

特约专栏

Development Report on China Titanium Industry in 2010

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Abstract: The operational aspect of China titanium industry in 2010 was reviewed, and the manufacturing, imports and exports of China titanium industry were also introduced. Simultaneously, the price trend of titanium sponge and titanium mill products was analyzed. China titanium industry shown a rising state in 2010, the capacity of titanium sponge was over 100 000 t, the output was 57 770 t, 41.6% over than that of 2009. The output of titanium mill products was 38 323 t, 53.5% over than that of 2009. The titanium consumption in industries like chemical, aviation, metallurgy, vacuum salt making, and etc., substantially increased in 2010, thus setting a new record for sales volume of China titanium products, 35 636 t. Titanium consumption in chemical industry has been close to 20 000t, turning into the absolute first field in titanium consumption of China. We will grasp the opportunity in the next few years and try our utmost to promote application of titanium materials, for the purpose of greater development.

Key words: titanium sponge; titanium mill product; capacity; output; price

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2010年中国钛工业发展报告

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摘 要: 回顾了2010年中国钛工业的运行情况, 介绍了中国钛工业的生产和进出口情况, 分析了海绵钛和钛加工材的价格走势。2010年中国钛工业呈明显回升状态, 海绵钛产能突破10万t, 产量达到57 770 t, 与2009年相比增长41.6%; 钛加工材产量达到38 323 t, 与2009年相比增长53.5%。2010年, 中国化工、航空航天、冶金、真空制盐等行业用钛大幅增长, 从而使中国钛制品的销售量达到创记录的35 636t。特别是化工用钛量已近2万t, 成为中国用钛的绝对第一大领域。应更好地把钛材的应用推广工作做好, 迎来行业的更大发展。

关键词: 海绵钛; 钛加工材; 产能; 产量; 价格

1 Operational aspects of China titanium industry 2010

1.1 Productive capacity and volume of production

1.1.1 Productive capacity

The productive capacity of sponge titanium and titanium mill products has been increasing till the year 2010.

According to statistics of 14 enterprises in production, the productive capacity of sponge titanium in China reached 103 500 t in 2010, 24 000 t of which came from Zunyi Titanium Plant, accounting for 23.2% of the national capacity. The productive capacity has increased 30.0% compared with that in 2009.

Based on statistical data from 23 enterprises, the productive capacity of China titanium ingot reached 89 200 t in 2010, 25 000 t of which came from Baoji Titanium Industry Co., Ltd., accounting for 28.0% of the national capacity. The productive capacity has increased 7.6% compared with that in 2009.

1.1.2 Volume of production

Sponge titanium In the year 2010, there are totally 14 enterprises engaged in sponge titanium production, volume of which detailed in Table 1. Total amount of sponge titanium production in China reached 57 770 t in the same year, increasing 41.6% compared with that in the previous year, and even 16.4% higher than that in 2008, the annual output of which has ever come to the peak. The volume of production of Zunyi Titanium Plant amounted to 14 248 t, accounting for 24.7% of the national output. The output of the preceding 7 enterprises listed in Table 1 has exceeded 3 000 t without exception, occupying 90% of the total amount in China. Production of sponge titanium has a tend-

ency of integration by comparatively large enterprises.

Table 1 Output of China sponge titanium in 2010

Manufacturing Enterprises	Output/t
Zunyi Titanium Plant	14 248
Jinzhou Huashen Titanium	9 182
Luoyang Shuangrui Wanji Titanium Industry	8 850
Chaoyang Jinda Titanium	6 200
Tangshan Tianhe Titanium Industry	5 500
Chaoyang Baisheng Titanium & Zirconium	4 300
Fushun Titanium	3 700
Anshan Hailiang Group	1 500
Baoji Lixing Titanium	1 286
CITIC Jinzhou Ferroalloy	1 200
Panzhuhua-Xinyu Chemicals	670
Zhuofeng Titanium of Shanxi	500
Huatai Metal Industries	400
Sichuan Hengvi Titanium	234
Subtotal	57 770

Titanium ingot The statistical data of 23 manufacturing enterprises show that the total volume of titanium ingot production in China is 46 262 t in 2010 (see Table 2), with an increase of 12.4% compared with that in the previous year. Among all the manufacturers, Baoji Titanium Industry Co., Ltd. produced 20 000 t of titanium ingot, accounting for 43.2% of the national output; Western Metal Materials Co., Ltd. and Western Superconducting Technologies Co., Ltd., shareholded by Northwest Institute for Nonferrous Metal Research, produced 2 376 t and 2 000 t of titanium ingot, respectively, occupying 9.5% of the total amount in China by their combined effort.

Titanium powder According to statistics of 5 enterprises, the output of China titanium powder in 2010 is 1 713t, with an increase of 36.6% compared with that of the previous year(see Table 3).

Titanium mill products Based on statistical data from 33 manufacturing enterprises, the total output of titanium mill products of China in 2010 is 38 323 t, increasing 53.5% compared with that of the previous year, and even 38.2% higher than that in 2008, the annual output of which has ever come to the peak (shown in Table 4).

In 2010, the output of titanium mill products of Baoji Titanium Industry Co., Ltd. reached 13 010 t, with an increase of 39.2% compared with that of the previous year, and it accounts for 33.9% of the national gross output. The volume of production of Baoshan Iron & Steel Co., Ltd. Special Steel Branch also broke through its low level and reached up to 1 934 t. Western Metal Materials Co., Ltd. and Western Superconducting Technologies Co., Ltd., shareholded by Northwest Institute for Nonferrous Metal Research, manufactured 2 746 t and 1 267 t of titanium mill products, respectively, occupying 10.5% of the total amount in China by their combined effort.

Classifications of 2010 titanium mill products are shown in the statistical Table 5, from which we could see that all i-

tems of titanium products except for the remnant are of substantial increase. The growth rate of sheets is of the maximum, reaching 74.5%.

Table 2 Output of China titanium ingot in 2010

Manufacturing Enterprises	Output
Baoji Titanium Industry Co., Ltd.	20 000
Shanghai Baogang Group Special Steel Branch Company	2 000
Western Metal Materials Co., Ltd.	2 376
Beijing Zhongbei Titanium Co., Ltd.	2 200
Hunan Xiangtuo Goldsky New Materials Co., Ltd.	850
Shenyang Xintong Technology Trade Co., Ltd.	2 200
Pangang Group Changgang Steel Company	2 500
Baoji Lixing Titanium Co., Ltd.	1 464
Donggang City Dongfang High-New Metal Materials Co., Ltd.	1684
Western Superconducting Technologies Co., Ltd.	2 000
Cixi Wuhuan Titanium Holding Co., Ltd.	900
Beijing Institute of Aeronautical Materials	1 000
Beijing HongDa Titanium Production Co., Ltd.	1 200
Hebei Delin Titanium Industrial Co., Ltd.	1 000
Zunyi Titanium Plant	698
Nanjing Baotai Special Materials Co., Ltd.	1 090
Luoyang Ship Material Research Institute	250
Shenyang Daji Industrial Co., Ltd.	1 100
CHINALCO Shenyang Non-Ferrous Metal Processing Co., Ltd	400
Baoji First Titanium Industry Co., Ltd.	600
Ningxia Orient Tantalum Industry Co., Ltd., Titanium Branch Company	200
Shenyang Beifang Titanium Industrial Co., Ltd.	50
Zhangjiagang Haian Titanium Industry Co., Ltd.	500
Total	46 262

Table 3 Output of titanium powder of China in 2010

Manufacturing Enterprises	Output/t	Percentage/%
Baoji Titanium Industry Co., Ltd.	30	1.8
Baoji First Titanium Industry Co., Ltd.	760	44.4
Kimet (WuYi) Special Metal Powder Co., Ltd.	310	18.1
Matt Qishan Titanium Co., Ltd.	600	35.0
Beijing General Research Institute of Nonferrous Metals (GRINM)	13	0.8
Total	1 713	100.0

Titanium equipment manufacturing Statistics of 11 manufacturing enterprises show that the production value of China's major titanium equipment manufacturers amounted to 1 489.927 million Yuan, with an increase of 39.8% compared with the figure in 2009. Titanium consumption was 4 738.9t, increasing 40.7%; and the number of equipment was 1991, increasing 24.8% (detailed in Table 6).

Table 4 Output of China titanium mill products in 2010

No.	Titanium mill products/t								Total
	Sheets	Bars	Tubes	Forgings (disc included)	Wires	Castings	New products	Remnant	
1	7 609	2 311	2 612	173	30	111	11	153	13 010
2	1 720	128		86					1 934
3	1 254	475	989	27	1				2 746
4		1 206						61	1 267
5	120	20		60				40	240
6	2 000								2 000
7	1 200								1 200
8	3 100								3 100
9	1 800								1 800
10	850								850
11	500								500
12		600							600
13		178	455	276	55		370		1 334
14		500	200						700
15		60	90						150
16	200		30	200					430
17	703	13	85	25	3	2			831
18						200			200
19						200			200
20			50						50
21			450						450
22			90						90
23			550						550
24			400						400
25			350						350
26			480						480
27			50						50
28			200						200
29			700						700
30		505	436						941
31		10			30				40
32			550						550
33		380							380
Total	21 056	6 386	8 767	847	119	513	381	254	38 323

Table 5 Group comparison of titanium mill products output in 2009 and 2010

Year	Sheets/t	Bars/t	Tubes/t	Forgings/t	Wires/t	Castings/t	Remnant/t	Total/t
2009	12 067	5 136	5 869	536	82	443	833	2 4965
2010	21 056	6 386	8 767	847	119	513	635	38 323
Rate of increase/%	74.5	24.3	49.4	58.0	45.1	15.8	-23.8	53.5

Table 6 State of operation of China's major titanium equipment manufacturers in 2010

Manufacturing enterprises	Gross output value, $\times 10^4/\text{¥}$	Titanium consumption/t	Quantity/set
Baoti Group Limited	15 932.7	401.4	331
Shenyang Dongfang Titanium Industry Co., Ltd.	32 000	446	693
Jiangsu Zhongsheng High Technology Industry Co., Ltd.	6 655	445	60
Northwest Institute for Nonferrous Metal Research	35 000	776	
Shenyang Paisi Titanium Equipment Co., Ltd.	7 579	183	82
Liaoning New Huayang Weiye Equipment Manufacturing Co., Ltd.	8 064	260	62
Nanjing Special Metal Equipment Co., Ltd.	14 390	540	61
Luoyang Ship Material Research Institute	3 960	184	
Baoji Lixing Titanium Co., Ltd.	10 676	1 166	586
Nanjing Baotai Special Materials Co., Ltd.	14 736	783.5	116
Total	148 992.7	4 738.9	1 991

1.2 Foreign trade

Imports and exports of China titanium products in 2010 are shown in Table 7, and comparisons between the imports

and exports in the first half year of 2010 and the annual volume are shown in Table 8. The total situation of China titanium products is better shown in Table.

Table 7 Imports and exports of China titanium products in 2010

Name of Products	Import		Export		Net exports/kg
	Quantity/kg	Sum/USD	Quantity/kg	Sum/USD	
Sponge titanium	3 370 581	20 555 510	3 554 380	24 714 690	183 799
Other unwrought titanium	845 228	9 116 685	487 560	7 009 382	-357 668
Titanium powder	2 843	290 290	67 116	1 052 565	64 273
Titanium waste & scrap	507 493	1 649 780	774 316	2 641 086	266 823
Titanium bars, rods, shapes, and profile shapes	365 204	24 918 393	3 091 198	56 233 290	2 725 994
Titanium wire	106 769	6 701 808	104 509	7 618 219	-2 260
Titanium sheets, plates, strips and foils with thickness ≤ 0.8 mm	1 615 657	45 160 478	152 468	4 360 824	-1 463 189
Titanium sheets, plates and strips with thickness > 0.8 mm	675 610	31 073 884	1 891 544	39 218 553	1 215 934
Titanium tubes	3 025 963	114 026 477	1 241 728	33 398 479	-1 784 235
Other titanium and titanium products	344 312	59 130 851	1 069 853	34 299 245	725 541
Total	6 133 515	281 011 891	7 551 300	175 128 610	1 417 785

Table 8 Comparisons between imports and exports in the first half year of 2010 and the annual volume

2010	Sponge titanium/t			Titanium mill products/t		
	Imports	Exports	Net imports	Imports	Exports	Net imports
First half year	2 892.561	1 459.82	1 432.741	2 289.997	3 308.182	-1 018.185
Annually	3 370.581	3 554.38	-183.799	6 133.515	7 551.3	-1 417.785

In 2010, the import, export and net export values for sponge titanium of China are 3 370.581 t, 3 554.38 t and 183.799 t, respectively; and the corresponding values for titanium mill products are 6 133.515 t, 7 551.3 t and 1 417.785 t, thus reversing the tide of net import in 2009. But the developing process shows a state of net import for sponge titanium in the first half of 2010, yet a decreasing state of import and an ascending state of export in the second half of 2010. Therefore, the annual mode still takes on net export. The annual imports and exports for titanium mill products are both buoyant in 2010.

Main types of imported titanium mill products in our country are still titanium welded tube and sheet.

From the imported and exported data, we could see that the overseas demand for sponge titanium began increasing in the second half of 2010, indicating the demanding recovery for titanium products in other countries.

1.3 Market and price

1.3.1 Sales volume

The inventory and net export of China sponge titanium production enterprises in 2010 are 2 286 t and 184 t, and the actual domestic sales volume is 57 770 - 2 286 - 184 = 55 300 t, which has increased 32.1% compared with that in 2009.

The inventory and net export of China titanium mill products in 2010 are 1 269 t and 1 418 t, and the actual domestic sales volume is: 38 323 - 1 269 - 1 418 = 35 636 t, which has increased 52.9% compared with that in 2009.

1.3.2 Demand assignment

The sales volume of China Ti and Ti alloy mill products in

different fields and their relevant proportions of 2010 are shown in Table 9 and Figure 1. In 2010, chemical industry was still the largest application field of titanium in China, setting a record of 19 718 t, which accounted for 53.2% of the national total consumption. Other major fields in titanium consumption are aerospace (9.7%), sports and leisure (7.8%), metallurgy (6.7%), vacuum salt making (6.1%), electrical (3.9%), and medicine (2.9%) in turn.

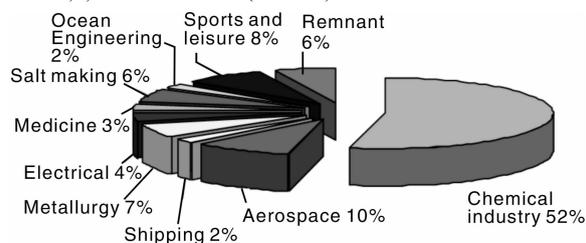


Fig. 1 Schematic drawing of relevant proportion for titanium consumption of China in 2010

1.3.3 Price

In 2010, the price of China main titanium products was slowly recovered, a slower ascending process pushed by cost (shown in Fig. 2 and Fig. 3).

2 Operational state analysis of titanium industry in 2010

2.1 Overall evaluation for operational state of China titanium industry in 2010

Under the regulation and control of the national macro-economic policy, Chinese economy got sustainable, speedy

and healthy development in 2010, and the international aviation industry also recovered from the second half of 2010.

China's titanium industry has got obviously improved under the influence of these two factors.

Table 9 Sales volume of China main production enterprises for titanium mill products in different fields (t)

Enterprise	Total	Chemical engineering	Aero-space	Shipping	Metallurgy	Electrical	Mectrical	Salt making	Ocean engineering	Sports and leisure				Remnant
										Golf	Glasses	Watch	Remnant	
1	12 373	5 931	2 160	500	600	1 000	300	600		400		200	682	
2	1 918	1 818	100											
3	2 746	1 675	192	55	55	110	27	357	110				55	110
4	1 267		760.2				443.5							63.3
5	240	120	36											84
6	2 000	1 400			200		100	200	100					
7	1 200	400	50	50	200	50	50	100	100	50		50	50	50
8	3 100	1 500			300		100	200	100	300		200	200	200
9	1 500	500												1 000
10	850	600			100		50	50	50					
11	500	300			100			50	50					
12	600	400			50			50				100		
13	1 085	868						217						
14	700	500			50			50	50			50		
15	150	100	20						30					
16	430	200				20			10					200
17	831	536			167		13	4	2					109
18	200		50							150				
19	200	4	42	20					4	118				12
20	50		50											
21	450	300						100	50					
22	90	90												
23	550				550									
24	400	300			50			50						
25	350	300						50						
26	480	380							100					
27	50	50												
28	200	182	8						10					
29	700	500				200								
30	941	164	132			63				221		1		232
31	33		3							25	2			3
32	550	400			50			50					50	
33	320	200												120
Total	37 054	19 718	3 603.2	625	2 472	1 443	1 083.5	2 256	766	1 264	2	601	1 037	2 183.3
Relevant proportion /%	100	53.2	9.7	1.7	6.7	3.9	2.9	6.1	2.1	3.4	0	1.6	2.8	5.9

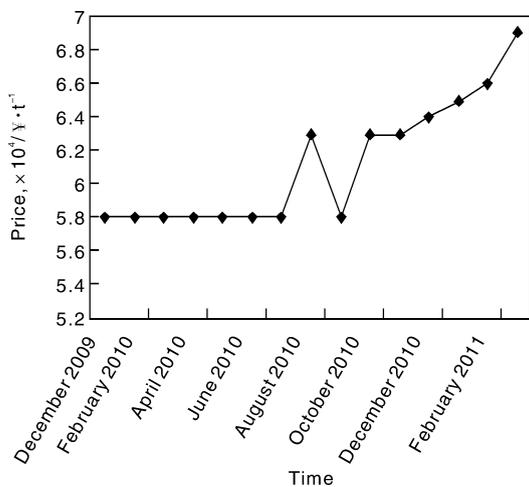


Fig. 2 Price behavior of China a-level sponge titanium in 2010

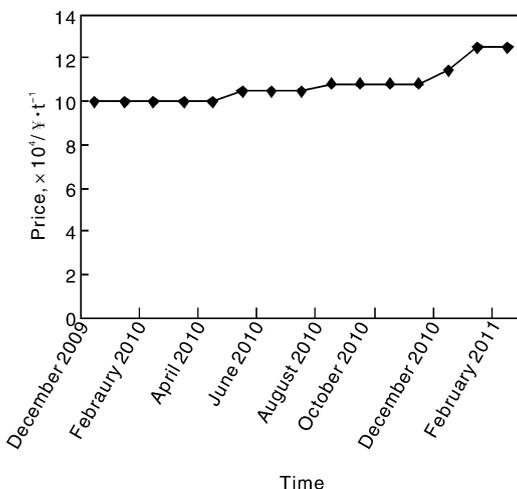


Fig. 3 Price behavior of China TA2 standard titanium sheets in 2010, 3.0 mm in thickness

The output and sales volume of China sponge titanium set records of 57 770 t and 55 300 t respectively in 2010, increasing 41.6% and 32.1% compared with the data in the previous year.

The output and sales volume of titanium mill products also set records of 38 323 t and 35 636 t respectively, increasing 53.5% and 52.9% compared with the data in the previous year.

Compared with 2009, the imports of sponge titanium fall slightly (7.0%) and the exports reach 3 554.38 t, 7.1 times as much as that of 2009. The net export volume of 2010 is 183.799 t. The imports and exports of titanium mill products still remain high (6 133.515 t of imports and 7 551.3 t of exports), realizing an annual net export volume of 1 417.785 t. In 2010, China titanium industry reversed the trend of imports of both sponge titanium and titanium mill products in one stroke. Since China is not capable of producing enough titanium sheets and welded tubes, it is still necessary to import large quantities of these two products based on the data for main types of products imported.

The price of China sponge titanium and titanium mill products rose slowly in 2010, up to 6.5×10^4 ¥/t to the end of the year from 5.8×10^4 ¥/t at the beginning, increasing 12.1%. For titanium mill products (TA2 standard sheets, 3.0 mm in thickness), the price rose from 10×10^4 ¥/t to 11.5×10^4 ¥/t with an increase of 15.0%. Considering the rising price of raw materials (high titanium slag, titanium tetrachloride, metallic magnesium, etc.) and energy resources (such as electric power), the price of titanium products is still around the cost line. Therefore, the operating margins of China titanium enterprises are not high.

2.2 Market analyzing

Motivated by the national macropolicy of domestic demand stimulation, titanium consumption in industries like chemical, aviation, metallurgy, vacuum salt making, and etc., substantially increased in 2010, thus setting a new record for sales volume of China titanium products, 35 636 t. Titanium consumption in chemical industry has been close to 20 000 t, turning into the absolute first field in titanium consumption of China. The recovery of the international aviation market has also provided beneficial conditions for titanium market.

Affected by inertia on the other hand, the capacity of China sponge titanium and titanium mill products has been climbing and the datum of the former one has broken through 10×10^4 ¥/t, reaching 103 500 t. So the competitive market has resulted in slow rise of price, and this state will remain the same in a few years from now on.

2.3 Policy analyzing

Generally speaking, China titanium industry of 2010 has made steady and rapid progress motivated by the national policy of domestic demand stimulation and "top-ten industrial adjustment plan". Yet the sustainable growth is also a factor for price hikes, especially the American policy of "Quantitative Easing (QE)", which intensifies the pressure caused by price rise of the raw materials from the outside, has brought on difficulties for enterprise operation to a certain degree.

In 2010, the Communist Party and the Government formulated the "Twelfth Five-Year Plan" and put forward the fundamental policies of 'energy-saving & emission reduc-

tion, industry upgrading, and growth mode transforming'. And all these are not only necessary and timely for long-term and healthy industrial development, but also quite essential for harmonious development between human and society, human and nature. For titanium industry, the policies of 'industry upgrading and growth mode transforming' bring two opportunities. One is that the industry upgrading of the whole society will produce larger market for titanium products as new materials. The other is that the enterprise itself could find its foot in competition and gain much more progress only if it pays more attention to technological input and advance, steadily improves the quality of products, reduces energy use, and reduces discharge of 'three wastes'.

2.4 Opportunity analyzing

High demand and low price bring difficulties for operations of enterprises, and also create great opportunities for development of titanium industry at the same time. Low price and high properties of titanium has raised the cost performance of titanium materials, and the application of titanium materials under corrosion resistant environment in chemical industry has been further enlarged. These two may be the root cause of the largely increasing output and sales of China titanium materials in 2010.

We will grasp the opportunity in the next few years and try our utmost to promote application of titanium materials, for the purpose of greater development.

3 Technical advance

China titanium industry made sustainable and greater technical progress in 2010.

Under the support of the national '863' program, Zunyi Titanium has made a breakthrough in research and development of electronic-grade high-purity titanium and 20 kg 4N5 high-purity titanium has been manufactured.

Sponge titanium project of Luoyang Shuangrui Wanji Titanium Industry has made significant progress, realizing whole process of production. Its capacity has been extended to 10 000 t/a, and its electric power consumption has been lowered to 26 000kW · h/t due to the adoption of new techniques such as multi-pole electrolyzer, etc.

The 1 400 mm titanium strip production line of Baoti Group Limited is in stage of installation, and 1 400 mm titanium strip project of Shanghai Baogang Group Special Steel Branch Company is in stage of debugging.

Electron-beam cold hearth melting furnace of Shanghai Baogang Group Special Steel Branch Company is in production, and plasma cold hearth furnace, in trial production.

High speed bar & wire line of Baoti Group Limited has been put into production.

4 500 t hydraulic press machine of Northwest Institute for Nonferrous Metal Research has been put into use and large-size bars with diameter from 400 mm to 600 mm have been manufactured.

2 800 mm hot rolling mill + 1 780 mm cold rolling mill of Northwest Institute for Nonferrous Metal Research have been put into use.

1 450 mm hot rolling mill + cold rolling mill of Luoyang Ship Material Research Institute has been put into use.

Scrap recycling line of Baoti Group Limited has been put into operation and about 3 000 t ~ 4 000 t scraps could be recovered each year, thus bring great benefits for the enterprise.

4 Existing problems in China titanium industry and conclusion

In the 'Development Report on China Titanium Industry 2009', we analyzed the imperfection of China titanium industry from five aspects, including insufficient industrial agglomeration, poor intrinsic and organic correlation between upstream and downstream enterprises, arduous task of energy saving and emission reduction in titanium smelting, incomplete techniques of titanium processing which fails to fully satisfy the demand of national economy development, and the quality of titanium enterprises which needs to be further improved. The above five problems are being solved gradually in 2010 but not yet completely removed, which have to be further perfected in future development (please refer to the 'Development Report on China Titanium Industry 2009').

Besides the above five, another problem which becomes more and more serious is the over investment of China titanium industry. The international financial crisis in 2008 and 2009 and output decrease of both sponge titanium and titanium mill products in 2009 have resulted in sharp decline of economic benefits and even zero profit of many enterprises. But huge investment in the past few years has promoted China's production capacity of sponge titanium and titanium ingot coming up to 103 500 t and 89 200 t in 2010, increasing by 30.0% and 7.6% respectively compared with that of the previous year. Excessive growth of production capacity will induce over competition and affect the healthy development of China titanium industry.

It is necessary for any an enterprise to make sufficient investigation and study, and give full attention to the capital risk, technical risk and market risk before investing in titanium industry.

欢迎参加“第四届百名专家淄川行暨科技成果引进洽谈会”

主办单位：山东省淄博市淄川区人民政府 网 址：<http://218.56.99.86:8000/>
会议地点：山东·淄川 会议时间：2011年7月29~30日

淄川区位于山东省中部，是世界短篇小说之王蒲松龄的故乡。淄川矿产资源丰富，工业基础比较雄厚。2010年，全区实现GDP417.09亿元，完成地方财政收入14.52亿元，规模以上工业企业515家，实现销售收入1093亿元，主营业务收入过亿元的企业329家，纳税过千万元的企业27家。现已形成了以建材冶金、医药化工、机械制造、纺织服装为主导的4大产业，4大产业产值分别达到558.5, 141, 256.9, 64.5亿元，从业人员达到15万人。

“十二五”时期，淄川区将在加快对建陶、水泥产业嫁接改造的同时，着力建设轻型汽车及零部件生产基地、医药化工生产基地、矿山机械生产基地、无机非金属材料 and 钙业基地，打造山东省经济强区。

为加快产业结构调整，促进淄川区经济又好又快发展，自2008年始，淄川区连续举办3届“百名专家淄川行暨科技成果引进洽谈会”活动，逐步搭建起院校与企业的科技合作桥梁。3年来，共有全国各地260余家高校院所、800人(次)专家教授、18名院士来淄川区参加活动并进行项目推广与技术指导，企业与院校累计签约项目87项、政府与9所大学建立了长期科技合作协议。

2011年7月29-30日，淄川区将举行“第四届百名专家淄川行暨科技成果引进洽谈会”活动，届时欢迎全国各地高等院校、科研院所的专家、教授及项目负责人来淄川区进行项目推广和技术指导。

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