be possible with large angle.

- d. The output shaft is a full 2-1/4" diameter shaft. Although other gearbox may use a larger shaft, the actual strength is determined by the load applied and physical properties of the shaft material. The gearbox overhung load point is relatively small at 1-1/2" from the bearing to the wheel mounting flange. The shaft material is a high-strength, forged steel.
- e. The worm end caps made from cast iron held by 4 bolts to reduce the possibility of working loose in the field – unlike system using a threaded nut design.
- f. Ratio: 50:1



**Standard gearbox**

Material: Grey Iron HT250



**Heavy duty gearbox**

Material: Ductile Iron HT300

Axle Material: Steel 45

Teeth Shape and Degree Change.

Improvement 150% against standard.



### **3.3 High quality electric cables**

All our cables are standard shield to withstand infrared and ultraviolet emission. Safety circuit is considered.

Our electric cables are:

- 4# 14 gauge, 6# 18 gauge
- 4# 12 gauge, 6# 14 gauge
- 4# 10 gauge, 6# 14gauge
- Inner PVC cover 30 mm thick
- 8 mil aluminum shield
- Outer high-density polyethylene cover is 15 mm thick
- Sunlight resistant
- Moisture and dirt protection





### **3.4 Electric motors**

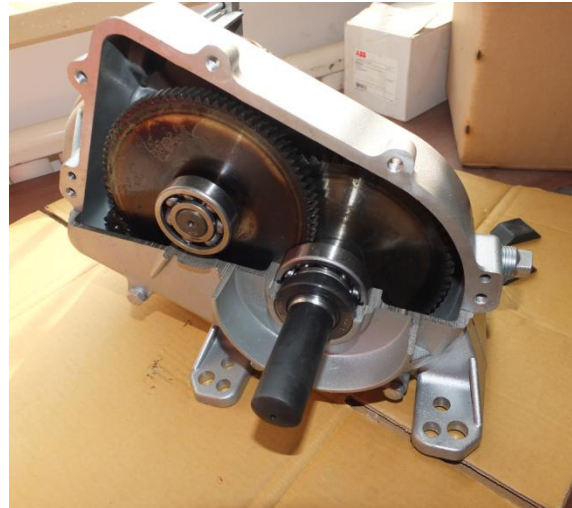
Worm wheel boxes

1.43 amps (full load) at 380v.

3/4 HP

1,000lb-in. torque (full load)

Three inside towers use slow speed motors with ratio:40:1



### **3.5 Special designed irrigation tire**





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**Tires and Rims**

14.9" x 24" tubeless tire with hot dip galvanized rim

Special designed valve stem to protect air

leak in hot/cold climate changes.

The wall thickness is 17-27mm, which is for heavy duty working conditions.

New style wheel tread can increase the capacity of walk on the slope land up to  $\pm 18^\circ$ .

Dry wheel package is used to keep the dry trace for tires.



**3.6 Standard coupler**

**3.7 Top quality sprinklers from America manufacturers.**







**Senninger sprinklers**



**Nelson sprinklers**

## 4. Functions

### 4.1 Control panel





**Standard control panel to perform the automatically control as below:**

- Main circuit breaker.
- Control transformer.
- Start stop switch.
- Main contactor.
- Monitoring indicators.
- Fused disconnect in panel rated 600v at 30 amps.
- Forward / reverse contactors rated 600v at 30 amps.
- Fuses - 30 amps.
- Lightning arrestor
- System monitors
  - control power
  - Pressure
  - Last tower movement
  - control circuit power
  - Safety circuit status
  - reverse control circuit
  - Forward control circuit
  - pump control circuit
  - Monitors incoming 380V power.
- Our main control also supports:
  - No water start stop.
  - Running direction (auto-stop/auto-reverse).
  - Speed adjusting.
  - Under voltage relay.
  - Over current relay.
  - Emergency stop.

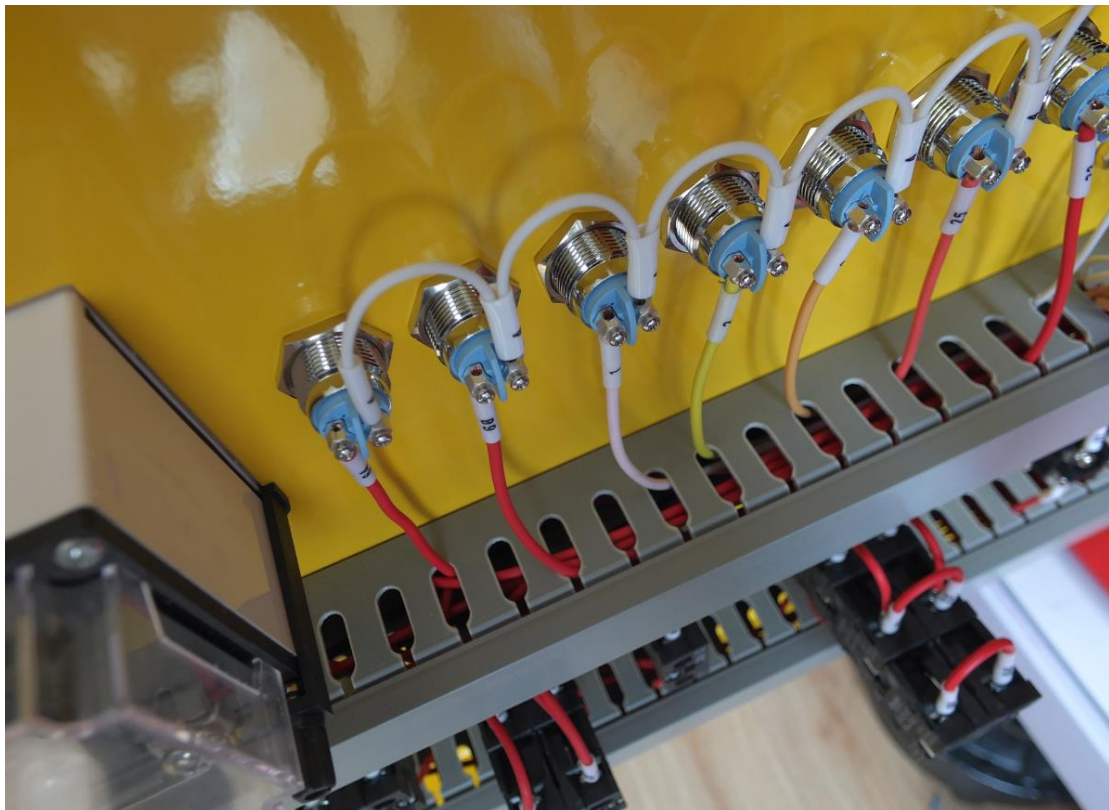


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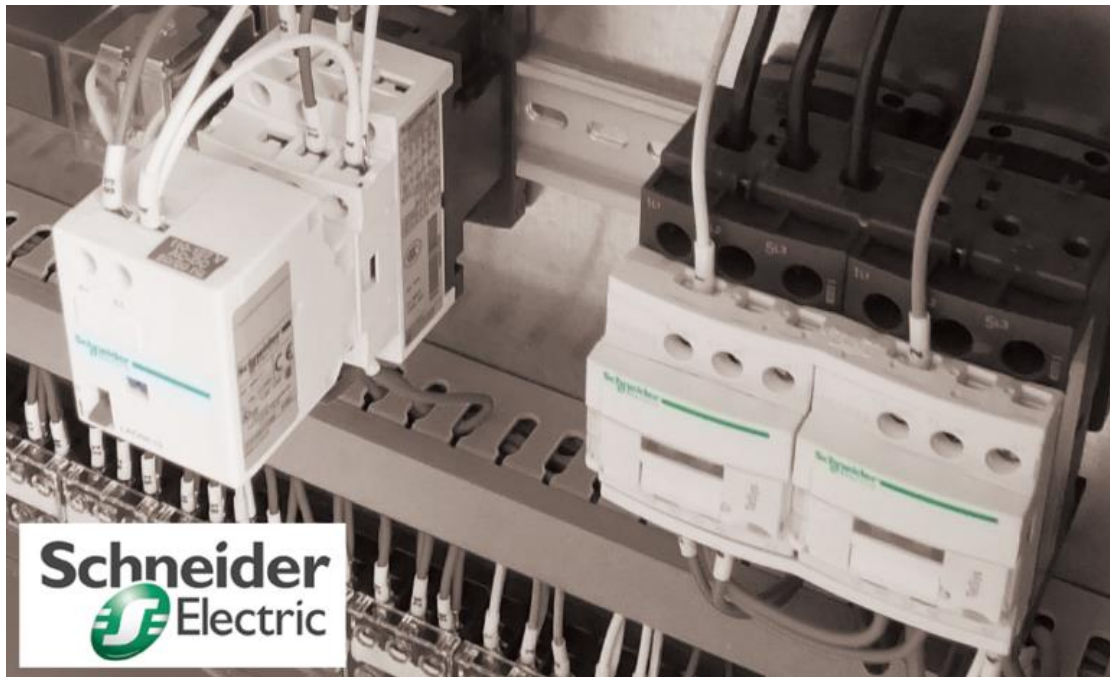
Low water pressure shut off.



Proper wiring



High quality components



Main switches are from Schneider.

## 5. QC system

### 5.1 ISO 9001:2008 for center pivot production





## 5.2. Quality control program for the pivot production

### 1. Material quality:

All the purchase for the materials of pivot should be from qualified manufactures.

Before we buy the materials we send the samples to independent lab and check the quality. All the steel parts will have chemicals and physical test report. The rubber parts and plastic parts should be checked by the professional lab.

### 2. Tooling guaranty

*Pipe:* the pipe fixture should be checked by the engineers and be sure all the positions are correct. All the welding equipment's are in good condition

*Angle:* checking gauges are used to check angles. The position of holes can be 100% checked by gauges

*Rod:* the length of the truss rods and the shape of the headed head is the most important part for the structures. We have special gauges to check the length and shape of the rods

*Welded parts:* All the welded parts are made by tooling and fixtures. Before the production, make sure all the tooling and fixtures are correct.

### 3. Production guaranty:

*Pipe:* when the pipe production started, we will check all the positions of the parts using our checking sheet. The engineer will check all the dimensions of the parts and fulfill the checking sheets. If any error was found, the pipe will be rejected. The second step is to check the quality of the welding. We use a special designed pull test machines to test each pipe. The pull test machine is to put the both end of the pipe with the requested force and check if the welding work is good. All the pipes will be tested and make sure all the pipes are in good condition of welding.

*Angles:* All the angles produced on the production line should be checked on the gauges and be sure all the holes diameter and positions are correct.

*Truss rod:* 100% the truss rods have to be put on the gauges to check the length and dimension.

*Welded parts:* The engineer in the factory will check all the dimension of the parts with check sheet and be sure all the positions and the welding are correct.

### 4. Double check before shipped to galvanizer:

Before sending all the parts to the galvanizer, our engineers will recheck the quality with checking sheet and be sure the size and the dimensions are correct.

5. QC for Galvanized zinc thickness.

All Rainfine steel parts are hop dip galvanized and meet the U.S ASTM-A123 galvanizing standard to assure 20 years free from corrosion. We use the zinc checking meters to check the thickness of the zinc on the parts. Different parts required different zinc thickness,. All the zinc thickness coating should come up with the standard.

6. Warehouse checking:

Warehouse QC people will check quality of the parts according to the checking sheet and our standard. If any mistake or error or wrong numbers are found, the parts will be rejected.

We have been started the pivot manufacturing since 2001. By 10years experience of the production practice, our pivot is becoming the top quality products in China.

**5.3 QC tests:**

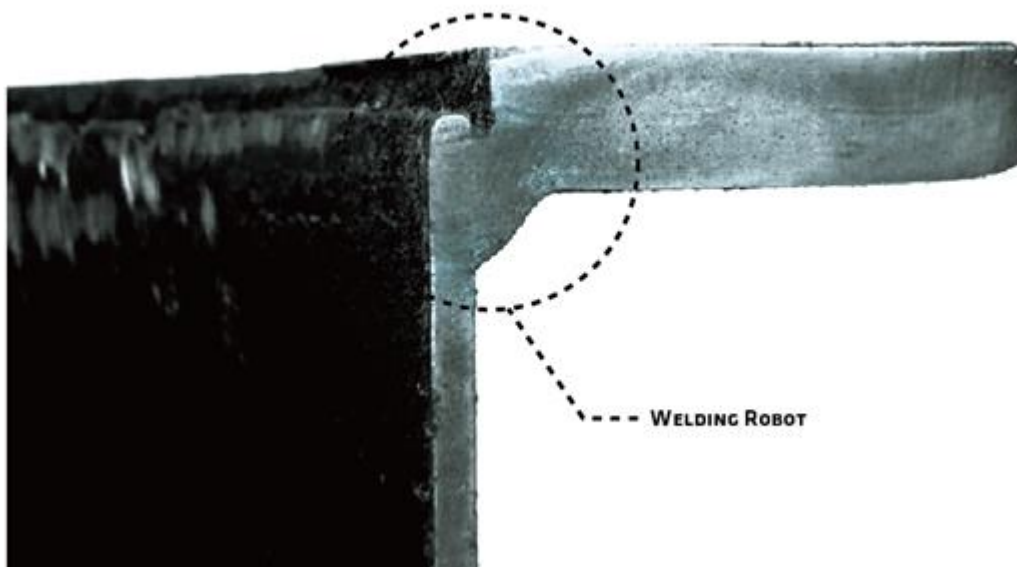
**(1)welding line breakdown test**

Hammer is used to punch the flange on the pipe until it bend to angle 45~90, if the welded line can't be broken after this test, the quality of the welding has no problem.

(The manufacturer do the breakdown test each pipe among 200 pipes ).



**(2)Penetration test**



The standard quality test of the welding penetration is to cut the part and see the section.



The penetration deep of the welding should be more than 1mm. This test will be done each pipe among 200 pipes.



Cut the pipe from other side and see the penetration deep. It should be more than 1 mm deep. This test is done each among 200 pipes.

### **(3) Pull test for truss rods**

The pull test is made in lab equipment each one among 200 rods.

The yield strength should be more than 60,000psi)



## **6. Main suppliers from U.S.A**

**Agsense: remote control system**

**ICII: percentage timer and control panel**

**NI: micro switch**

**Nelson: sprinkler**

**Senninger: sprinkler**

**UMC: couplers , gear box and electric motor.**

## **7. Warranty and Service**

### 1 Guarantee of pivot/lateral move

- 1 year concerning electric equipment
- 10 years/10 000h working hours for gearboxes and gear motors whichever expires earlier.
- 20 years concerning the galvanized equipment against corrosion
- 3 years for tires and rims.

2. We guarantee our equipment and its service ability against all materials or construction defects.

3. This guarantee does not apply to spares or repairs which may be the result of normal wear, deterioration or accidents resulting from negligence, lack of supervision or maintenance and miss-use of the equipment's.

4. In all cases, this guarantee is specifically limit to replacement of the parts recognized as defective by our technical services and absolutely excluding all other damages for any other reason and all other reimbursement.

5. In case of emergency repairs the parts recognized as defective will be ordered to our spare parts department. It will be sent in express subject to availability and invoice to the dealer.

a) Then within a month, a guarantee claim should be sent to after sales department that will consider the necessity to return or not the defective part for assessments.

b) If the said parts are cumbersome (pipes for example), it must be kept during 6 months. During this period, our technical department will decide an

Assessment on the spot or return to the factory at the Manufacturer's expense.



c) In the same time and after guarantee acceptance, an order free of charge will be registered for the replacement of the parts recognized as defective or the refund will be credited on the dealer accounts.

6. Guarantee is given to spare parts replaced for a period of 3 months after delivery date.

This Warranty does not apply to the following conditions and circumstances:

(a) to conditions directly resulting from negligence or improper handling by shipper, purchaser, or installer;

(b) to conditions resulting from improper installation or operation;

(c) to conditions resulting from failure to provide, or neglect in providing, reasonable and necessary maintenance to an installed system;

(d) to conditions resulting from accidents or faults in installation or repair, or from making any alteration;

(e) to conditions resulting from misuse, neglect, accident, casualty, or acts of God;

(f) to conditions resulting from malicious mischief, vandalism, riots, wars, or acts of terrorism; or

(g) to conditions not involving defects in material or workmanship.

Rainfine assumes no responsibility for installation, for proper location of the Irrigation System in the field or for the design, construction or suitability of the water conveyance system to the irrigators or Irrigation System.

The liability of Rainfine under this limited warranty, or otherwise, shall not in any case exceed the cost of repair or replacement of the component subject to this warranty. Rainfine is not liable for any claim of any damages to any party after the above stated period. Rainfine is not liable for any claim for travel expenses incurred in or labor used in repairing or replacing defective parts. The above warranty is valid only if the Irrigation System has been installed, used and maintained in accordance with the instructions contained in the owner's manual