



Zhenwu Electric Furnace (Germany) GmbH

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Overview

- **I am bring a chinese local company to Germany**
- What is Electirc Furnace/Induction Furnace ?
- The Company
- Market analysis
- Cost calculation
- Conclusion
- Reference

Electric Furnace

- An electric furnace is a furnace that runs using electricity as its main power source to smelt metal
- Main Types {
 - Induction furnace
 - Electric arc furnace
- For first 10 year strategy, the product is designed as Induction furnace only since we have relatively proven techniques in this aspect



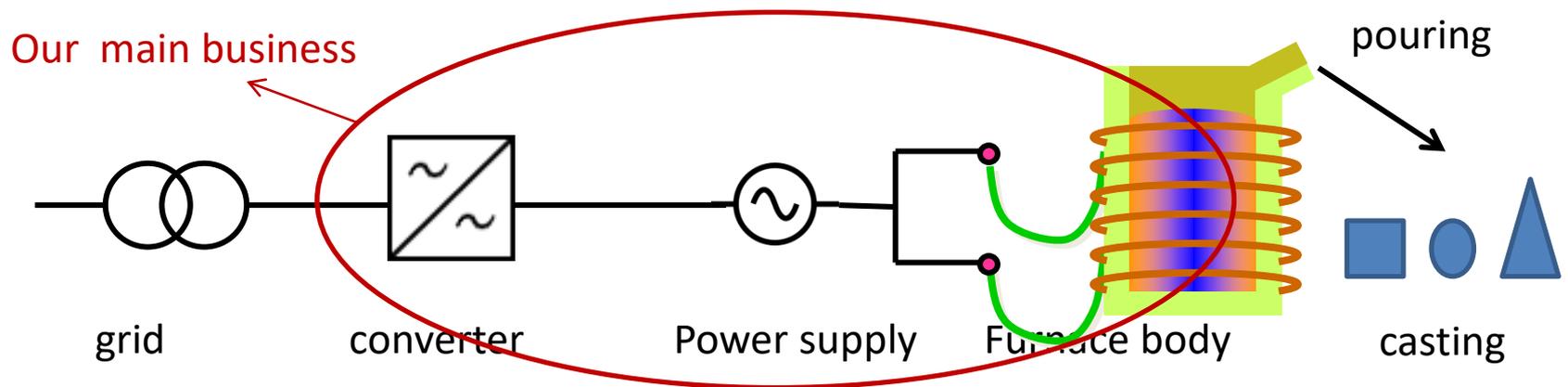
Induction Furnace

- An **induction furnace** is a set of installation that using electro-magnetic induction effect to heat and smelt metal.
- Mainly used to produce rough metal product (e.g. copper, iron, aluminum)

Induction Furnace

- components:
converter-power supply-furnace body

The whole production line:

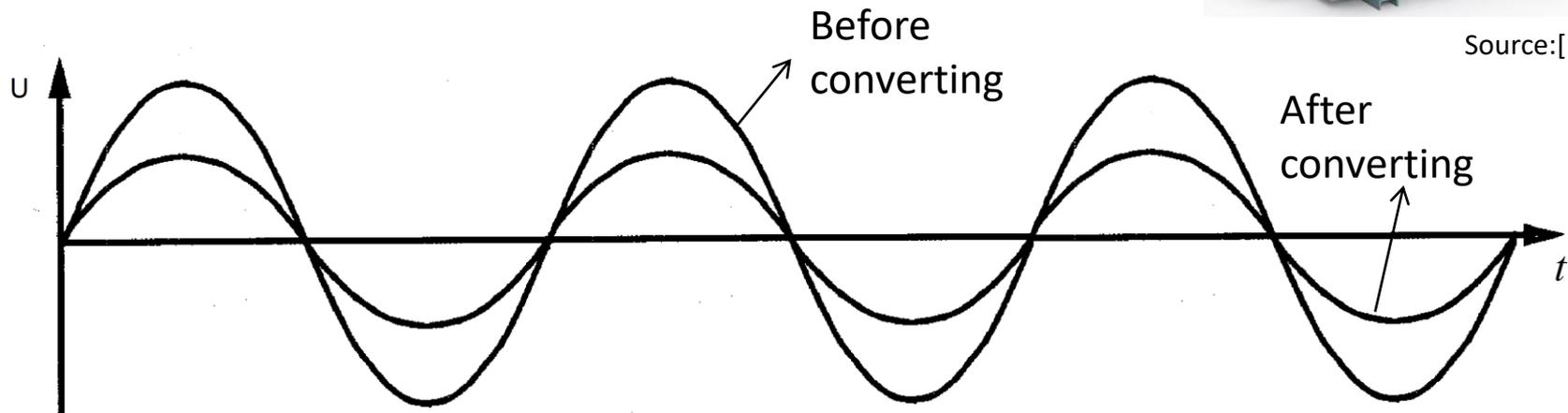


Converter

- Function : to convert high voltage of grid into the suitable voltage according to capacity of power supply

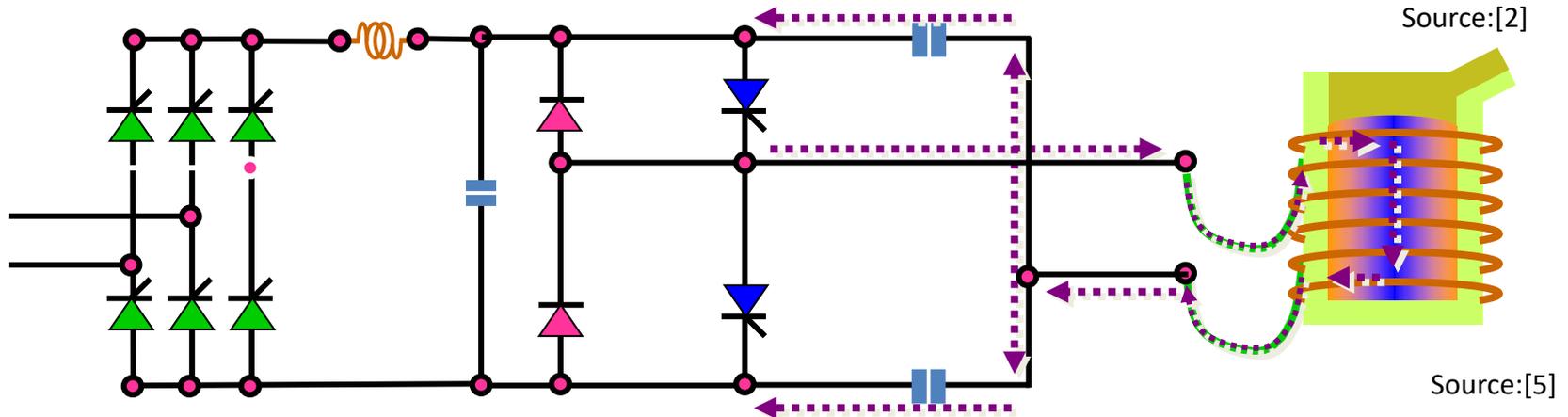


Source:[1]



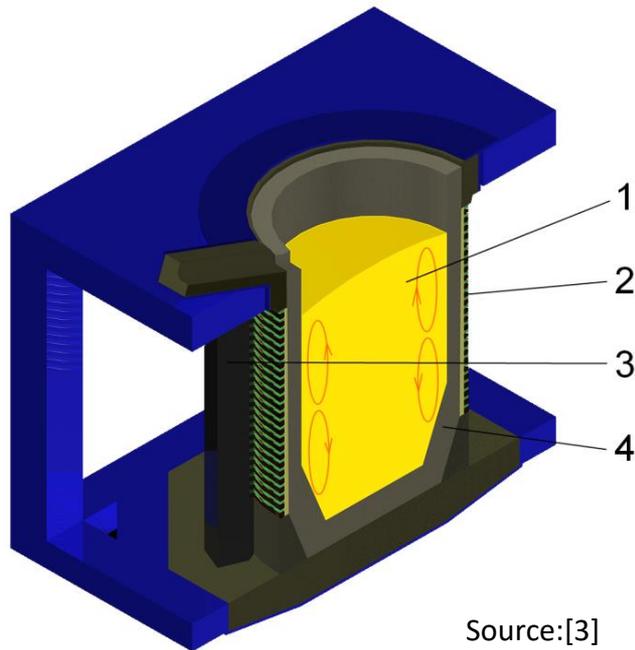
Power supply

- Function: to rectification that means to convert AC to DC and generate current for larger power and convert it again to AC with higher frequency and power according to capacity of furnace



Furnace Body

- Function: to hold and melt metal
- Theory: faraday' law of induction



Source:[3]

- 1 - Melt
- 2 - coil
- 3 - yokes
- 4 - crucible

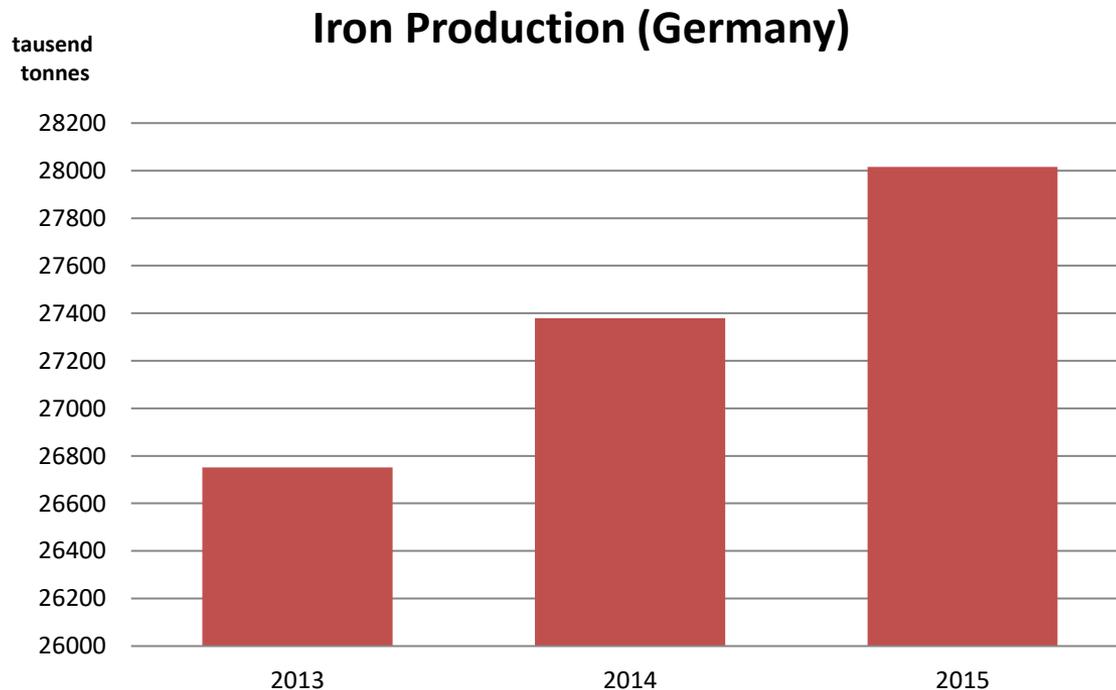


Source:[2]

Markt Analysis

- The total iron production in Germany from Jan. to Nov. 2015:

25682 thousand tonnes [4] . We assume 2015: $\frac{25682}{11} \times 12 = 28016$ e



Growing!

Growing!

Growing!

data:[4]

Markt Analysis

- Company that can produce induction furnace: at least 12 companies in Germany
- But only **3 companies** have the same or a little higher technology and quality than us
- **ABP** : almost same technological level

ALD Vaccum Technologies : advanced in vaccum technology but focused on smelting of superalloy

Otto Junker : almost same technological level

WE ARE ADVANCED !!

Markt Analysis

- The most common capacity of induction furnace in Market : 10 t
- The arrangement of produce: 1 shift 8 h/day or 2 shifts 16 h/day. Assume half 1 shift half 2 shifts : 12h/day in average
- International standard for smelting iron :
1 t needs 500kW power to reach 1450°C for 1 h

Markt Analysis

- For feeding and sampling inspection : 0.5 h
- The whole production period: 1.5 h
- The production capacity of each year (1 set) :

$$246 \text{ work day/a} \cdot \frac{12/\text{day}}{1.5\text{h}} \cdot 10\text{t} = 19680 \text{ t/a}$$

Markt Analysis

- Assume the iron production is all down by induction furnace and 3/4 of then wit 10 capacity

$$\frac{28016000t \cdot \frac{3}{4}}{19680 \text{ t/set}} = 1067 \text{ set}$$

- Life of one furnace: 20 years

$$1067 \div 20 = 54 \text{ set}$$

- 54 sets every year is needed

LARGE DEMAND !!



Markt Analysis

- Latest data from ABP 145.000 euro per set [6]
- Selling price of different companies:
Between 140.000 and 150.000 euro per set
We intend to sell at 143.000 euro



The Company

Zhenwu Electric Furnace (Germany) GmbH

- **Legal form:** limited company (GmbH)
- **Franchising:** franchisor Zhenwu co. Ltd. in China
- **Products:** the whole set (converter, power supply, furnace body) of induction furnace for iron smelting with capacity of 10 t



The Company

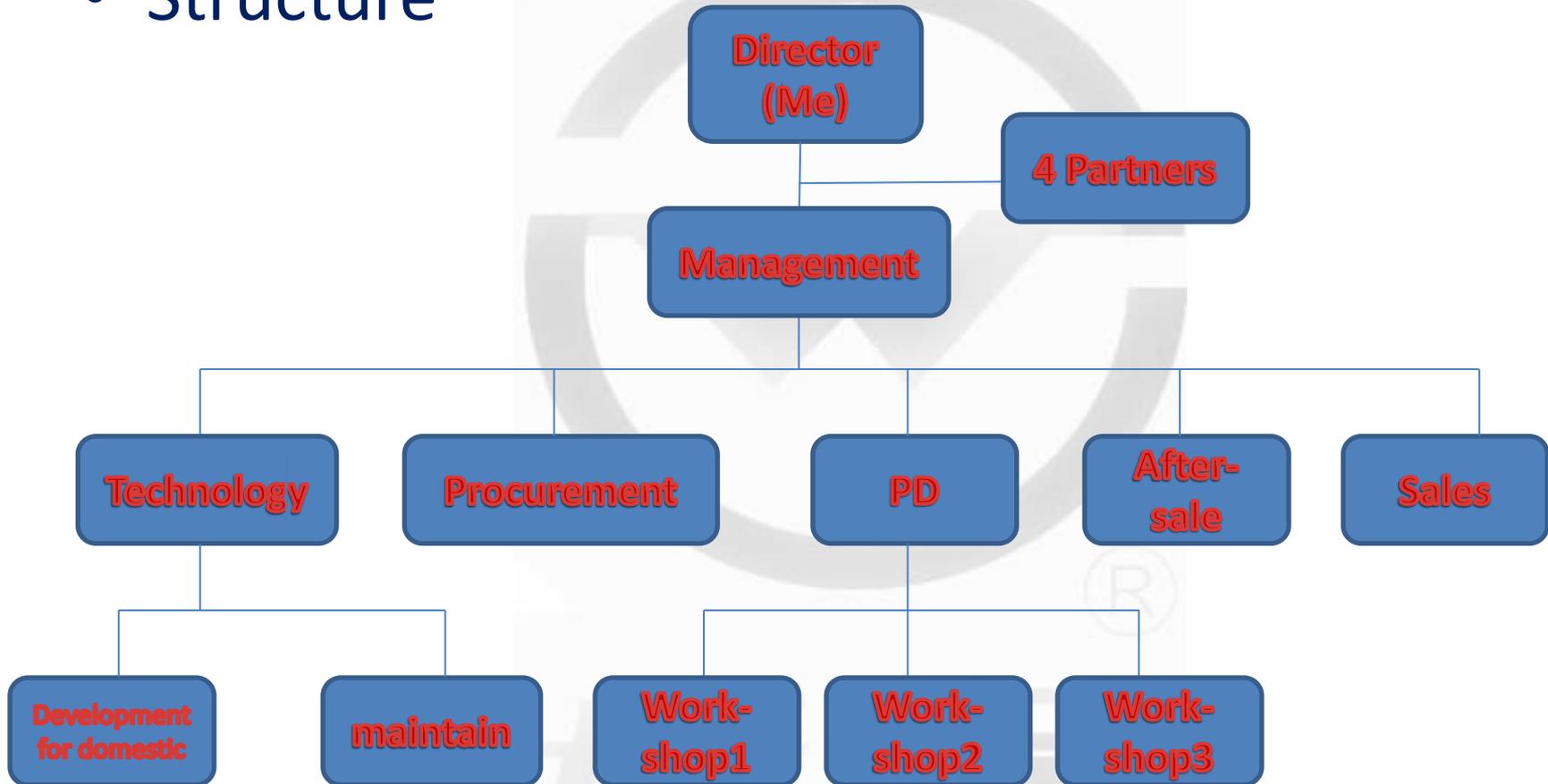


Location: Industrial park between Jülich and Aldenhoven

Source:[5]

The Company

- Structure



Investment Calculation

Investment goods	Investment/Expenditure[€]	Depreciation in year	Depreciation cost[€]
Property	1.220.000	0	0
Building			
Administraion building	750.000	20	37.500
Workshop	125.000	20	6.250
Warehouse	90.000	20	4.500
Entertainment area	12.000	20	600
Sum of building	977.000		48.850
Installation			
Office-sets	12.000	10	1.200
Tools and intruments	85.000	10	8.500
Rectreational facility	17.000	10	1.700
Transport & Assembly	55.000	10	10.500
Sum of installation	169.000		16.900
Offsites/Extra			
License	25.000	10	2.500
Franchising fee	0	0	
Veicles	50.000	5	10.000
Sum of offsites/extra	75.000		
Unexpected	400.000	0	0
Circulating capital	80.000	0	0
Total investment	2.921.000		78.250

Calculation of consumption

Expendable material	Specific consumption per set	Specific price	Cost per set [€]
converter	1	57.000€	57.000
Power supply			
Capacitor	24.240 units	1€/unit	25.240
Silicon controlled units	5.000 units	5€/unit	25.000
Copper bar	14.706 meter	1.7€/meter	24.990
Frame , controll & saftey system Pipes and others			23.000
Sum of power supply			98.230
Furnace body			
coil	14.600 units	1€/units	14.600
yokes	1.6000	10€/units	15.000
crucible	1	16.400€	15.400
Hydraulic system	1	5.600€	5.600
Saftey system Pipes and others			5,300
Sum of furnace body			55.900
Assembly and debug			12.000
Total cost of every set			228.130

Cost Calculation

Calculation of labor costs

Personal in cost centre	Number	Personnel direct costs
Management	5	500.000
Technology	15	950.000
Sales	10	750.000
Workshop	90	4.500.000
After-sale-service	5	200.000
Procurement	5	200.000
Total of labor costs(1 shifts)		7.100.000

Total of investment and financing

Total investment	2.921.000
40% won capital funds (shareholders equity)	1.168.400
60% outside financing (bank loans)	1.752.600



Interest rate : 3.5%
Running time : 10 years

Calculation of financing costs

Year	Banlance of debet [€]	interest rate (%)	Interest costs paid p.a. [€]	Repayment [€]
1	1752600	3.5	61341.00	175260
2	1577340	3.5	55206.90	175260
3	1402080	3.5	49072.80	175260
4	1226820	3.5	42938.70	175260
5	1051560	3.5	36804.60	175260
6	876300	3.5	30670.50	175260
7	701050	3.5	24536.75	175260
8	525790	3.5	18402.65	175260
9	350530	3.5	12268.55	175260
10	175270	3.5	6134.45	175260
Total interest paid			337376.90	
Total Repayment				1752600



Computation of cash-flow for 10 years in EURO

Year	1	2	3	4	5	6	7	8	9	10
Utilization of capacity	60%	60%	80%	100%	100%	100%	100%	100%	100%	100%
Quantity in set	6	6	8	10	10	10	10	10	10	10
Sales profits	8580000	8580000	11440000	14300000	14300000	14300000	14300000	14300000	14300000	14300000
cost										
Depreciation costs	78250	78250	78250	78250	78250	78250	78250	78250	78250	78250
Financing costs	61341.00	55206.90	49072.80	42938.70	36804.60	30670.50	24536.75	18402.65	12268.55	6134.45
Labour costs	7100000	7100000	7100000	7100000	7100000	7100000	7100000	7100000	7100000	7100000
Consumption cost	1368780	1368780	1825040	2281300	2281300	2281300	2281300	2281300	2281300	2281300
Loss carried forward		-125831	-34853.54							
Profit before tax	-28371	103594.1	2422490.74	4797511.3	4803645.4	4809779.5	4815913.3	4822047.4	4828181.5	4834316
Taxe(40%)	0	41437.64	968996.296	1919004.5	1921458.16	1923911.8	1926365.3	1928818.9	1931272.6	1933726
Profit after tax	-28371	62156.46	1453494.444	2878506.8	2882187.24	2885867.7	2889548	2893228.4	2896908.9	2900589
cash-flow	49879	140406.46	1531744.444	2956756.8	2960437.24	2964117.7	2967798	2971478.4	2975158.9	2978839
Repayment credit	175260	175260	175260	175260	175260	175260	175260	175260	175260	175260
Re-investing						50000				
Dividend	-125381	-34853.54	1356484.444	2781496.8	2785177.24	2738857.7	2792538	2796218.4	2799898.9	2803579



Conclusion

Total dividend: 20.694.021 €



Reference

- [1] Transformer : <http://hubpages.com/technology/Types-of-Electrical-Transformers>
- [2] Product sample of Zhenwu electric furnace co. Ltd.
- [3] wikipedia : https://en.wikipedia.org/wiki/Induction_furnace
- [4] World steel association :
<https://www.worldsteel.org/statistics/Aboutourstatistics.html>
- [5] Inductotherm Group: theory of induction furnace
- [6] ABP 2014 invitation for bid for:
CHINA NATIONAL HEAVY DUTY TRUCK GROUP HANGZHOU ENGINE SALES CO., LTD