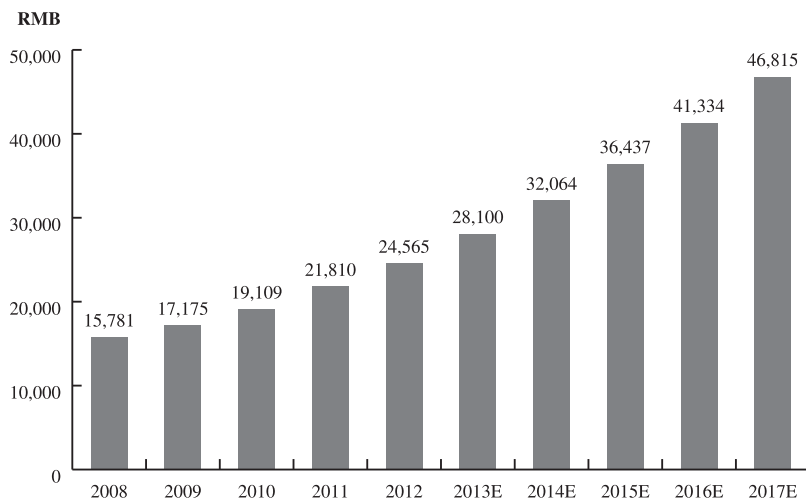


## INDUSTRY OVERVIEW

*Certain information and statistics relating to our industry provided in this section have been derived from official government sources. In addition, this section and elsewhere in the prospectus contains information extracted from a commissioned report, or the F&S Report, prepared by Frost & Sullivan for purposes of this prospectus. See “— About This Section.” We believe that the sources of the information in this “Industry Overview” section are appropriate sources for such information, and we have taken reasonable care in extracting and reproducing such information. We have no reason to believe that such information is materially false or misleading, and no fact has been omitted that would render such information materially false or misleading. However, the information has not been independently verified by us, the Underwriters, any of our or their respective directors, officers, employees, advisers, agents or representatives or any other party involved in the Global Offering and no representation is given as to its accuracy. Except as otherwise noted, all the data and forecast in this section are derived from the F&S Report.*

### OVERVIEW OF MACRO-ECONOMIC ENVIRONMENT IN CHINA

As one of the most important economies in the world, China has experienced robust economic growth since the onset of the economic reform. The 2008 financial crisis triggered the debate of structural changes to its economic model. While export remains a major growth driver for China, it has gradually shifted its focus from being an export-oriented economy to one that is increasingly driven by domestic consumption. China’s urban disposable income has been growing at a double-digit rate since 2008. Driven by increasing urbanization, China’s urban population is also expected to grow in tandem with the rise in purchasing power of urban dwellers. The following chart illustrates the average annual disposable income per capita in China for urban households from 2008 to 2012 and the forecast from 2013 to 2017.



Source: National Bureau of Statistics, Frost & Sullivan estimates

## INDUSTRY OVERVIEW

Beijing, Guangzhou, Shanghai and Shenzhen, which are usually defined as tier I cities, contributed 10.0% to 15.0% of total GDP in China in 2010. Tianjin, Chongqing, most provincial capital cities, and certain coastal cities situated in economically developed provinces are usually defined as tier II cities, and the rest are tier III and county level cities.

### HEALTHCARE INDUSTRY IN CHINA

#### Total Healthcare Expenditure Growth in China

China's total healthcare expenditure has been growing rapidly along with the ongoing healthcare reform, and is expected to continue to grow in the next several years. Total healthcare expenditure is composed of government healthcare expenditure and social healthcare expenditure, which includes social medical funds, employers' contribution and individual's healthcare expenditure. China's total healthcare expenditure increased from RMB1,453.5 billion in 2008 to RMB2,891.4 billion in 2012, and is expected to reach RMB5,367.2 billion in 2017, representing a CAGR of 15.6% during the ten-year period.

Healthcare expenditure in China varies significantly among tiers I, II and III cities. In 2010, tier I cities represented 11.2% of the total healthcare expenditure in China while the population of these cities represented only 4.7% of the total population. The fact that tier I cities incur considerable healthcare expenditure is attributable to a combination of factors, such as relatively high average income levels, concentrated medical resources and a large number of patients attracted from nearby cities and provinces.

#### Per Capita Healthcare Spending

China achieved higher growth in per capita healthcare expenditure in comparison to most of the developed countries. China's per capita healthcare expenditure increased from RMB1,094.5 in 2008 to RMB2,135.4 in 2012, and is expected to reach RMB3,866.9 in 2017, representing a CAGR of 15.1% during the ten-year period. This growth rate compares favorably to 3.5% in the United States, (1.4)% in the United Kingdom, and 10.3% in Japan in the same period. The robust increase in per capita healthcare spending is largely attributable to an increase in medical needs as a result of an increasingly aging society, increasing household income, increasing focus on the quality of life, changing lifestyle, such as less reliance on manual labor due to increased automation during the industrialization processes in China, improvements in medical facilities and expansion of medical insurance coverage. Nevertheless, per capita healthcare expenditure of RMB2,135.4 in China in 2012 remained relatively low comparing to RMB54,401.9 in the United States, RMB20,993.1 in the United Kingdom, and RMB20,061.6 in Japan.

## **INDUSTRY OVERVIEW**

### **Overview of Government-sponsored Medical Insurance Schemes**

The health insurance system in China is led by the government. The ongoing healthcare reform aims to build a nationwide insurance system to provide substantially all of China's population with affordable medical services. Currently, such system consists of three types of essential medical insurance, Urban Employee Basic Medical Insurance Scheme as a mandatory health insurance program for urban employees and retirees, Urban Resident Basic Medical Insurance Scheme as a voluntary program for other urban residents, and New Rural Co-operative Medical Scheme, or NRCMS, as a voluntary program for all rural population. By the end of 2012, the coverage of the two urban insurance schemes reached 536 million urban residents, accounting for approximately 95% of the total registered urban population, and NRCMS covered 805 million rural residents, accounting for approximately 98% of the total registered rural population. For certain illnesses that require expensive medical procedures, a supplemental medical reimbursement system is in place, which provides a minimum of 50% reimbursement in addition to the basic social medical insurance coverage.

In 2012, 31.3% of total healthcare expenditures in China were directly paid by the governments, and 35.2% of total healthcare expenditures were paid by government-directed public medical insurance schemes, commercial insurance plans and employers.

### **Hospital Classification in China**

Hospitals in China are statutorily classified into three classes including Classes 1, 2 and 3 hospitals. Generally, Class 3 hospitals are the largest hospitals that provide the services with the highest degree of complexity and sophistication, and perform a broad range of educational and medical research functions. In addition, compared to hospitals in other classes, Class 3 hospitals are more concentrated in tiers I and II cities, and have more surgeons with a broader range of specialties and a higher degree of technical expertise and experience. Class 2 hospitals are typically regional hospitals that are smaller and provide fewer and less complex services compared to Class 3 hospitals, but also perform certain educational and medical research functions. Class 2 hospitals are typically found in cities throughout China. Class 1 hospitals are the smallest hospitals offering basic medical services. Class 1 hospitals are typically found in small cities throughout China. According to the 2012 China Healthcare Yearbook, of the 21,979 hospitals in China in 2011, there were 1,399 Class 3 hospitals, 6,468 Class 2 hospitals, 5,636 Class 1 hospitals and 8,476 other hospitals.

### **MEDICAL DEVICE INDUSTRY IN CHINA**

The medical device market in China covers all the medical devices on the CFDA device list, the major categories of which include basic medical devices (such as surgical knives and forceps), medical electronic devices (such as patient monitors, ventilators, and anesthesia machines), optic devices (such as endoscopes and microscopes), medical imaging devices (such as X-ray, CT, and ultrasound), low-value consumables (such as suture, needle, syringes, and infusion sets), high-value consumables (such as intraocular lens, stents, and orthopedic

## INDUSTRY OVERVIEW

implants), IVD devices (such as clinical chemistry analyzers, blood gas analyzers, and immunoassay analyzers) and others (such as software, disinfection devices, traditional Chinese medicine devices, and physical therapy devices).

The total size of China's medical device market was RMB242 billion in 2012, with an expected growth of a CAGR of 19.8% in the next five years. The total size of China's medical device market is expected to reach RMB597 billion in 2017.

### MEDICAL CONSUMABLE INDUSTRY IN CHINA

Medical consumables are one of the major categories of medical devices, mainly consisting of high-value consumables and low-value consumables. Medical consumables play a very important role in the overall medical device industry. According to the Ministry of Industry and Information Technology, or the MIIT, there are over 20,000 medical device companies in China, and based on Frost & Sullivan's estimate, about 5,000 of them are manufacturers of medical consumables.

In recent years, China's medical consumables market grew at a double-digit growth rate and reached RMB48 billion in 2012, fostered by factors such as strong government investment in the healthcare industry, substantial development of the public medical insurance system, as well as high disease prevalence resulting from an aging population and changing lifestyle. In 2012, China's medical consumables market accounted for approximately 20% of China's medical device market, with a growth rate slightly higher than that of China's overall medical device market. The medical consumables market is estimated to grow at a CAGR of 19.8% in the next five years, and the market size is expected to reach RMB119 billion in 2017.

#### Key Growth Drivers

Factors that contribute to the growth of the medical consumables industry in China include the following:

- *Aging population.* According to 2010 population census, there were 177 million individuals aged above 60 years old, or 13.3% of the total population in China. The number is growing at a relatively fast pace and is expected to reach 450 million by the end of 2030.
- *Steady economic growth.* As one of the most important economies in the world, China has experienced robust economic growth since the onset of its economic reforms. The Chinese economy is expected to continue its robust growth from 2013 to 2017. In line with the growing economy, per capita GDP of China is growing at a relatively fast pace and is expected to continue its growth momentum.

## INDUSTRY OVERVIEW

- *Expansion in public health investment.* The government encourages the development of private hospitals and is expected to further accelerate the reform and development of general hospitals by investing in healthcare infrastructures and prioritizing the reform of county-level general hospitals. It is estimated that over RMB100 billion will be invested in this public health infrastructure upgrade.
- *Changing lifestyle.* In China, the prevalence of chronic health problems, such as hypertension, diabetes and hyperglycemia, grew rapidly over the last decade and is expected to continue to grow significantly in the future due to the change of lifestyle. For example, the incidence rate of hypertension among adults in Beijing has increased to 33.8%.
- *Expansion of nationwide healthcare insurance.* The healthcare reform program of 2009 aimed to build a nationwide insurance system. By the end of 2012, the coverage of the two urban insurance schemes reached approximately 95% of the total registered urban population, and the NRCMS covered approximately 98% of the total registered rural population. For certain illnesses that require expensive medical procedures, a supplemental medical reimbursement system is in place, which provides a minimum of 50% reimbursement in addition to the basic social medical insurance coverage.
- *Urbanization.* China's rapid economic growth has coincided with its unprecedented urbanization since the 1990s. Because cities often offer better employment prospects, educational opportunities and investment options, together with better living environment as a result of comprehensive transportation, logistics infrastructure and recreational environment, there has been an increasing migration trend to the cities, and hence, leading to the convergence of household income and medical demand of rural dwellers.

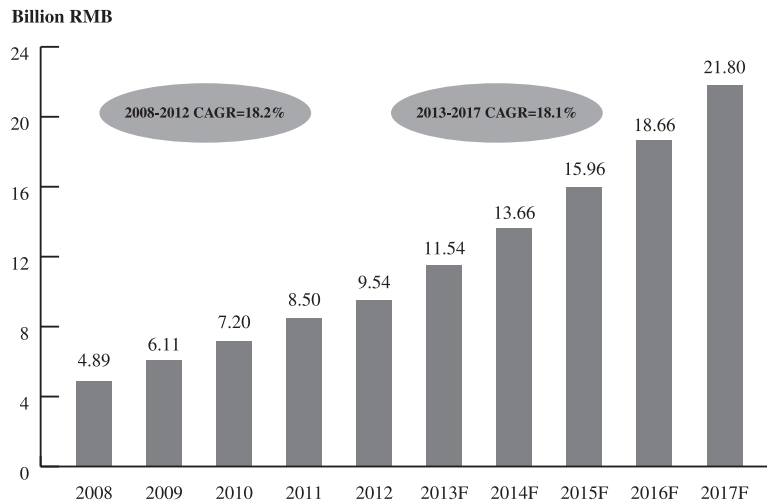
### ORTHOPEDIC IMPLANT INDUSTRY IN CHINA

#### Market Size and Growth

China's orthopedic implant market reached RMB9.54 billion in 2012, with a CAGR of 18.2% from 2008 to 2012. In the next five years, this market is expected to continue to grow at a CAGR of 18.1% and reach RMB21.8 billion in 2017, supported by factors such as an aging population and relatively low penetration rates (particularly in the spine and joint segments) compared to more developed countries. Despite the relatively high growth rate, China's orthopedic implant market remains small compared to developed countries such as the United States, with a market of approximately a quarter the size of that of the United States and per

## INDUSTRY OVERVIEW

capita spending only about 5% of that of the United States based on statistics for 2011. The following chart illustrates the sales revenue of orthopedic implants in China from 2008 to 2012 and the forecast from 2013 to 2017.



Source: Frost & Sullivan database and estimates

In 2012, the market size for tier I cities was RMB3.83 billion, and the market size for tiers II and III and county level cities was RMB5.71 billion. The growth rate in tiers II, III and county level cities, with a CAGR of 20.4% from 2008 to 2012, was much higher than that of tier I cities (15.3%), driven by factors such as larger population in these regions than tier I cities and restrictions in reimbursement policies which only reimburse surgeries performed at local hospitals. The market size for tier I cities is estimated to be RMB7.13 billion in 2017, representing a CAGR of 12.3% from 2013 to 2017, while the market size for tiers II, III and county level cities is estimated to be RMB14.67 billion, representing a CAGR of 20.1% from 2013 to 2017. Due to limited household income and the cap on healthcare reimbursement, domestic brands are more popular in tiers II, III and county level cities as a result of their attractive pricing and improved quality. Therefore, the high growth of tiers II, III and county level cities will contribute to the growth of domestic companies in the next few years.

### Market Composition

According to CFDA registration data, there are approximately 80 domestic companies registered as orthopedic implants manufacturers, of which 40 to 50 companies are actively selling orthopedic products, according to Frost & Sullivan's estimate, and 15 MNCs in China. In 2012, the MNCs had a total market share of 64.3%, with domestic companies having the remaining 35.7%. In recent years, domestic companies have increasingly taken market shares away from the MNCs, driven by price competitiveness, strong local market access, and improved design and quality. For instance, PW Medtech's orthopedic implant products are on average 50.0% less expensive than international brands. In recent years, the market shares of

## INDUSTRY OVERVIEW

MNCs vis-a-vis domestic companies have been affected by the acquisitions of leading domestic companies, such as Kanghui and Trauson (the two largest orthopedic products manufacturers in China, with a collective market share of 9.7% in 2012) by Medtronic, Inc. and Stryker Corporation, respectively, in 2012 and 2013, respectively. Excluding the effect of these acquisitions, orthopedic products of domestic companies experienced a growth trend during the past three years, accounting for collective market shares of 39.7%, 41.4%, 43.1% and 45.4% in 2009, 2010, 2011 and 2012, respectively. In addition, Frost & Sullivan estimates that most domestic companies had market share less than 1.0% in the overall market. The fragmentation of this market presents attractive consolidation opportunities for the market leaders.

As the average gross margin of major domestic orthopedic implant manufacturers was estimated at 69% in 2012, the orthopedic implant business can be categorized as high margin business.

### **Key Growth Drivers**

Key industry drivers contributing to the growth of the orthopedic implant industry in China include: (i) high degenerative disease population caused by aging population or stressful lifestyle; (ii) greater demand for higher quality of life supported by rising income levels; (iii) increasing health insurance coverage; and (iv) improvement of surgical skills.

### **Competitive Landscape of the Orthopedic Implant Industry in China**

Excluding Kanghui and Trauson from the category of “domestic companies,” Shandong Weigao is currently the largest domestic company in China’s orthopedic implant market, with sales revenue of RMB267 million and a market share of 2.8% during the 12 months ended June 30, 2013. Tianjin Zhengtian is the second largest domestic company with sales revenue of RMB196 million and a market share of 2.1% during the same period. PW Medtech ranks the third in domestic companies, with sales revenue of RMB124 million and a market share of 1.3% during the same period, followed by Chunli Zhengda and Suzhou Ideal, with sales revenues of RMB109 million and RMB105 million, respectively, during the same period.

### **Product Portfolio Comparison of Major Domestic Companies**

Orthopedic implant products can usually be segmented into three major categories: trauma, spine and joint. Furthermore, there are about nine sub-categories, covering at least 90.0% of the market demands in terms of volume.

The technologies required to develop and produce these three major categories of orthopedic implant products vary from one another. The entry barrier for orthopedic implants mainly consists of technical and regulatory aspects. The production of orthopedic implants requires a deep understanding of material science, mechanical engineering, biomedical engineering and human anatomy. As orthopedic implants are Class III devices, which are directly regulated by the CFDA, strict technical evaluation and clinical trials are required and

## INDUSTRY OVERVIEW

product registrations, especially for joint products, are difficult to obtain and sometimes may take years. Most domestic orthopedic implant companies only focus on trauma products, and a few companies expanded into spine products in recent years. A wide product coverage generally confers certain market advantages. For example, orthopedic doctors practicing at Class 2 hospitals tend to be generalists and not to focus on a specific type of orthopedic surgery, and therefore, a wide product coverage may increase cross-selling opportunities.

PW Medtech, with a coverage of nine sub-categories, had the widest product coverage among all domestic companies as of the Latest Practicable Date. A majority of the major participants cover trauma and/or spine products. There are also some domestic companies that mainly focus on joint implants, such as Aikang Yicheng and Beijing BaimTec. The following chart illustrates the product coverage of major domestic companies (including Kanghui and Trauson) in China's orthopedic implant market as of the Latest Practicable Date.

	Trauma <sup>(1)</sup>				Spine <sup>(1)</sup>			Joint <sup>(2)</sup>		Segment Coverage
	Intramedullary Rod	Bone Plates	Maxillofacial Plates	Bone Screws	Anterior Fixation System	Posterior Fixation System	Lumber Fusion Cage	Hip	Knee	
PW Medtech	✓	✓	✓	✓	✓	✓	✓	✓	✓	9
Shandong Weigao	✓	✓	✓	✓	✓	✓	✓	✓	✓	9
Kanghui <sup>(3)</sup>	✓	✓	✓	✓	✓	✓	✓	✓	✓	9
Suzhou Xinrong	✓	✓	✓	✓	✓	✓	✓	✓		8
Trauson <sup>(3)</sup>	✓	✓	✓	✓	✓	✓	✓			7
Tianjin Zhengtian	✓	✓	✓	✓	✓	✓		✓		7
Xiamen Dabo	✓	✓	✓	✓	✓	✓	✓			7
Shanghai Puwei	✓	✓	✓	✓		✓		✓	✓	7
Suzhou Ideal	✓	✓	✓	✓	✓	✓	✓			7
Chunli Zhengda					✓	✓	✓	✓	✓	5
Beijing BaimTec								✓	✓	2
Aikang Yicheng								✓	✓	2

*Source: Frost & Sullivan analysis based on data published by the CFDA*

- (1) Each subcategory includes surgical instruments for the respective implants.
- (2) Other joint subcategories such as upper extremity joints represented an insignificant segment of the market in 2012.
- (3) Kanghui and Trauson were acquired by MNCs in 2012 and 2013, respectively.



### Trauma Segment

Trauma implant products currently represent the largest segment of the orthopedic implant market. China's trauma implant market reached RMB3.13 billion in 2012, with a CAGR of 16.6% from 2008 to 2012. Nevertheless, the penetration rate for trauma surgeries remains relatively low. In 2012, the penetration rate (as calculated by dividing the number of people who have undergone surgeries by the number of people who require surgeries) for trauma surgeries in China was 4.9%, compared to 66.0% in the United States. In the next five years, this market is expected to continue to grow at a 15.8% CAGR, and reach RMB6.51 billion in 2017. Excluding impact from the MNCs' recent acquisitions of Kanghui and Trauson, domestic trauma products experienced a growth trend during the past four years, accounting for collective market shares of 50.5%, 53.5%, 56.1% and 60.2% in 2009, 2010, 2011 and 2012, respectively.

Excluding Kanghui and Trauson from the category of "domestic companies," Shandong Weigao is currently the largest domestic company in China, with sales revenue of RMB155 million and a market share of 4.9% in the 12 months ended June 30, 2013. Shandong Weigao's trauma products cover a wide range, and its product quality is widely accepted in Chinese hospitals. PW Medtech is the second largest domestic company in the trauma segment, with sales revenue of RMB89 million and a market share of 2.8% in the 12 months ended June 30, 2013.

### Spine Segment

China's spine implant market reached RMB2.05 billion in 2012, with a CAGR of 20.8% from 2008 to 2012. The penetration rate for spine surgeries is relatively low, estimated at 1.5% in China in 2012, compared to 38.0% in the United States. In the next five years, this market is expected to continue to grow at a 19.8% CAGR, and reach RMB5.06 billion at 2017. Excluding impact from the MNCs' recent acquisitions of Kanghui and Trauson, domestic spine products experienced a growth trend during the past four years, accounting for collective market shares of 26.4%, 27.6%, 30.5% and 33.4% in 2009, 2010, 2011 and 2012, respectively.

Excluding Kanghui and Trauson, Shandong Weigao remains the market leader in domestic companies. Its sales revenue in spine products reached RMB61 million in the 12 months ended June 30, 2013, with a market share of 3.0% in the overall spine segment. Shandong Weigao's products cover anterior and posterior fixation systems, and have high brand awareness among hospitals. Tianjin Zhengtian is the second largest domestic spine product manufacturer with a market share of 2.9% in the 12 months ended June 30, 2013. Beijing Fule ranks the third with a market share of 2.9% and PW Medtech is the fourth largest domestic company with a market share of 1.0% in the 12 months ended June 30, 2013.

### Joint Segment

China's joint implant market reached RMB2.99 billion in 2012, with a CAGR of 22.9% from 2008 to 2012. The penetration rate for joint surgeries remains relatively low, estimated at 0.6% in China in 2012, compared to 43.0% in the United States. In the next five years, this market is expected to continue to grow at a 22.1% CAGR, and reach RMB8.11 billion in 2017. Joint implant products are expected to have the largest market share in the overall orthopedic implant product market by 2017. Innovation capabilities, competitive pricing and wide sales network are among the factors that will help a company gain market share in this segment.

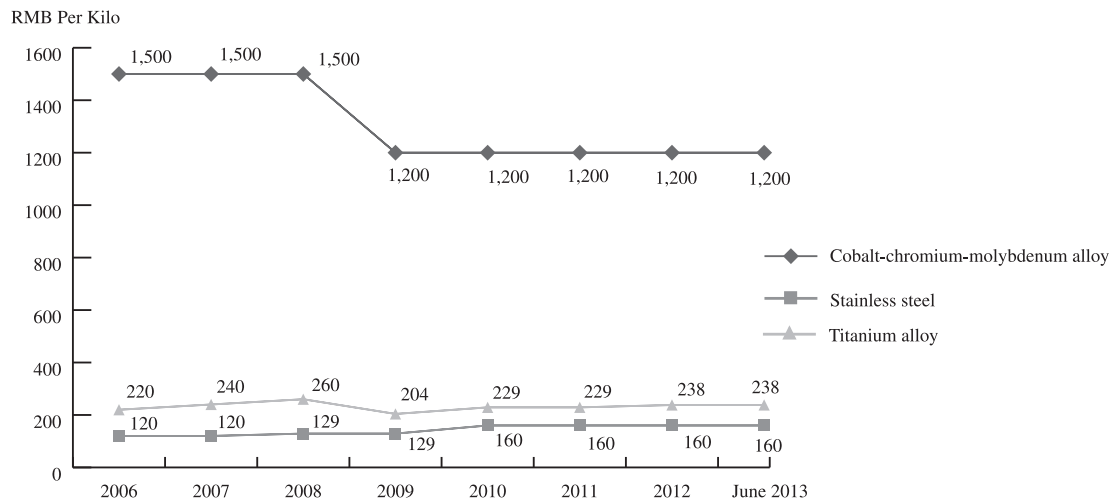
Joint products principally consist of hip and knee implants, which accounted for approximately 95% of all joint implants sold in China in 2012 in terms of sales volume. There is a relatively higher entry barrier for joint products compared with trauma and spine products primarily due to requirements for research and development capabilities and the difficulty to get the registration licenses for joints products. As a result, there are currently a small number of domestic companies in the joint implant market with relatively complete product licenses. The leading domestic companies include Aikang Yicheng and Chunli Zhengda, with 3.0% and 2.6% market shares, respectively, in the 12 months ended June 30, 2013. Other companies with relatively complete product licenses include PW Medtech, Beijing BaimTec, Tianjin Zhengtian and Shandong Weigao. As of the Latest Practicable Date, PW Medtech had the second largest number of registration certificates among major domestic companies in terms of hip and knee implants, the major areas of joint implants, with five registration certificates for hip implants and one for knee implants. Excluding impact from the MNCs' recent acquisitions of Kanghui and Trauson, domestic joint products experienced a growth trend during the past four years, accounting for collective market shares of 25.4%, 26.9%, 28.2% and 29.7% in 2009, 2010, 2011 and 2012, respectively.

Compared with their market share in the trauma implant market, the domestic companies' market shares in the spine and joint implant markets were relatively low in 2012, which is mainly attributable to the fact that most domestic companies mainly focus on trauma products, and that trauma surgeries generally require less expertise and less high-end surgical equipment. As a result, trauma surgeries performed at tiers II, III and county level cities have contributed to the growth in the trauma implant market in recent years, where domestic brands were desired due to their attractive pricing and improved quality. As the national medical insurance is largely established and an increasing number of people can afford the spine and joint implant products, there is also a great growth opportunity for domestic participants in the spine and joint implant markets, particularly at tiers II, III and county level cities.

## INDUSTRY OVERVIEW

### Historical Prices of Major Raw Materials

Based on different clinical needs, orthopedic implants are usually made of different types of metal materials. The most widely used metal materials for orthopedic implants include titanium alloy, medical grade stainless steel and cobalt-chromium-molybdenum alloy. The historical purchasing prices of orthopedic companies' major raw materials were stable. Cobalt-chromium-molybdenum alloy price experienced a slight decline since 2009. The following chart illustrates the historical prices for orthopedic companies' major raw materials from 2006 to June 2013.



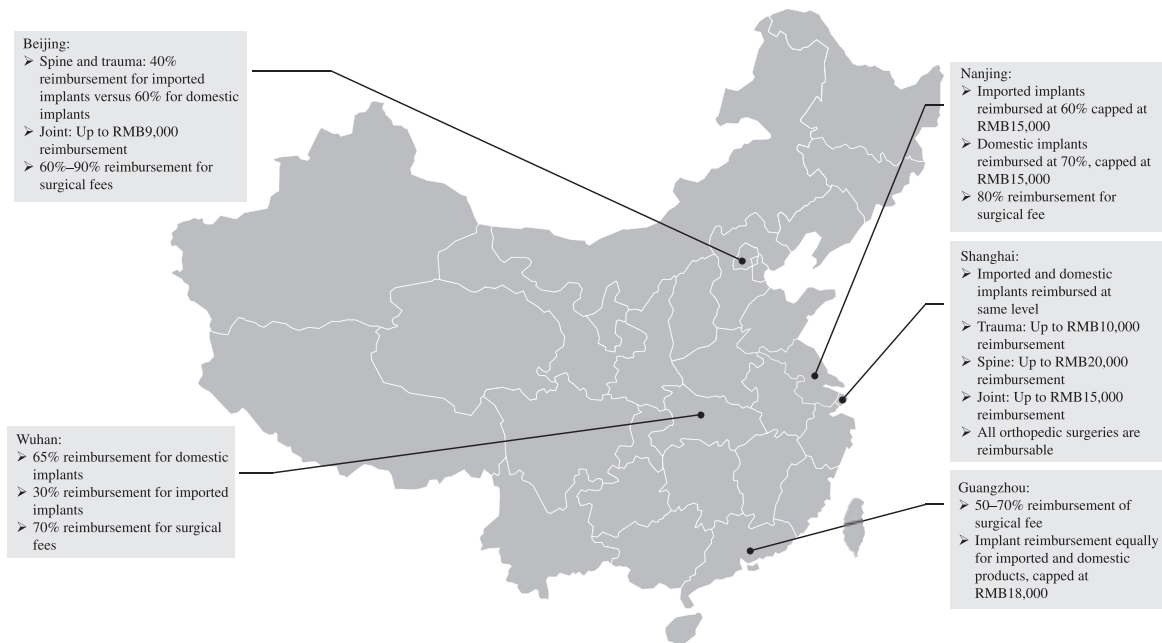
Source: Historical purchasing prices of Walkman Biomaterial, Frost & Sullivan analysis

### Reimbursement Policies in China

Orthopedic implant surgeries, particularly the MNC brands, are relatively expensive for Chinese patients. As a result, health insurance reimbursement is particularly important for Chinese patients in deciding whether to undergo these surgeries and selecting the brand of orthopedic implants. Because Chinese health insurance policies often have a cap on the

## INDUSTRY OVERVIEW

reimbursement amount and insurance coverage often only allows reimbursement for orthopedic surgeries performed in local hospitals, and in light of the improving quality and design of domestic branded implants, many physicians and patients may elect to use domestic branded implants for surgeries to reduce patients' out-of-pocket expenses. The following map shows the reimbursement policies of the cities indicated.



Source: Frost & Sullivan analysis based on interviews

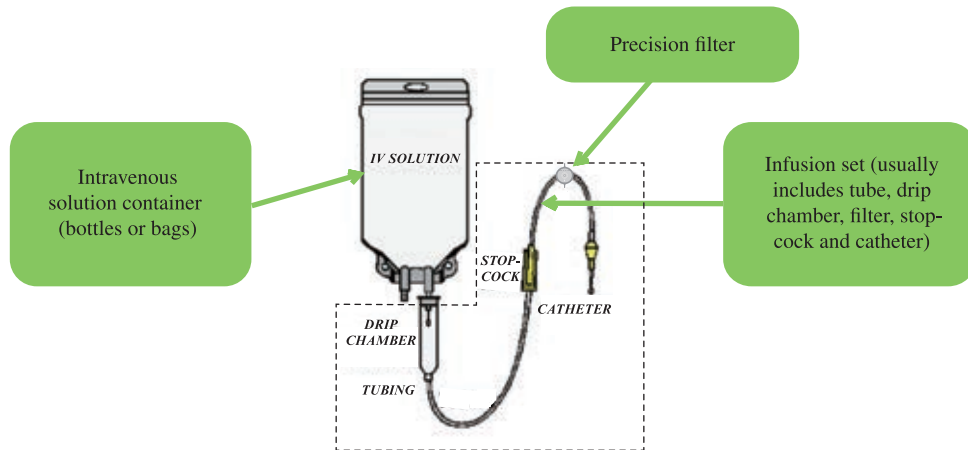
## OVERVIEW OF THE INFUSION SET INDUSTRY IN CHINA

### Introduction of Intravenous Therapy

Intravenous therapy refers to the infusion of therapeutic solution directly into the vein, which is one of the most commonly used therapy methods in the clinical field. Intravenous therapy may be used to correct electrolyte imbalances, deliver medications, transfuse blood or correct dehydration. Intravenous therapy can also be used for chemotherapy. An intravenous

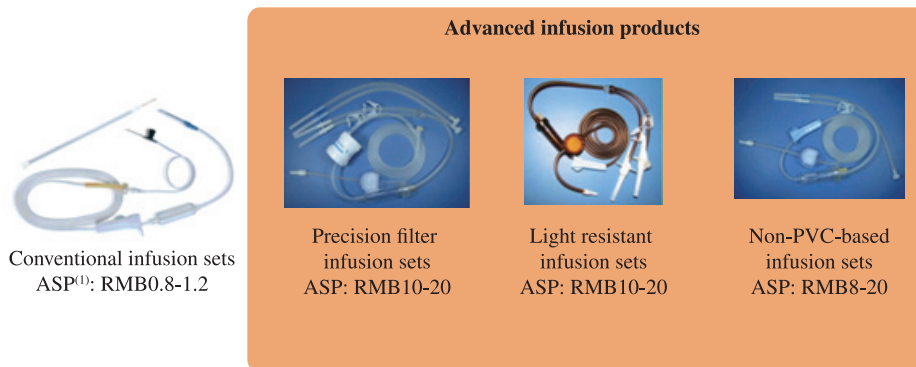
## INDUSTRY OVERVIEW

therapy system usually consists of an intravenous solution container and an infusion set. The following picture illustrates how an infusion set operates in an intravenous therapy system.



### *Types of Infusion Sets*

In China, infusion sets are generally divided into conventional infusion sets, with basic functionalities, and advanced infusion sets, with added functional or safety features. Advanced infusion sets are further divided into precision filter infusion sets, light resistant infusion sets and non-PVC-based infusion sets. The following charts illustrate the classification of infusion sets.



(1) ASP refers to end user average selling price.

Conventional infusion sets use PVC tubing and provide the most basic functionalities, and are currently widely used in China. With the increasing health consciousness and focus on infusion safety, higher quality infusion set products, advanced infusion sets are becoming increasingly more common.

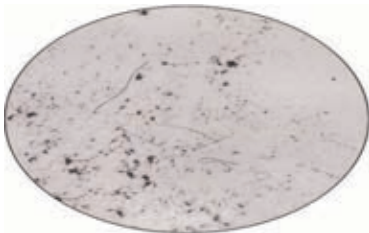
***Precision Filter Infusion Sets***

Intravenous solutions contain insoluble particles. Precision filter infusion sets include precision filters which prevent insoluble particles in intravenous solutions from entering the blood vessels of patients thereby increasing the safety of intravenous infusion therapy. In China, intravenous solutions are manufactured according to a standard which permits insoluble particles with sizes up to 10 microns, allowing insoluble particles with diameter less than 10 microns to enter infusion fluid and subsequently patients' blood vessels. Since human blood vessels have diameters as small as five microns, insoluble particles can block blood vessels, potentially causing pain, inflammation of these blood vessels and long-term damage to organs which receive blood supply from the blocked blood vessels. Precision filter infusion sets can significantly reduce the amount of insoluble particles and improve infusion safety.

The following pictures illustrate typical types of insoluble particles in intravenous solutions.

**Insoluble particles**

*Environmental sources*



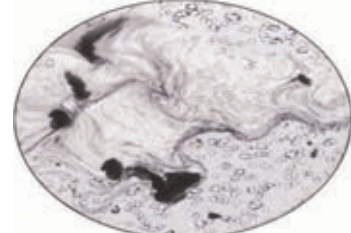
Dust and smog

*Infusion medicine sources*



Insoluble gel from traditional Chinese medicine injection

*Infusion handling sources*



Rubber debris from rubber cap pierced by syringe

Generally, there are three different types of materials being used for precision filters, including PES membranes, nuclepore membranes and fibrous membranes. Fibrous membranes are the most cost-effective solution, but have irregular pore size, poor chemical incompatibility and high drug absorption. PES materials are usually imported and expensive, and have precisely controlled pore size and low drug absorption. Nuclepore membranes have relatively lower cost compared with PES, and also have precisely controlled pore size and low drug absorption. There are currently about 30 manufacturers in China that produce precision filter infusion sets, among which about four use PES membranes, three use nuclepore membranes, and the others mainly use fibrous membranes.

## INDUSTRY OVERVIEW

In many developed countries, precision filtered infusion is required and widely adopted. In the United States, the *Infusion Nursing Standards of Practice*, which are followed by nurses during clinical practice, recommend the use of 0.2 micron filter for non-lipid solutions and 1.2 micron filter for lipid solutions or total nutrient admixtures when necessary. There is still a gap in infusion standard setting between China and developed countries. In 2012, precision filter infusion sets constituted 36.7%, 10.2% and 9.8% of the infusion sets used in Beijing, Guangdong province and Jiangsu province, respectively. In comparison, such infusion sets accounted for only 5.1% of the infusion sets used nationwide in China that year. Although conventional infusion sets currently occupy substantially all of the market in China, as the awareness for infusion safety increases, adoption of precision filter infusion sets is expected to significantly increase.

### *Light Resistant Infusion Sets*

Light sensitive drugs are frequently used in the clinic field, which include the following major categories: sodium nitroprusside, dihydropyridines, vitamins, thiazide, and quinolones. Light sensitive drugs will decompose when exposed to light, and cause serious safety problems. Therefore, when light sensitive drugs are used for intravenous therapy, specially designed infusion containers and infusion sets become necessary. Currently in China, due to relatively high cost, light resistant infusion sets are not widely used in many low tier cities and county areas. In these areas, physicians sometimes use alternative methods, such as administering intravenous therapy in dark rooms or using black curtain to cover infusion sets, but all these methods have potential risks. With the increasing safety awareness, it is expected that the light resistant infusion set market will continue to grow in the next few years.

### *Non-PVC-based Infusion Sets*

PVC is a plastic polymer that is used in a wide array of products. Unplasticized PVC is hard and brittle at room temperature. A plasticizer (softener) is typically added to increase the flexibility of the polymer. DEHP (di(2-ethylhexyl)phthalate) is the plasticizer for most PVC medical devices, including infusion bags and infusion sets.

DEHP can leach out of plastic infusion bags and infusion sets to enter solutions that come in contact with the plastic. The amount of DEHP that will leach out depends on the temperature, the lipid content of the liquid, and the duration of contact with the plastic. Seriously ill individuals often require more intravenous therapy, thus exposing themselves to even higher levels of DEHP.

Exposure to DEHP has produced a range of adverse effects in laboratory animals, of which the greatest concern is the harmful effects on the development of the male reproductive system and production of normal sperm in young animals. In view of the animal data available, precautions should be taken to limit the exposure of the developing male to DEHP. PVC

## INDUSTRY OVERVIEW

materials also have other disadvantages. For example, PVC infusion tubing absorbs active substances (such as nitroglycerin) in infusion fluids to varying degrees, reducing the amount of medicine that actually reaches the human body.

Since the U.S. FDA released the *Safety Assessment of DEHP Released from PVC Medical Devices*, companies began seeking alternative materials. In recent years, TPE (thermoplastic elastomers) materials gradually became the alternative materials for PVC.

TPE materials, also referred to as thermoplastic rubbers, are a class of copolymers consisting of materials with both thermoplastic and elastomeric. There are mainly six generic types of commercial TPEs, namely, styrenic block copolymers (TPE-s), polyolefin blends (TPE-o), elastomeric alloys (TPE-v or TPV), thermoplastic polyurethanes (TPU), thermoplastic copolyester (TPC) and thermoplastic polyamides. Among these commercially available TPE materials, some medical-grade TPU materials have been customized for the medical market and meet the requirements of the U.S. FDA-modified ISO 10993 Part 1 “Biological Evaluation of Medical Devices” tests for 30-day indirect blood contact applications, suitable for use in infusion sets. ISO 10993 is also the same standard that the U.S. FDA used to evaluate the health hazards of DEHP released from PVC-based medical devices.

Currently in China, due to their relatively high cost, TPE materials are not widely used in infusion sets, and as of the Latest Practicable Date, only three companies were approved by the CFDA to manufacture TPE-based infusion sets (namely, Shandong Weigao, PW Medtech and Shandong Shinva), and among them, only PW Medtech used medical-grade TPU materials that meet the abovementioned U.S. FDA test, which provides PW Medtech greater competitive advantage in China and the global market.

### **Market Size and Growth**

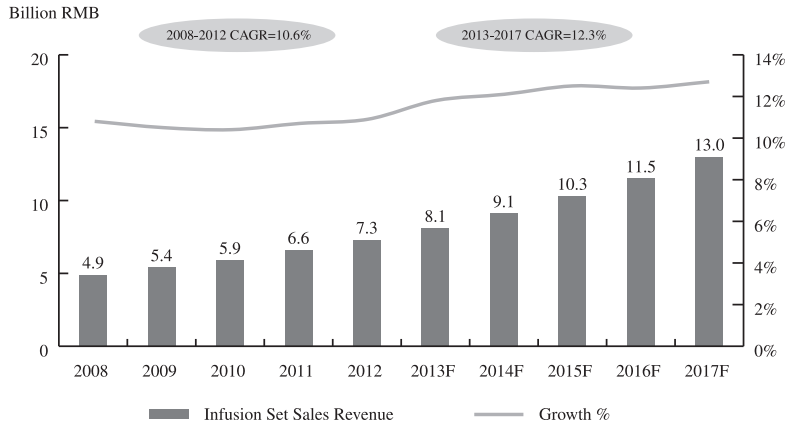
China is the largest market for infusion sets in the world. There is a wide belief among physicians and patients in China that intravenous therapy is more effective and quicker than oral ingestion.

Infusion set consumption is expected to maintain a CAGR of 8.9% in the next five years. In 2012, the total infusion set consumption was 7.9 billion units, and it is expected to reach 12.2 billion units by the end of 2017. Sales of infusion sets grew at a double-digit rate in the past years, and is expected to continue to grow at a similar rate in the next several years because an increasing number of low-end products will gradually be replaced by advanced infusion products. In 2012, the total sales revenue was RMB7.3 billion, and it is expected to



## INDUSTRY OVERVIEW

reach RMB13.0 billion by the end of 2017. The following chart illustrates the sales revenue of infusion sets in China from 2008 to 2012 and the forecast from 2013 to 2017.

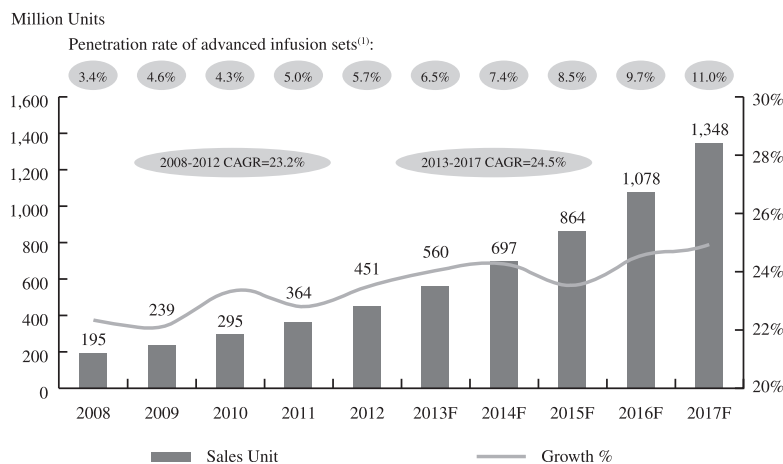


Source: Frost & Sullivan estimates

### Advanced Infusion Set Market in China

#### Market Size and Growth

China's advanced infusion set market has grown at a double-digit rate from 2008 to 2012, and is expected to continue to grow in the next several years due to a number of positive factors. In 2008, the total size of China's advanced infusion set market was 195 million units, which increased to 451 million units in 2012, representing a CAGR of 23.2%. The market is expected to grow at a CAGR of 24.5% in the next five years and reach 1,348 million units in 2017. The following chart illustrates the sales volume, growth and penetration rate of the advanced infusion set industry in China from 2008 to 2012 and the forecast from 2013 to 2017.



Source: Frost & Sullivan estimates

- (1) Penetration rate of advanced infusion sets is calculated by dividing the sales volume of advanced infusion sets by the overall sales volume of infusion sets in China for the corresponding years.

## INDUSTRY OVERVIEW

In 2012, advanced infusion sets had approximately 5.7% of sales volume in the overall infusion set market, compared to 38.2% in tier I cities of China, which have historically been leaders in China in adopting new medical technologies. As a result, China's advanced infusion set market is expected to grow at a CAGR of 24.5% in the next five years. Frost & Sullivan estimates that the advanced infusion sets will have approximately 11.0% market share in the overall infusion set market by 2017.

As the average gross margin of major domestic manufacturers of advanced infusion sets was estimated at 64% in 2012, the advanced infusion set business can be categorized as high margin business.

Similar to the orthopedic implant industry, the entry barrier for advanced infusion sets mainly consists of technical and regulatory aspects. The production of advanced infusion sets requires deep understanding of polymer materials, mechanical design, as well as know-how such as temperature control, plastic formula and co-extrusion molding skills. Advanced infusion sets are also Class III devices and directly regulated by the CFDA, and therefore, strict technical evaluation and clinical trials are required and product registrations are difficult to obtain and sometimes may take years.

### ***Key Growth Drivers***

The following is a summary of key growth drivers in China's advanced infusion set market.

- *Increasing health awareness about infusion safety.* Efforts on educating the patients and doctors about the medical hazards associated with intravenous therapy due to insoluble particles in intravenous solutions support the usage of precision filter infusion sets. According to Frost & Sullivan, patients pay increasingly more attention to infusion safety.
- *Rising income.* Per capita annual disposable income in urban households rose from RMB15,781 in 2008 to RMB24,565 in 2012, and is expected to reach RMB46,815 in 2017.
- *Increasing government focus on PVC risks.* The PRC government has increasingly focused on safety issues relating to PVC-based infusion bags. The CFDA has listed PVC infusion bags as obsolete products. Although the PVC-based infusion bags will not be phased out immediately, they are expected to account for an increasingly small proportion in infusion bags in the future. The phasing-out of PVC-based infusion bags represents a significant precursor to the potential phasing-out of PVC-based infusion sets.

## INDUSTRY OVERVIEW

- *Product innovation.* The infusion set industry is experiencing a period of significant product innovation. To meet the increasing needs of Chinese patients for safe medical products, industry participants are broadening their product lines to include new features and products such as light resistance, auto air venting and non-PVC-based infusion sets. The expanded infusion set product portfolio available on the market is expected to further drive demand.

### *Competitive Landscape*

In addition to PW Medtech, leading market players in China's infusion set industry include the following:

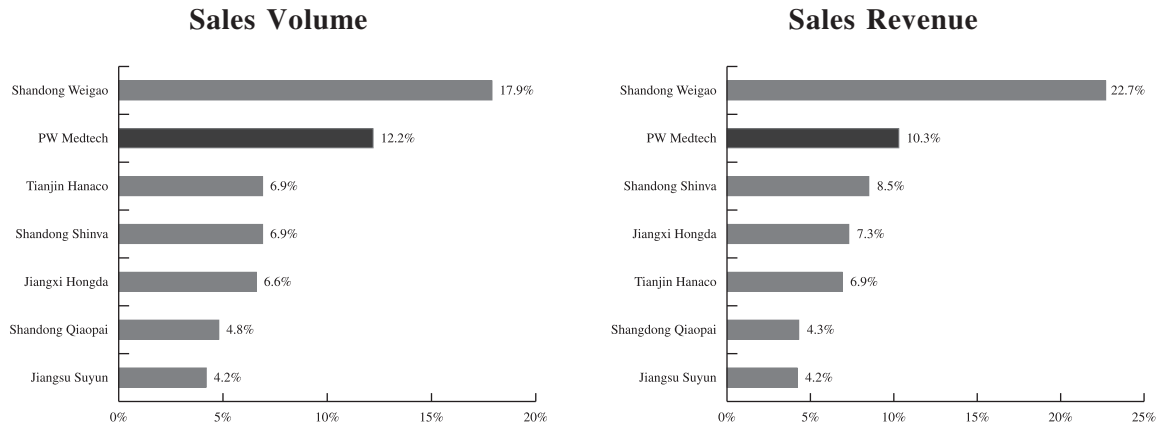
- *Shandong Weigao* is a large medical device manufacturer and a public company listed on the Stock Exchange, which produces infusion sets, syringes and needles, orthopedic products and disinfection products. In 2012, its total sales revenue for infusion sets reached RMB530.8 million.
- *Shandong Shinva*, which mainly produces infusion sets and other medical plastic products, is a subsidiary of Shandong Shinva Group. Shandong Shinva has good brand awareness in the north China region. It is also one of the three companies with the capability of producing all of the precision filter, light resistant and non-PVC-based infusion sets.
- *Jiangxi Hongda* is one of the largest manufacturers of conventional infusion sets products. It commenced the production of advanced infusion products several years ago.
- *Shandong Qiaopai* is also one of the largest manufacturers of conventional infusion sets products. A significant portion of its products are made for international markets, but it also has significant market share in the domestic market. Shandong Qiaopai produces both precision filter and light resistant infusion sets.
- *Jiangsu Suyun* is a large infusion sets manufacturer located in southeast China, and its products mainly supply east China and south China provinces. Jiangsu Suyun can produce both precision filter and light resistant infusion sets, and similar to Shandong Qiaopai, about 30% of its products are made for international markets.

Shandong Weigao led China's advanced infusion set market with a market share of 17.9% in terms of sales volume and 22.7% in terms of sales revenue in 2012. PW Medtech ranked the second with a market share of 12.2% in terms of sales volume and 10.3% in terms of sales revenue in 2012, which was also significantly greater than the market shares of other domestic brands. Shandong Weigao has generated a higher portion of revenue from direct sales to hospitals, which contributed to a higher market share in terms of revenue than its market share in terms of sales volume. In Beijing, a leading city in adopting new medical technology and a

## INDUSTRY OVERVIEW

bellwether for the national market trend, PW Medtech ranked first with a market share of 49.5% in terms of sales revenue in 2012. Other top five players in the Beijing market include Shandong Weigao, Tianjin Hanaco, Shandong Shinva and Jiangxi Hongda, with market shares of 19.3%, 9.6%, 7.5% and 4.6%, respectively, in 2012. There are a total of approximately 40 players in the advanced infusion set market.

The following charts illustrate the ranking of major players in China's advanced infusion set market in terms of sales volume and sales revenue, respectively, in 2012.



*Source: Frost & Sullivan analysis based on public data and interviews*

### Precision Filter Infusion Set Market

Precision filter infusion sets had significant market share in China's advanced infusion set market, with total sales reaching 360 million units in 2012 and a CAGR of 22.8% from 2008 to 2012. The market size of precision filter infusion sets is expected to reach 1,061 million units in 2017, representing a CAGR of 24.2% for the period from 2013 to 2017, which is much higher than the growth rate of the overall infusion set market.

The ranking of key players in the precision filter infusion set market is the same as that in the advanced infusion set market. Shandong Weigao is still the market leader, with a market share of 17.6% in terms of sales volume in 2012. PW Medtech ranked the second with a market share of 14.1% in 2012, followed by Tianjin Hanaco, Shandong Shinva and Jiangxi Hongda.

### Light Resistant Infusion Set Market

The market size for light resistant infusion sets in China increased from 15.7 million units in 2008 to 37.8 million units in 2012, and is expected to reach 114.4 million units in 2017, representing a CAGR of 24.7% during this ten-year period. Key players in this market include Shandong Weigao, Jiangxi Hongda, Tianjin Hanaco and Shandong Qiaopai.

### Non-PVC-based Infusion Set Market

Sales of non-PVC-based infusion sets in China reached 53.3 million units in 2012 after growing at a CAGR of 25.9% from 2008 to 2012. There remains considerable room for growth opportunity as the penetration rate for the consumption of non-PVC-based infusion sets (as calculated by dividing the consumption volume of non-PVC-based infusion sets by the overall consumption volume of infusion sets) was merely 0.7% in China in 2012, compared to 80.0% in the United States. The market size of non-PVC-based infusion sets is expected to reach 172.5 million units in 2017, representing a CAGR of 26.5% for the period from 2013 to 2017. The ranking of key players in the non-PVC-based infusion set market is the same as that in the overall advanced infusion set market, with Shandong Weigao as the market leader and PW Medtech ranking the second in terms of sales volume in 2012.

Globally, the principal growth driver for non-PVC-based infusion sets is the increasing government endorsement. For instance, in the United States, the Center for Drug Evaluation and Research (CDER) is aware of the potential human health risks associated with exposure to dibutyl phthalate (DBP) and DEHP. Therefore, the latest industry guidance published by the U.S. FDA recommends that companies in pharmaceutical industry avoid the use of these two special phthalates as excipients in CDER-regulated drug and biological products, including prescription and non-prescription products. Although this guidance does not impose any legally enforceable obligations, it nonetheless has significant impact on the practice of all pharmaceutical companies.

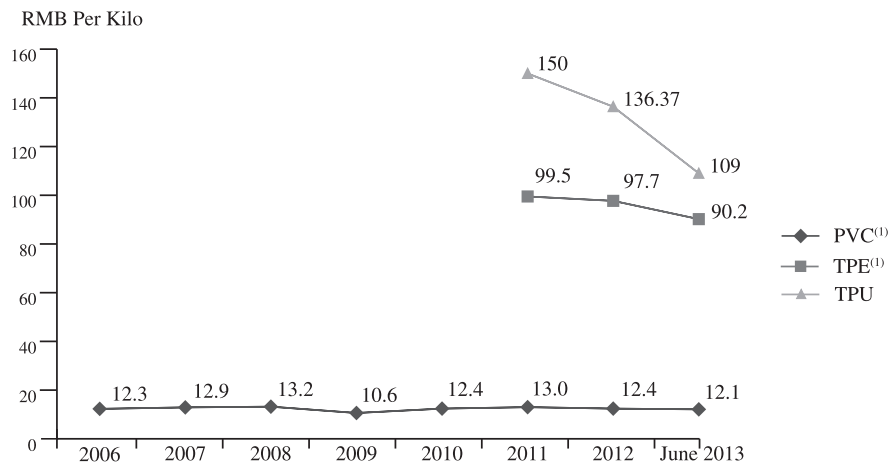
In addition, a number of international regulatory authorities have begun taking steps to more closely regulate certain phthalates. For example, the United States prohibits the use of DBP, DEHP and BBP (another phthalate) in children's toys with concentrations higher than 0.1% under Consumer Product Safety Improvement Act of 2008. The U.S. FDA's Center for Device and Radiological Health issued recommendations regarding minimizing exposure to PVC-based devices containing DEHP. The European Commission identifies DBP, DEHP and BBP as reproductive toxicants (Directive 2005/84/EC), and the European Union prohibits their use as ingredients in cosmetics (Directive 2005/90/EC).

Guidance promulgated by the CFDA in 2000 recommended against the use of PVC material for infusion bags in China. Although this guidance imposed no legally enforceable obligations, according to Frost & Sullivan's interviews, no new PVC-based infusion bag production lines have been approved since 2000, and many domestic companies have shifted to introduce non-PVC-based infusion bag production lines after that. Currently in the United States, more than 80% of infusion sets use DEHP-free plastic materials (non-PVC materials), while in China, less than 5% of infusion sets are made of DEHP-free materials. Relatively lower public awareness of the harmful effects of DEHP material compared to developed countries, product affordability and limited reimbursement coverage are the major restraints of the wide acceptance of DEHP-free materials in China.

## INDUSTRY OVERVIEW

### Historical Prices for Major Raw Materials

Infusion sets are made of plastic, and the major raw materials include PVC, TPE and TPU. Infusion set companies' historical purchasing price of PVC was stable during the Track Record Period, while the historical purchasing price of TPE and TPU was on the decline. The following chart illustrates the historical prices for infusion set companies' major raw materials from 2006 to June 2013.



Source: Fert Technology's historical purchasing data, TPE open market trading data, PVC open market trading data

- (1) As PVC and TPE each contains several hundreds of types, the selling price of Dupont TPE and the average selling price of domestic manufactured medical-grade PVC are used as a benchmark, respectively. Fert Technology did not manufacture non-PVC-based infusion sets prior to 2011 and the selling prices of TPE and TPU for earlier periods are not included.

### ABOUT THIS SECTION

This "Industry Overview" section contains information extracted from a commissioned report, or the F&S Report, prepared by Frost & Sullivan for purposes of this prospectus. We expect to pay a total of RMB700,000 to Frost & Sullivan for the preparation and use of the F&S Report, of which RMB630,000 was already paid and the remaining RMB70,000 is payable by November 2013.

### Research Methodology

Frost & Sullivan has refined its research methodology over years of experience, having researched diverse markets in different life cycles, from the embryonic to mature. Frost & Sullivan's market engineering system focuses on "T.E.A.M.": Technical, Econometric, Applications and Market. Frost & Sullivan collects market information through bottom-up and

## INDUSTRY OVERVIEW

top-down method and use different information sources to cross check with each other to increase reliability of market data. Frost & Sullivan uses desk research, primary interview to different stake holders and their internal database as major data source of its industry report.

### **Market Engineering Forecasting Methodology**

This methodology integrates several forecasting techniques with the market engineering measurement-based system. It relies on the expertise of the analyst team in integrating the critical market elements investigated during the research phase of the project. These elements include (i) expert-opinion forecasting methodology, (ii) integration of market drivers and restraints, (iii) integration with the market challenges, (iv) integration of the market engineering measurement trends, and (v) integration of econometric variables.

Based on its forecasting methodology, Frost & Sullivan forecasted the medical device market and various segment markets from 2013 to 2017 based on the following five steps:

- (i) Conduct analysis of the medical device market and various segment markets with respect to production capacity and trade;
- (ii) Conduct interviews and analysis of downstream industries with respect to technology, customers' affordability and production capacity;
- (iii) Conduct interviews and analysis of government regulations and industry policies;
- (iv) Forecast the demand of downstream industries in key applications according to the interviews and database of Frost & Sullivan; and
- (v) Combine step (i), step (ii), step (iii) and step (iv), and work out market forecast for the medical device market and various segment markets.

### **About Frost & Sullivan**

Frost & Sullivan is an independent industry consultant founded in 1961 which has over 35 global offices and employs over 1,800 analysts and experts worldwide. The firm covers a number of industries, including aerospace, defense, automotive, transportation, chemicals, energy and power systems, environmental technologies, electronics, information and communication technologies and healthcare.