LPR | Friction Welding Machine

LPR GLOBAL

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Introduction

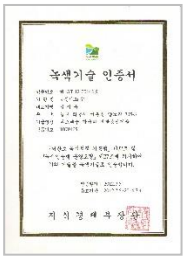
As a leader in designing and building friction welding equipment in South Korea since 2000, we have provided friction welding equipment and solutions to global clients in automotive, construction and oil and gas industries. Our tireless efforts for innovation first brought our CNC friction welding equipment to the market in 2012. Since then, the CNC friction welding equipment has been adopted by more industries and clients around the world.

Now, LPR Global is known as one of the most trusted names for friction welding equipment in the global market. We continue to develop and improve our material joining technologies to offer faster, more precise, and automated welding solutions to our clients.

Certificates

ISO9001:2008

Promising Export Firm



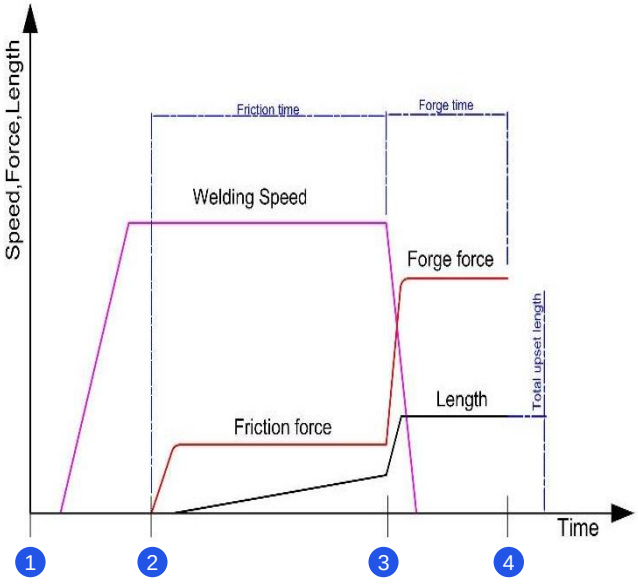
Green Technology

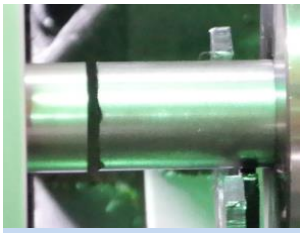
CE Certification

Promising S&M Enterprise

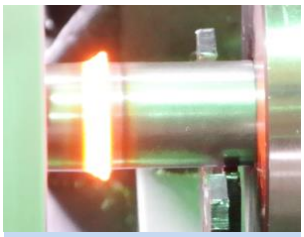
Patent Invention

Friction Welding Process

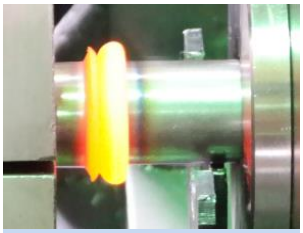




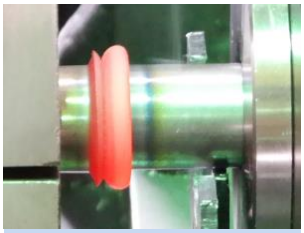
1. Contact & Rotate



2. Friction Weld

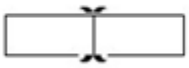
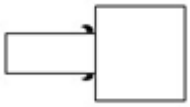
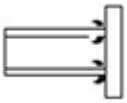
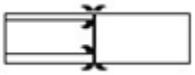
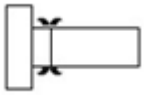
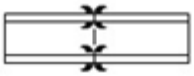
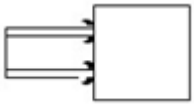
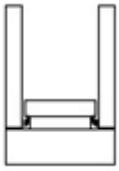


3. Forge pressed

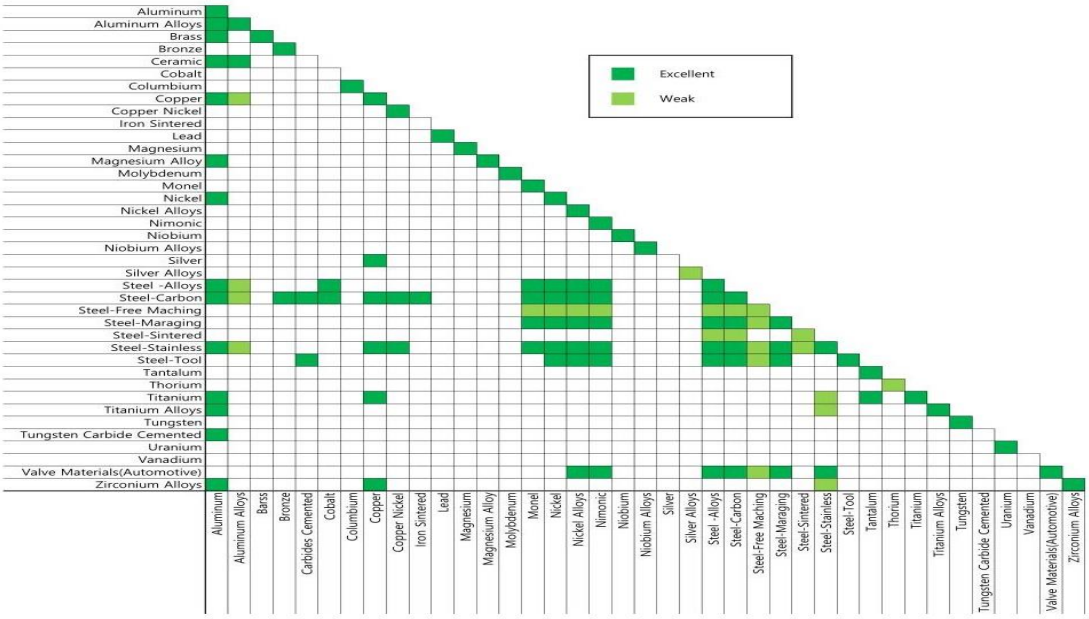


4. Complete

Friction Welding Joint Designs

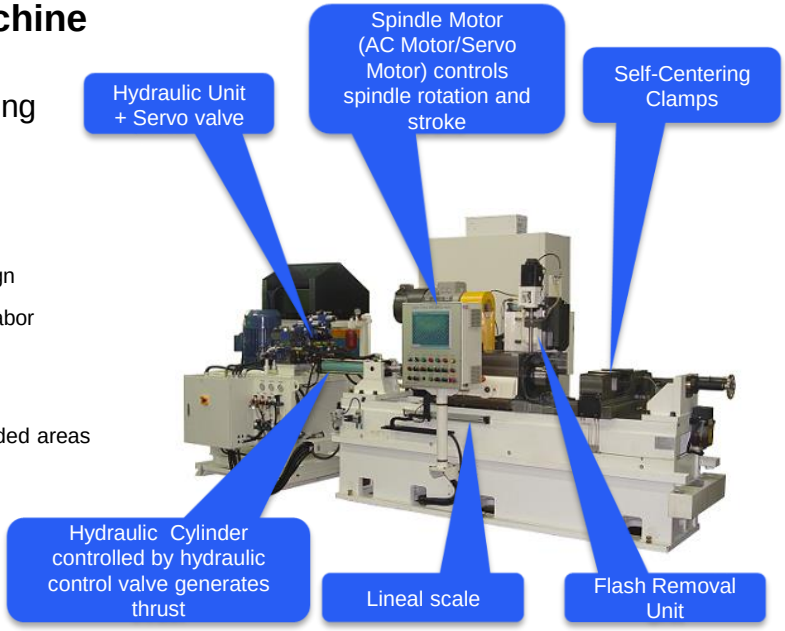
Welding Interface	Design	Welding Interface	Design	Welding Interface	Design
Bar + Bar		Bar + Bar		Pipe + Pipe	
Pipe + Bar		Bar + Plate		Considering the shape of the heat balance	
Pipe + Pipe		Pipe + Bar		Detail showing method of upset concealment	

Friction Welding Combinations



Hydraulic Friction Welding Machine

Benefits of Hydraulic Friction Welding



Improve Productivity

- Shorten welding cycle time and increase efficiency
- Minimize human errors with a simple, easy to use design
- Automated welding allows for redeployment of skilled labor

Enhance Quality

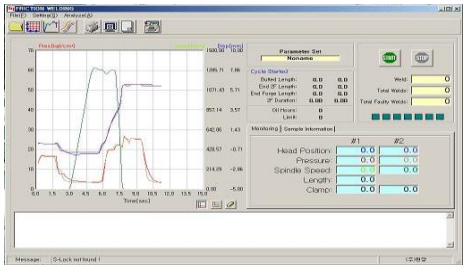
- Keep consistent welding quality with high strength welded areas
- Minimize heat-affected zones and weld porosity
- Provide greater precision

Save Costs

- No need for filler materials, flux or shield gas
- Ability to weld dissimilar metals and non-ferrous materials with the high cost material used in only the required locations
- Reduced costs for materials, forging and machining

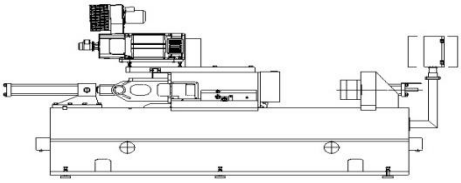
Green Technology

- Low energy consumption
- Clean environment with no arcs, sparks, smoke or flames

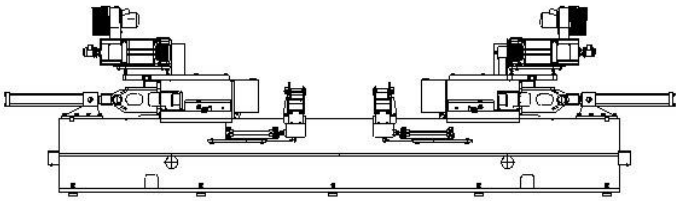


Welding cycle graphics (Touch screen PC)

Hydraulic Friction Welding Machine



SF (Single Spindle)



DF (Double Spindle)

Technical Data		8SF/DF	15SF/DF	50SF/DF	60SF/DF	80SF/DF	125SF/DF
Nominal forge load	ton	8	15	50	60	80	125
Nominal forge pressure	KN	80	150	500	600	800	1250
Typical spindle power	KW	15	18	37	45	60	112
Max Tube Diameter (mild steel)	mm	40	60	110	140	250	180
Range weldable (mild steel)	mm	4~25	8~36	20~70	25~75	35-90	50~125
Max weld area (mild steel)	mm^2	500	1000	4000	4500	6500	11,500

Hydraulic Friction Welding Machine

MODEL 6SF

- ✓ Work : Battery Terminal
- ✓ Material : Copper, Aluminum

Model	Spindle Speed	MAX. Forge Force	MAX. Solid Diameter	MAX. Weld Area	Spindle Drive Motor
6SF	2,500 rpm	6 Ton	Ø 20 mm	450 ㎟	22KW

MODEL 6SFH-CA2

- ✓ Work : Battery Terminal
- ✓ Material : Copper, Aluminum

Model	Spindle Speed	MAX. Forge Force	MAX. Solid Diameter	MAX. Weld Area	Spindle Drive Motor
6SF	2,500 rpm	6 Ton	Ø 22.5 mm	400 ㎟	18.5KW

Hydraulic Friction Welding Machine

MODEL 8SF

- ✓ Work : Cam shafts
- ✓ Material : S45C, STKM

Model	Spindle Speed	MAX. Forge Force	MAX. Solid Diameter	MAX. Weld Area	Spindle Drive Motor
8SF	1,700 rpm	8 Ton	Ø 28 mm	600 ㎟	17.5KW

MODEL 10SF

- ✓ Work : Electrical Connector
- ✓ Material : Aluminum and Copper

Model	Spindle Speed	MAX. Forge Force	MAX. Solid Diameter	MAX. Weld Area	Spindle Drive Motor
10SF	2,700 rpm	10 Ton	Ø 32 mm	800 ㎟	17.5KW

Hydraulic Friction Welding Machine

MODEL 10DF

- ✓ Work : Intermediate Shaft
- ✓ Material : S45C, STKM13

Model	Spindle Speed	MAX. Forge Force	MAX. Tube Diameter	MAX. Weld Area	Spindle Drive Motor
10DF	2,000 rpm	10 Ton	Ø 32 mm	800 ㎟	30KW

MODEL 12DF

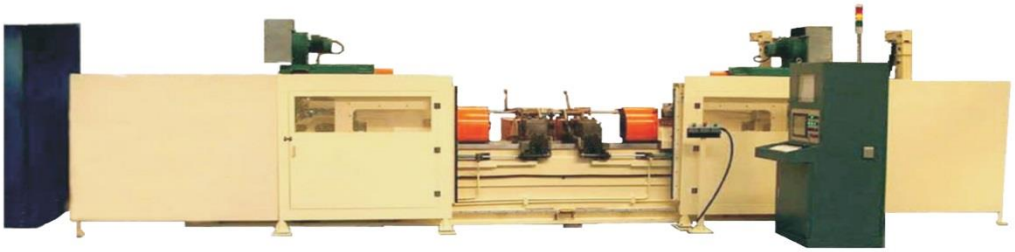
- ✓ Work : Drive shaft, CV. Joint
- ✓ Material : S45C , STKM13

Model	Spindle Speed	MAX. Forge Force	MAX. Solid Diameter	MAX. Weld Area	Spindle Drive Motor
12 DF	1,500 rpm	12 Ton	Ø 50 mm	2,000 ㎟	60KW

Hydraulic Friction Welding Machine

MODEL 15DF

- ✓ Work : Propeller Shaft
- ✓ Material : S45C, STKM13



Model	Spindle Speed	MAX. Forge Force	MAX. Tube Diameter	MAX. Weld Area	Spindle Drive Motor
15DF	2,300 rpm	15 Ton	Ø 60 mm	1,100 ㎟	60KW

MODEL 50SF

- ✓ Work : Aluminum blank for fracturing balls
- ✓ Material : Aluminum

Model	Spindle Speed	MAX. Forge Force	MAX. Tube Diameter	MAX. Weld Area	Spindle Drive Motor
50SF	1,500 rpm	50 Ton	Ø 100 mm	4,000 ㎟	90KW

Hydraulic Friction Welding Machine

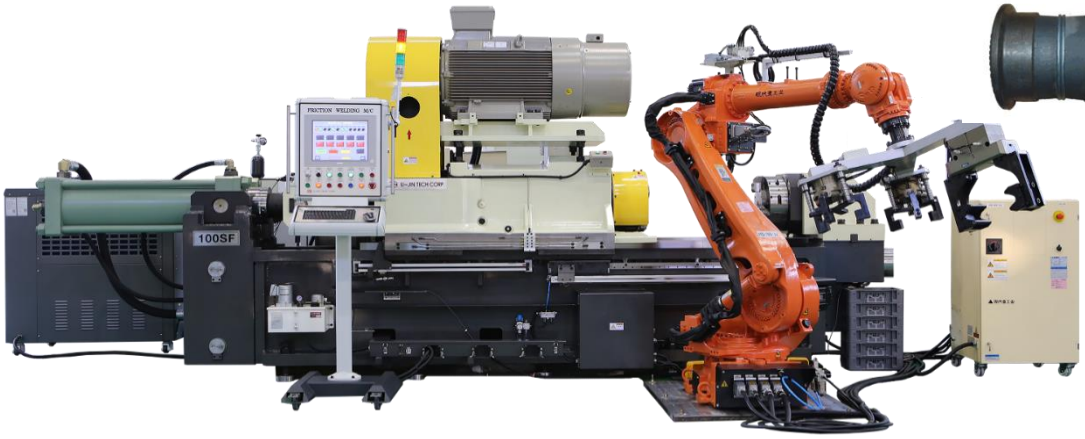
MODEL 60DF

- ✓ Work : Drill Pipe
- ✓ Material : S45C, STKM13

Model	Spindle Speed	MAX. Forge Force	MAX. Tube Diameter	MAX. Weld Area	Spindle Drive Motor
60DF	1,500 rpm	60 Ton	Ø 145 mm	5,000 ㎟	83KW

MODEL 100SF

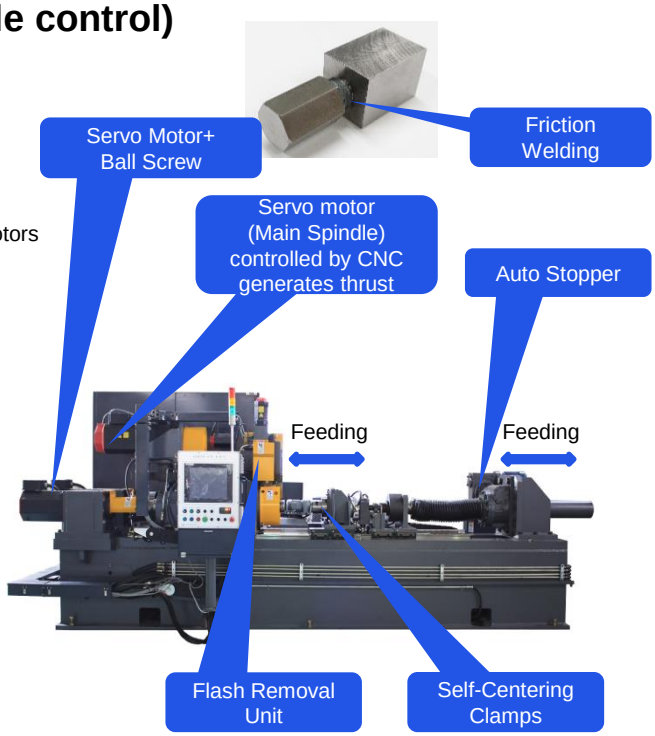
- ✓ Work : Track Roller
- ✓ Material : S45C



Model	Spindle Speed	MAX. Forge Force	MAX. Tube Diameter	MAX. Weld Area	Spindle Drive Motor
100SF	1,000 rpm	100 Ton	Ø 180 mm	7,850 ㎟	108KW

CNC Friction Welding Machine (Angle control)

Benefits of CNC Friction Welding



Improve Productivity

- Reduce cycle time due to precisely control speed using servo motors
- Increase operational stability without oil temperature change
- Reduce setup time using servo that automatically adjusted to the length of the material

Enhance Quality

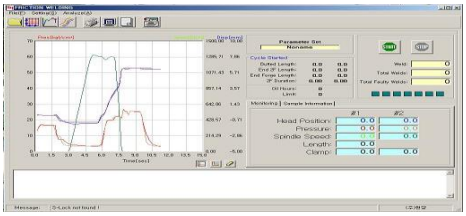
- Result in precise weld with the servo motor and ball screw control
- Minimize quality variance due to oil temperature change
- Achieve highly precise angle control with servo motor control
- Servo stopper precisely controls the automatic stopper.

Save Costs

- Reduce cycle time with minimized machine idle time
- Small footprint required due to compact design

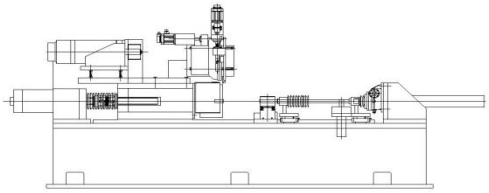
Green Technology

- Reduced CO2 gas
- Reduced noise and oil waste with a small sized hydraulic unit

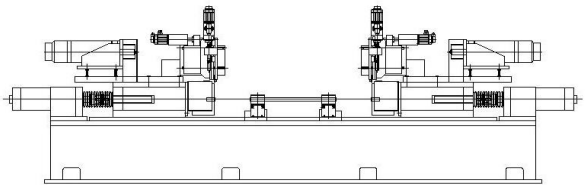


Welding cycle graphics (Touch screen PC)

CNC Friction Welding Machine



CNC SF (Single Spindle)



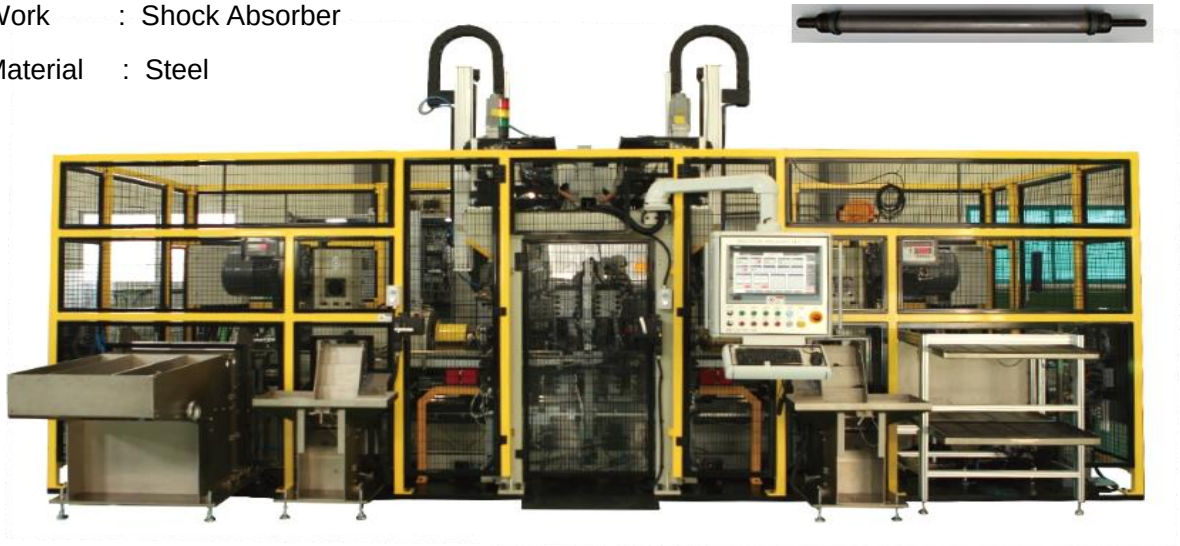
CNC DF (Double Spindle)

Technical Data		CNC 5 SF/DF	CNC 8 SF/DF	CNC 12 SF/DF	CNC 22 SF/DF
Nominal Forge Load	ton	5	8	12	22
Nominal Forge Pressure	KN	50	80	120	220
Stop Angle Accuracy	Angle	±0.5°			
Range Weldable (Mild Steel)	mm	6~20	8~25	10~30	15~45
Spindle Rotation	rpm	3000	2500	2000	2000
Spindle Stroke	mm	250	300	300	400
Max Weld Area (Mild Steel)	mm^2	350	500	800	1500

CNC Friction Welding Machine (Angle control)

MODEL CNC 8DF – 2Axis Flash Removal

- ✓ Work : Shock Absorber
- ✓ Material : Steel



Model	Spindle Speed	MAX. Forge Force	MAX. Solid Diameter	MAX. Weld Area	Spindle Drive Motor
CNC 8DF	2,000 rpm	8 Ton	Ø 28 mm	500 ㎟	38.5KW

MODEL CNC 12DF-P

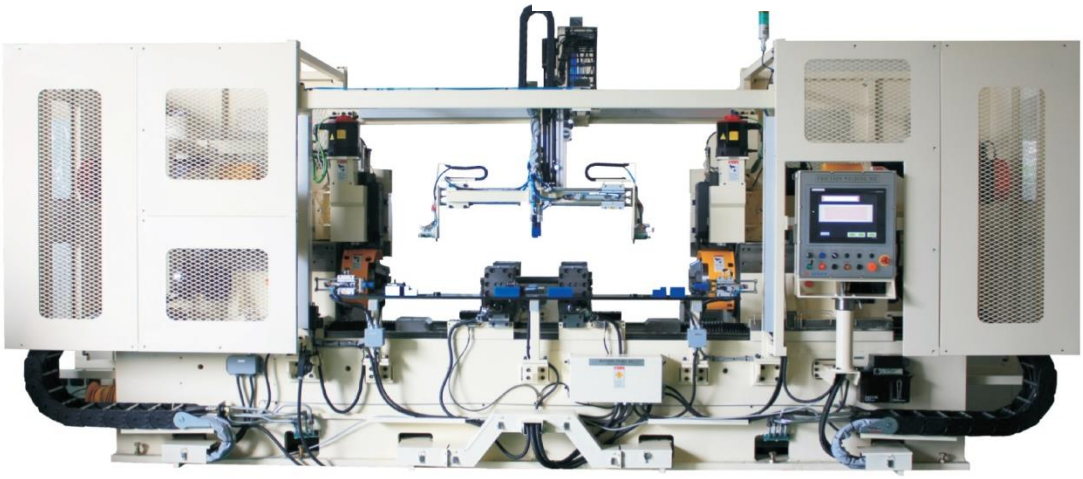
- ✓ Work : Propeller Shaft
- ✓ Material : S45C , STKM

Model	Spindle Speed	MAX. Forge Force	MAX. Tube Diameter	MAX. Weld Area	Spindle Drive Motor
CNC 12DF-P	2,00 rpm	12 Ton	Ø 80 mm	800 ㎟	60KW

CNC Friction Welding Machine (Angle control)

MODEL CNC 12DF-D – 2Axis Flash Removal

- ✓ Work : Drive Shaft
- ✓ Material : S45C , STKM



Model	Spindle Speed	MAX. Forge Force	MAX. Tube Diameter	MAX. Weld Area	Spindle Drive Motor
CNC12DF-D	2,000 rpm	12 Ton	Ø 80 mm	800 ㎟	60KW

MODEL CNC 12DF

- ✓ Work : Propeller Shaft
- ✓ Material : S45C , STKM

Model	Spindle Speed	MAX. Forge Force	MAX. Tube Diameter	MAX. Weld Area	Spindle Drive Motor
CNC 12DF	1,800 rpm	12 Ton	Ø 80 mm	800 ㎟	60KW

CNC Friction Welding Machine (Angle control)

MODEL CNC 22SF

- ✓ Work : Angle Control Parts
- ✓ Material : Steel, Copper, Aluminum, etc

Model	Spindle Speed	MAX. Forge Force	MAX. Solid Diameter	MAX. Weld Area	Spindle Drive Motor
CNC 22SF	2,000 rpm	22 Ton	Ø 45 mm	1,500 ㎟	60KW

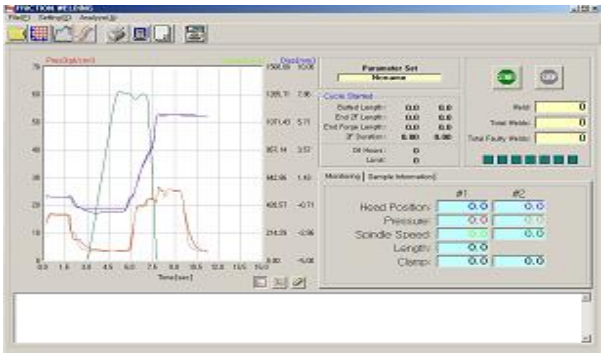
Automatic Ultrasonic Testing

- ✓ Work : Drive Shaft
- ✓ Material : S45C , STKM

Ultrasonic Flaw Detector	MAX. Tube Length	MAX. Tube Diameter	Ultrasonic Probe	Testing Time
USPC71710/Socomate	1,000 mm	Ø 60 mm	4 Points	45 sec

Options

Process monitoring



- Displays important parameters
- Data from every weld is stored and easily retrieved

Information Displayed

- ✓ Machine status and diagnostics
- ✓ Welding parameter database
- ✓ Record of each welding cycle
- ✓ Alarm conditions

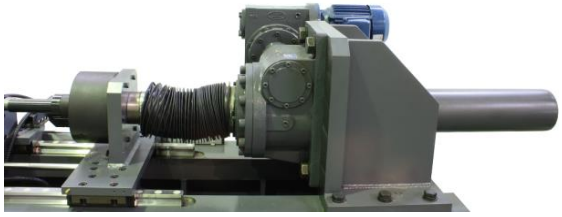
Flash Removal

- ◆ Turning
  - Applicable to spinning machines only (1 and 2 axis NC)
- ◆ Shearing
  - I.D or O.D flash can be sheared off directly
  - Applicable to non-spinning machines only

Angle Control

- Mechanically or electrically controls angles on both ends of the product after welding when certain angles are required for applications such as propeller shafts

Auto Stopper



- Reduce setup time using servos that automatically adjusted to the length of the material

Friction Welding - Example

Weld Dissimilar Metals

Dissimilar metals can be joined

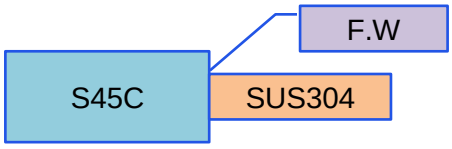
- Steel + Stainless steel
- Steel + Powder metal
- Cu, Al + Stainless steel

Non-ferrous metal can be joined

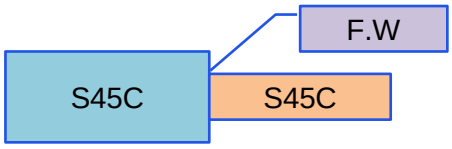
- Al + Cu
- Al + Al or Cu + Cu

Weld Non-Ferrous Metals

Reduces Material Costs



Substitution with less costly materials

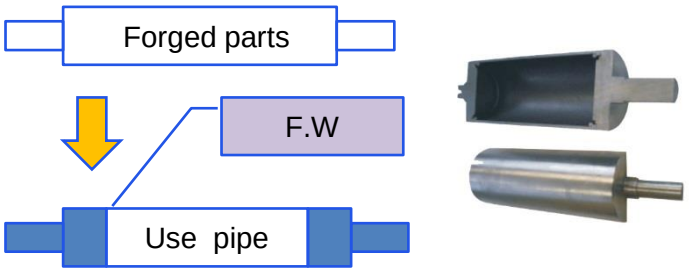


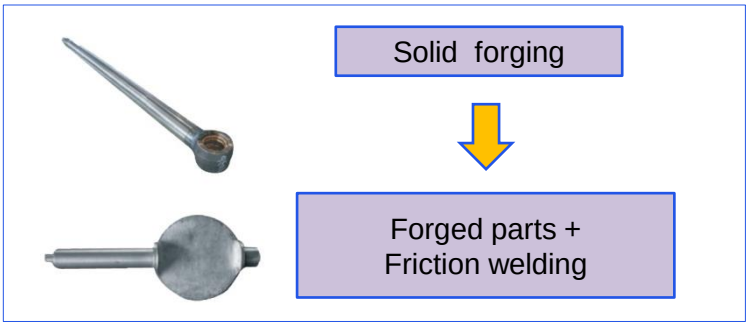
No need to dispose machine chips

Reduces Scrap Parts

Friction Welding - Example

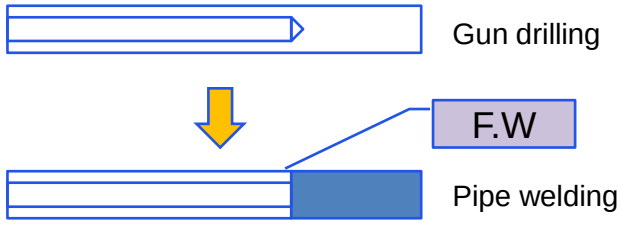
Reduces Weight





Reduces Forging Cost

Improves Process



Enhanced air tightness at joining section

Elimination of leak inspection process

Friction Welded Components

Automotive Components

Propeller Shaft

Cam Shaft

Intermediate Shaft

Universal Joint

Drive Shaft

Constant Velocity joint

Absorber Rod

Worm Gear Drive Shaft

Torque Converter

Turbo Chargers

Engine Valves

Engine Piston

Compressor Piston

Rear Axle Shaft

S-Cam Brake

Yoke Shaft

Rear Axle Housing

Torque Rod

Friction Welded Components

Construction Equipment Components

HYD. Piston Rod	Track Roller Bushing	Track Roller

Electric Components

Cable Connector	Battery Terminal	Motor Shaft

Machine Components & Ect.

Print Roller	Hose Coupling	Pipe Flange
Drill Pipe	Tool Holder	Gear Shaft
HYD. Pump Piston	Steel Ball	Flange	Oriented Steel Hex

Friction Welding Machine Clientele

	Model	Customer	Q'TY	Application	Delivery date	Remarks
1	15DF (15 Ton)	Dae –Seung	3	Propeller Shaft	2009.02 - 2014.03	Double head
2	60DF (60 Ton)	Central DTS	1	Propeller Shaft	2009.06	Double head
3	100SF (100 Ton)	Jin Sung T.E.C (China)	1	Track Roller	2010.08	Single head
4	8SF (8 Ton)	Seo Jin Cam	10	Cam Shaft	2010.02 - 2011.09	Flash removal
5	8SF (8 Ton)	Hanwha	1	Inflator	2011.01	Flash removal
6	25SF (25 Ton)	Posco	1	Copper Roller	2012.01	Single head
7	15DF (15 Ton)	Veri-Tek	3	Retrofit	2010.07 - 2011.09	Double head
8	CNC22SF (22 Ton)	R&D	1	Angle Control	2012.04	Flash removal
9	CNC 12DF (12 Ton)	Central DTS	5	Drive Shaft	2012.06 - 2016.02	Flash removal
10	10DF (10 Ton)	SI Automotiv	1	Intermediate Shaft	2012.10	Double head
11	CNC 12DF (12 Ton)	Central DTS	1	Propeller Shaft	2013.05	Double head
12	10SF (10 Ton)	KEDALI (China)	1	Battery Terminal	2013.07	Flash removal
13	8SF (8 Ton)	R&D	1	Sample Test	2014.05	Single head
14	NC6SF-SP (6 Ton)	KEDALI (China)	22	Battery Terminal	2014.11 - 2015.06	Vertical head
15	100SF (100 Ton)	Zulion Eng. (China)	1	Track Roller	2014.11	Single head
16	NC6DF (6 Ton)	ATK	1	Compressor Piston	2015.02	Double head
17	60DF	YKE Inc.	1	Drill Pipe	2015.08	Double head
18	NC6FW-CA (6 Ton)	Zhenyu (China)	7	Battery Terminal	2015.10	Single head
	Total		62			

Friction Welding Machine Clientele

	Model	Customer	Q'TY	Application part	Delivery date	Remarks
19	6SF (6 Ton)	Jigtech Technology (China)	1	Battery Terminal	2015.10	Single head
20	50SF (50 Ton)	Packers Plus (USA)	1	Al + Al	2015.11	Single head
21	CNC8DF (8 Ton)	Automotive Tier 1 (USA)	1	Absorber Rod	2015.12	Double head
22	NC6FW-CA (6 Ton)	YOSUN (China)	2	Battery Terminal	2015.12	Single head
23	NC6FW-CA (6 Ton)	Jigtech Technology (China)	4	Battery Terminal	2015.12	Single head
24	NC6FW-CA (6 Ton)	SHENZHEN Technology (China)	1	B/ Terminal	2016.11	Single head
25	12DF (12 Ton)	Sungwoo Engineering	1	Drive Shaft	2016.03	Double head
26	NC6FW-CA (6 Ton)	Suzhou Chuangneng (China)	2	B/ Terminal	2016.04	Single head
27	NC6FW-CA (6 Ton)	Jingjiang Dongda (China)	2	B/ Terminal	2016.04	Single head
28	5SFH-CA1	JCI Trading (China)	1	B/ Terminal	2016.05	Single head
29	5SFH-SP1(6)	KEDALI (China)	10	B/ Terminal	2016.09	Single head
30	5SFH-SP2(7)	KEDALI (China)	10	B/ Terminal	2016.12	Single head
31	CNC 12DF-P(2)	Central DTS	1	Propeller Shaft	2017.01	Double head
32	5SFH-CA2(3)	Zhenyu (China)	1	Battery Terminal	2017.02	Single head
33	12DF-D	Hyolim Industrial	1	Drive Shaft	2017.04	Double head
34	CNC 12DF (12 Ton)	Dae –Seung	1	Propeller Shaft	2013.05	Double head
35	CNC8DF (2)	Automotive Tier 1 (USA)	1	Absorber Rod	2017.05	Double head
	TOTAL		103			

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