Guangdong G Clef Bending Technology Co., Ltd

Sole Mission: To bend the straight into curving

CONTENTS









Business Mode

PART FOUR



Company Introduction





G Clef

Doing one thing to the extreme is success!

G Clef was established in 2012, with a paid-up registered capital of 40 million. Currently, it has 150 employees, including 60 R&D personnel. So far, G clef has 103 patents.

Guangzhou: Headquarter, R&D, investment and financing, etc.Foshan: Production operation

Shanghai: Demonstration, after-sales service, spare parts, trainingDongguan: Processing

Team Introduction



David Zheng

- General Manager
- Founded G Clef in 2012
- In charge of R&D work



Company Photos







Products of G Clef--Bending Equipment









2. Stretch bending machine



4. Free bending machine



Products of G Clef--Bending Equipment



G-CNC-A12T

G-CNC-B20T

Application of Roll Bending Machine

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Electric vehicle Lighting Building materials Furniture Aerospace Railway transportation







Products of G Clef--Bending Equipment





Three-dimensional stretch bending machine



Bumper beam stretch bending machine



Universal stretch bending machine

Application of Stretch Bending Machine



Electric vehicle Aerospace Railway transportation





Application of Tube Bending Machine



Automobile Aerospace



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Products of G Clef--Bending Equipment



Application of Free Bending Machine





Automobile Three-dimensional furniture Architecture





ltem	Roll bending	Tube bending	Stretch bending	Free bending
Picture				
Forming Principle				
Sample		The second se		
Application	Large radius automobile, aerospace, lighting, etc.	Small radius; automobile, aerospace, etc.	Large radius; electric vehicle, railway transportation, etc.	Large radius; three-dimensional furniture, building, etc.
Bending quality	One time forming, relatively low qualification rate	98% product qualification rate	99% product qualification rate	95% product qualification rate
Bending efficiency	1-20 minutes; cannot be automated	40 seconds around; can be automated	30 seconds around; can be automated	60 seconds
Profile waste	300mm above	Size customizable production with no waste	Size customizable production with no waste	300mm

Sample production, small batch delivery

For large quantities: equipment procurement or OEM service







Checking Fixture



3D Laser Measuring Instrument



Specialized checking fixture for customers



Products of G Clef--Bending Automation System Integration



Unmanned workshop

Upgrade your workshop to a whole new level of productivity

Reduced material costs

Less floor Minimal space management staff

Fastest output

Intelligent Virtual Workshop

Virtual workshop in the office consistent with the production site

Lower Better data Shorter More management processing communication transparency and costs distances visualization

Digitalized Workshop

Every process on the workshop can be quantified. Let the data speak for itself.

Higher efficiency Fewer switching times Lower Fastest commissioningarrangement costs for decision

Automotive Bumper Beam Stretch Bending Workstation

available

Stretch bending station robot arm trussed installation: when loading an unloading materials by manual, it can be put away

Stretch bending workstation: 1、 Manual and robot arm loading and unloading are both available 2、 Can be a single stretch bending workstation, but can also be connected to the CNC station

CNC station robot arm trussed installation: when loading and 205000 unloading materials by manual, it can be put away Material Access 10500 Stretch bending Bent Deburring Material material Washing Inspection CNC*4 Punching Marking Deburring Punching directly Edge trimming Washing after CNC, and Inspection **Process:** then aging CNC workstation: Marking Material->Punching->Stretch bending->Punching-Automatic and >CNC->Deburring->Washing->Inspection-Markingmanual loading and >Stack station->Aging) unloading are both

Cycle time: 34s/p Qualification rate: 99% Working time: 7*24hours Tooling replacement: 60-120m Number of products: 10 Number of operators: 1 Aluminum chips collocation: Automotive

Products under Development



Vertical stretch bending



Online bending



Core Competence: Operating System



Roll Bending Machine

1. Graphical and digital, completely eliminating dependence on manual labor.

2. Importing 2D and 3D drawings, automatically generating mold drawings and programs.

3. Multiple forming processes to eliminate stress, ensuring high quality and efficiency.



Core Competence: Operating System



Stretch Bending Machine

1. Graphic and digital, completely solving the dependence on manual operation.

2. Only need to input the material, radius, yield strength, cross-sectional area, length, etc.

3. Unique core algorithm, big data processing, seamless connection with the office system.



Problems of Traditional Bending

Bending Technique

- Bending workers do not know the principle of bending and rely solely on experience for bending
- Bending workers' mood and proficiency can affect the quality of bending

Product Quality

- Twisting, wrinkling, cross-section deformation, and fracture
- Surface depression and misfitting with checking fixture
- Quality discrepancy: Qualified in factory, but unqualified at customer's end

Bending Efficiency

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- Continuous trial and error requires
 numerous materials and multiple
 mold revisions
- The capability for consistent
 bending is poor, necessitating
 repeated trials and errors,
 ultimately leading to an inability
 to produce consistently highquality workpieces

Advantages of G Clef's Operating System

Bending Technique

- Simple bending procedures
- Clear production process

Bending Efficiency

- Reusable production procedures
- Reduce material loss and mold adjustment time

Product Quality

- Applying reasonable bending principles to effectively eliminate internal stress in profiles
- Simulatable bending scenarios: predict the effects of the bending process in advance, thereby ensuring product quality





CAE Analysis

- Simulates bending processes for precise outcomes
- Identifies optimal bending solutions
- Anticipates potential issues before production
- Minimizes material waste and scrap rates.
- Reduces testing time and costs

We can predict:

bending deformation trend, tension and elongation, minimum bending radius, distortion change, mandrel processing, and profile rebound.



CAE simulation process for rectangular tube



Principles of Stretch Bending Machine



Position Control Mode



1. Each axis individually servo control, accurate real-time control of tensile force and displacement;

2. Bending processing can be set in G Clef mode and traditional mode;

3. Automatically detect the material yield strength, and adjust the stretch force;

4. CNC program independent learning, automatic generation of tooling parameters;

5. Bending product quality and stability, accuracy are always consistent;

6. No need to rely on the experience of skilled workers;

7. Energy saving, environmental protection. The heating problem of the hydraulic system is solved.

Principles of Stretch Bending Machine



Rebound Control





Before: Traditional non-numerical control

Bending angle: > 190°

Bending effect: The radius at both ends of the arc is different from the radius of the middle arc segment.

Solution: When the radius is wrong, the only way is to change the tooling.

Now: CNC bending machine

Bending angle: about 181°

Bending effect: The radius of every part of the arc is the same.

The spring back is small, while the spring back is consistent. Solution: When the radius is wrong, only need to modify the stretch parameters. No need to change or replace the tooling.

Principles of Stretch Bending Machine



Neutral Layer Control

Total length of the material remains unchanged after bending.



Original state: neutral layer in the center

Non-numerical control bending Insufficient bending, the surface wrinkles

CNC bending

The neutral layer just touch the inner arc. Digitally controlled, no wrinkles. Minimum cross section deformation, meeting the state of yielding

Non-numerical control bending

Overstretching, material deformation, fracture



Technology Mode

Guiding practice with theory

Guiding Market Trends and Stimulating Demand





Close cooperation between industry, academia and research

Intellectual Property





Туре	QTY	
Software copyrights	18	
Patents of Invention	16	
Utility Model Patent	55	
Appearance Patent	13	
PCT	2	

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Marketing Mode















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Company Culture

Core Mission

Create more of the art of bending in this world!

Vision

To be one of the world's leading bending experts and to fulfill our employees and partners.

Core Values

Adhering to honesty and integrity, persevering with passion, and refusing to take shortcuts.

Positioning, Competitive Strategy and Profit Mode

Use the advanced bending solution to cater to the middle and high-end applications, create value for users and realize enterprise value.

Core Competence

Lies on the bending innovation and the ability to create sustainable value for users.

Our confidence



Grasp the core technology and continuous innovation ability!