



Tiangong International – “Die” Steel

February 15, 2022

The Basics		Emerson Analytics Forecast
Ticker:	0826.HK	Target Price: HK\$1.33 (-67.1%)
Recent Price:	HK\$4.04	
Market Cap:	HK\$11.3bn	

Tiangong is a Hong Kong-listed manufacturer of die steel (DS) and high-speed steel (HSS) based in Zhenjiang of Jiangsu province. It bragged to have grown its revenue by 52% in the five years to 2020 while profit surged 6.4x.

However, our investigation shows that it has consistently overstated its DS production volume, with 2020 real output at about 100k tons rather than the reported 181,7k tons. We base our estimate on (i) interview with an ex-staff, (ii) its subsidiary’s filing and (iii) careful deductions from its consumption of key raw materials.

Tiangong’s DS gross profit per ton (unit GP) for 2020 was 2.7x of its peer. But two separate well-placed sources suggested that its real unit GP was 45% below the Rmb3,636 per ton claimed by the company.

We reckon that the company exaggerated its DS gross profit by 2.6x and that, all else being equal, real EBIT was only 33% of reported amount for 2020.

Generously assuming unchanged valuation benchmarks, we believe the stock would drop correspondingly to about HK\$1.33 per share. Strong Sell.

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Disclaimer

We are a group of seasoned equities analysts with many years of experience in the research of economic and political trends as well as individual stocks around the world. With background in various international investment banks, we have followed the development of the Chinese equities market right from day one.

We are determined to expose as much of the fraud in the Chinese stock market as we can. The most widespread and serious fraud is probably that undertaken by listed companies, in fabricating non-existent businesses and stealing shareholders money, among other tricks.

In exposing these crimes we challenge the listed companies to prove the integrity of their announcements and financial statements. The listed companies, of course, want everybody to believe that their announcements and financial statements are true. Their auditors, employees, independent directors, lawyers, shareholders and even the general public all hope that these announcements and financial statements are true.

We have made our best effort to ascertain that everything we say in this report is accurate. We have obtained our information from public sources that we believe to be accurate and reliable, or from sources whom we believe are not insiders or connected parties to the companies mentioned herein. However, we are certainly NOT in the business of making investment recommendations. This is not an investment report and should not be regarded as such. Read and use our reports at your own risk. Most important of all, DO YOUR OWN RESEARCH BEFORE YOU COMMIT OTHER PEOPLE’S MONEY.

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Part 1 EBIT Margins Far Superior to Those of Peers

Tiangong International Company Limited (0826.HK, 天工國際有限公司, Tiangong) is a manufacturer of special steel and cutting tools based in Zhenjiang city in Jiangsu province. Listed on the Hong Kong stock market since July 2007, the company is now held 28.0% by Zhu Xiaokun (朱小坤) and 24.1% by his son, respectively, for a combined control of 52.1%.

According to Tiangong’s announcements, that company’s revenue grew 52% during the 2015 to 2020 period, from Rmb3.4bn to Rmb5.2bn. At the same time, profit attributable to shareholders surged 6.4 times, from Rmb73m in 2015 to Rmb537m in 2020. Broadly speaking, Tiangong’s stock price lagged the profit growth moderately, jumping about 4.8x from the beginning of 2016 to the end of 2020. During 2021, the stock surged 42%.

Our analysis and investigations, however, reveal that the company has engaged in serious financial fraud in the last few years. The die steel business, Tiangong’s most important revenue contributor, has actually done barely half of the production volume declared by the company, and its profitability has also been grossly exaggerated. Tiangong’s real earnings before interest and tax (EBIT) in 2020 was about 67% below reported.

1.1 Adjusting Revenue and Gross Profit of High-speed Steel Segment

Exhibit 1 below shows the revenue, gross profit and gross margin breakdown of the various divisions of Tiangong. DS stands for die steel, which is mainly used in making molds. HSS stands for high-speed steel, and is mainly used in making cutting tools. Both belong to the realm of tool steel. From 2016, the cutting tools segment covers carbide cutting tools, in addition to the traditional HSS cutting tools. The titanium alloy business is undertaken by Jiangsu Tiangong Technology Co., Ltd. (江蘇天工科技股份有限公司, TG Technology), a subsidiary of Tiangong listed on the National Equities Exchange and Quotations System.

The gross profit numbers are calculated by Emerson Analytics based on the revenues and the gross margins announced by the company. Note that during 2015-18, internal sales of the HSS segment were recorded at cost, resulting in zero gross profit for its inter-segment sales, despite the proclamation in every annual report during 2015-20 that “inter-segment revenue is priced with reference to prices charged to external parties for similar orders”.

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Exhibit 1 – Tiangong revenue and gross profit breakdown

Year ended Dec 31 (Rmb m)	2015	2016	2017	2018	2019	2020
Revenue						
DS	1,018	1,262	1,686	2,098	2,215	2,351
HSS						
- External sales	679	395	654	782	791	776
- Inter-segment sales	236	341	109	243	298	493
Cutting tools	515	528	530	581	657	875
Titanium alloy	173	234	168	245	322	170
Trading of goods	1,045	956	859	1,315	1,385	1,049
Total	3,429	3,376	3,898	5,022	5,370	5,221
Gross margin						
DS	15.2%	15.7%	16.3%	18.2%	25.9%	28.1%
HSS	19.4%	18.6%	19.1%	20.6%	25.0%	28.1%
Cutting tools	15.4%	12.2%	13.8%	13.9%	16.3%	18.9%
Titanium alloy	13.6%	14.6%	14.4%	15.2%	20.3%	18.2%
Trading of goods	0.20%	0.20%	0.20%	0.00%	0.04%	0.04%
Gross profit						
DS	155	198	275	382	574	661
HSS						
- External sales	132	74	125	161	198	218
- Inter-segment sales	0	0	0	0	75	139
Cutting tools	79	64	73	81	107	165
Titanium alloy	24	34	24	37	65	31
Trading of goods	2	2	2	0	1	0
Total	391	372	499	661	1,019	1,214

Sources: Tiangong and Emerson Analytics

We recalculate gross profit of the HSS and cutting tools segments to better reflect their underlying profitability. To illustrate this adjustment with the 2015 data, we can calculate that HSS achieved inter-segment sales of Rmb292m (= 236 / (1 – 19.4%)) based on the 19.4% gross margin for external sales rather than the Rmb236m reported. The extra Rmb57m (= 292 x 19.4%) is, therefore, the theoretical gross profit for internal sales. Accordingly, the downstream cutting tools segment’s actual gross profit in 2015 was Rmb57m less.

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Exhibit 2 – Adjusted revenue and gross profit for HSS and cutting tools segments

Year ended Dec 31 (Rmb m)	2015	2016	2017	2018	2019	2020
Revenue						
HSS	971	814	790	1,087	1,089	1,269
- External sales	679	395	654	782	791	776
- Inter-segment sales	292	419	135	305	298	493
Cutting tools	515	528	530	581	657	875
Gross profit						
HSS	188	151	151	224	272	356
- External sales	132	74	125	161	198	218
- Inter-segment sales	57	78	26	63	75	139
Cutting tools	23	-14	47	18	107	165
Gross margin						
HSS	19.4%	18.6%	19.1%	20.6%	25.0%	28.1%
Cutting tools	4.4%	-2.6%	8.9%	3.1%	16.3%	18.9%

Source: Emerson Analytics

Tiangong discloses the HSS sales volume to external customers but not those for internal use. Dividing the adjusted inter-segment sales in Exhibit 2 by the average selling price (ASP) to external customers, we can calculate the inter-segment sales volume for the relevant years. For 2020, with an external ASP of Rmb34,163 per ton and adjusted inter-segment sales of Rmb493m, we can calculate that inter-segment sales volume amounted to 14.4k tons (= 493 x 1,000 / 34,163). Together with the external sales, total sales volume in 2020 amounted to 37.1k tons.

Exhibit 3 – HSS sales volume

Year ended Dec 31	2015	2016	2017	2018	2019	2020
External sales (Rmb m)	679	395	654	782	791	776
External sales volume (k tons)	22.8	16.8	23.5	24.6	24.6	22.7
External ASP (Rmb/ton)	29,765	23,516	27,849	31,789	32,159	34,163
Adjusted inter-segment sales (Rmb m)	292	419	135	305	298	493
Inter-segment sales volume (k tons)	9.8	17.8	4.9	9.6	9.3	14.4
Sales volume (k tons)	32.6	34.6	28.4	34.2	33.9	37.1

Sources: Tiangong and Emerson Analytics

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Exhibit 4 below summarizes sales volume and ASP for DS and HSS over the last few years. The production of DS and HSS is undertaken by Tiangong Aihe Special Steel Co., Ltd. (天工愛和特鋼有限公司, TG Aihe) and Jiangsu Tiangong Tools New Materials Co., Ltd. (江蘇天工工具新材料股份有限公司, TG Tools)¹, respectively².

Year ended Dec 31	2015	2016	2017	2018	2019	2020
Revenue (Rmb m)						
DS	1,018	1,262	1,686	2,098	2,215	2,351
HSS	971	814	790	1,087	1,089	1,269
Sales volume (k tons)						
DS	91.5	122.7	137.3	148.6	169.6	181.7
HSS	32.6	34.6	28.4	34.2	33.9	37.1
ASP (Rmb/ton)						
DS	11,124	10,285	12,283	14,119	13,062	12,940
HSS	29,765	23,516	27,849	31,789	32,159	34,163

Sources: *Tiangong and Emerson Analytics*

Exhibit 5 below presents the reports submitted by the two companies August 25, 2020 to Zhenjiang Bureau of Ecology and Environment (Zhenjiang BEE) on their *Plan for Inter-provincial Transfer of Solid Wastes* (固體廢物跨省轉移實施方案), which corroborate with the annual report disclosures. Note that some websites in this report, including the Zhenjiang municipal government website below, cannot be accessed outside mainland China.

¹ Renamed from Jiangsu Tiangong Tools Co., Ltd. (江蘇天工工具有限公司) November 30, 2021

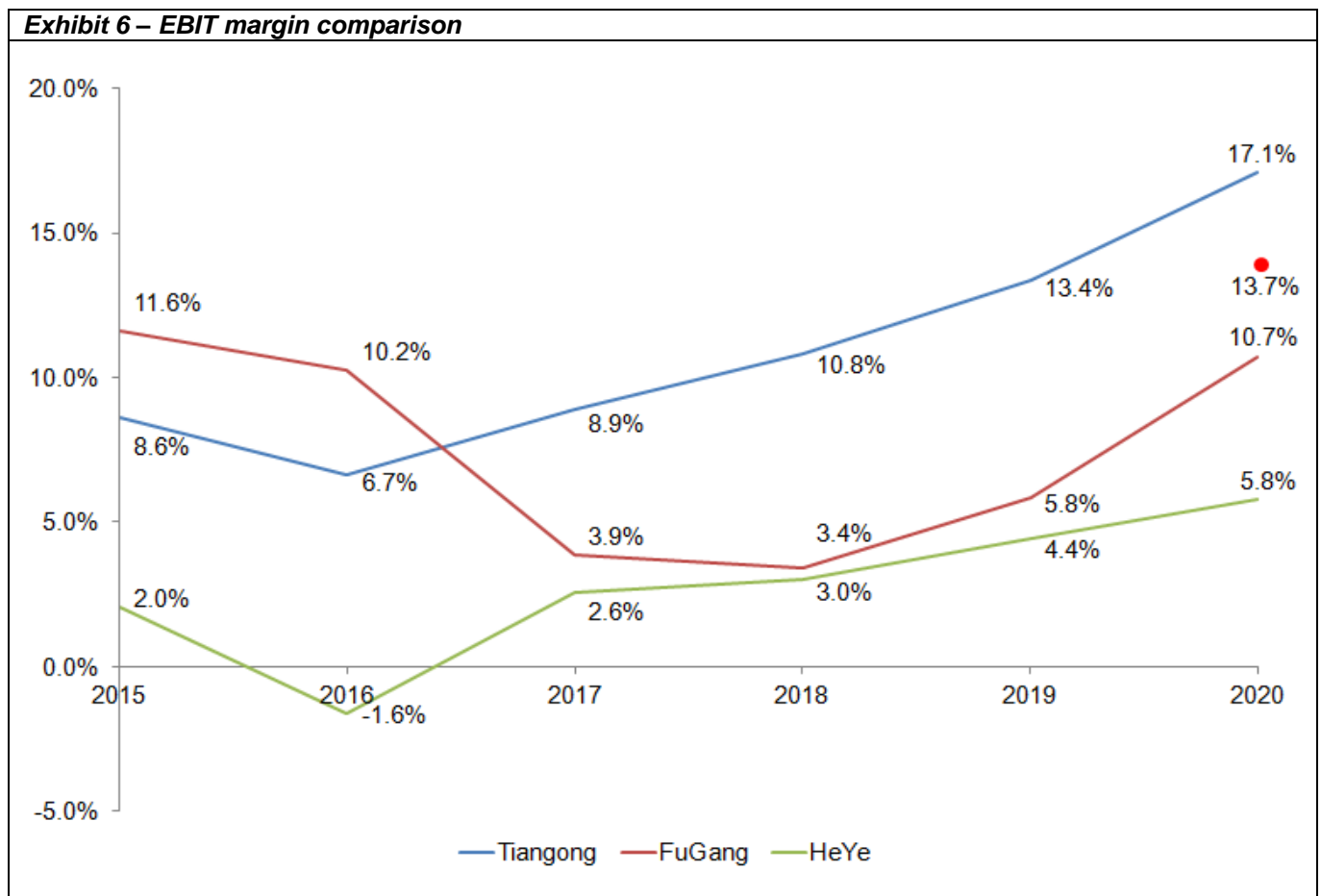
² Tiangong 2020 annual report, p.149

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enterprise located some 25km from Tiangong. These two Chinese HSS leaders are technologically strong with high quality products.

Baowu Special Metallurgy and Jiangsu Fuda are both unlisted, nor are they part of any listed companies. We are therefore unable to obtain relevant data for peer comparison purpose. As a result, we are using FuGang and HeYe for comparison with Tiangong. The comparison necessitates a degree of estimates for HeYe’s profitability based on various assumptions and raw data from AT&M’s disclosures. These can be found in [Appendix](#).

Exhibit 6 below compares the EBIT margins of the three companies during 2015-2020. For Tiangong, we have excluded trading of goods from our calculations, as this division contributed a huge amount of revenue with almost non-existent profit. In 2020, Tiangong reported overall EBIT margin of 13.7% including the trading of goods division. Excluding this trading division, the adjusted EBIT margin was 17.1%.



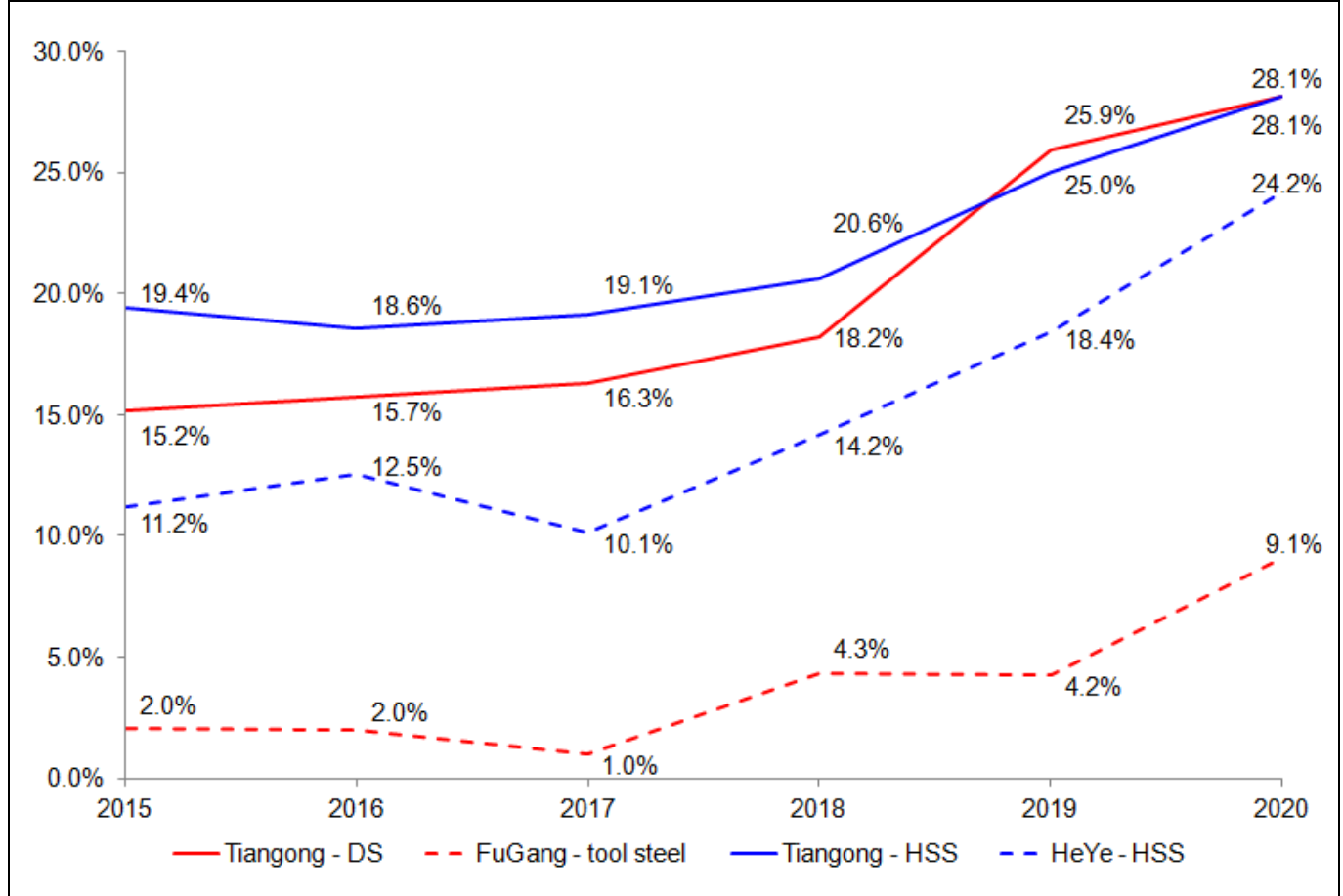
Sources: Tiangong, FuGang, HeYe and Emerson Analytics

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It can be seen that prior to 2017, Tiangong’s EBIT margins were between those of FuGang and HeYe. Subsequently, its EBIT margins were far higher than those of its peers. In 2020, Tiangong’s EBIT margin was 6.4 percentage points higher than that of FuGang and 11.3 points higher than that of HeYe.

Exhibit 7 below compares their gross margins. FuGang’s tool steel focuses on DS with some HSS business. We can see that Tiangong’s DS gross margins were far higher than those of FuGang’s tool steel business. Its HSS gross margins were also higher than those of HeYe.

Exhibit 7 – Gross margin comparison



Sources: Tiangong, FuGang, HeYe and Emerson Analytics

1.3 Higher Prices or Lower Costs?

Has Tiangong been able to achieve higher gross margins due to its better product mix? From the ASP comparison in Exhibit 8 below, the answer is negative. As we can see, most of the time, the ASP of Tiangong’s DS business was about Rmb2,000 per ton lower than that of FuGang’s tool steel. Its HSS division, meanwhile, achieved ASP roughly Rmb12,000 per ton lower than that of HeYe.

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Exhibit 8 – ASP comparison (Rmb/ton)

Year ended Dec 31	2015	2016	2017	2018	2019	2020
Tiangong - DS	11,124	10,285	12,283	14,119	13,062	12,940
FuGang - tool steel	28,791	12,430	14,417	16,049	16,132	14,920
Gap	-17,667	-2,144	-2,134	-1,929	-3,069	-1,979
Tiangong - HSS	29,765	23,516	27,849	31,789	32,159	34,163
HeYe - HSS	44,010	34,431	32,534	43,465	44,572	46,251
Gap	-14,244	-10,915	-4,685	-11,676	-12,412	-12,088

Sources: Tiangong, FuGang, HeYe and Emerson Analytics

Could Tiangong sell similar products at higher prices than its peers because of better quality? From the market price comparison below, the answer is again negative.

DS products can be classified into three types: hot-worked, cold-worked and plastic. Our investigation shows that Tiangong’s products are mainly in the first two categories, with a tiny amount of plastic DS products. A broker’s research report even suggests that “Tiangong only produces hot-worked DS and cold-worked DS”³. In the following tables, 4Cr5MoSiV1/H13 is a typical hot-worked DS product. Cr12MoV is a typical cold-worked DS product, whereas W6Mo5Cr4V2/M2 is a typical HSS product.

A professional steel information website, www.mysteel.com, provides price information on similar products (products of the same specification produced with the same technology, in the same form factor, and with the same processing state of delivery) by different manufacturers. Exhibit 9 below shows the price for 4Cr5MoSiV1/H13 in the Suzhou market on December 30, 2021.

³ http://www.hibor.com.cn/docdetail_3090289.html, p.8

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Exhibit 9 – Price of 4Cr5MoSiV1/H13 in Suzhou market on Dec 30, 2021 (partial screen capture)

Price of hot-worked DS in Suzhou market on Dec 30, 2021

2021年12月30日苏州市市场热作模具钢价格行情

钢种 ↑ ↓	牌号 ↑ ↓	工艺/交货状态 technology ↓	规格 form	钢厂/产地 plant ↓	价格 price	涨跌	备注
请筛选	请筛选	请筛选	请筛选	请筛选			
当前筛选 材质: 4Cr5MoSiV1/H13							
热作模具钢	4Cr5MoSiV1/H13	热轧	25-90*151-30 5	抚顺特钢 FuGang		🔒	现货
热作模具钢	4Cr5MoSiV1/H13	热轧	30-70*205-81 0	天工国际 Tiangong		🔒	现货

1、如未特殊说明以上表列为当地市场现款、现货、小批量、自提、不含吊费、含税、开票、当地提货、过磅的价格；

2、小批量：最少成交量在1吨/批；

3、加工交货状态中，圆钢为粗磨光，扁钢或者模块均为黑皮；

4、processing state of delivery 易日收盘价格比价差；

Source: <https://qongmo.mysteel.com/m/21/1230/10/94E81E1780A1C66E.html>

At the end of 2020, Tiangong had four associated companies engaged in the sale of special steel products in mainland China, three of which were located in Suzhou city, Jiangsu province. We have, therefore, chosen Suzhou market to compare DS product prices. For HSS products, there is no regional market information because the market size is smaller. Exhibit 10 below shows prices for three typical special steel products on a particular day last December. We can see that Tiangong is selling similar products at prices lower than those of its peers.

Exhibit 10 – Price comparison for similar products (Rmb/ton)

	Tiangong	FuGang/HeYe ⁴	Difference (%)
Cr5MoSiV1/H13	17,100	18,900	-9.5%
Cr12MoV	11,800	13,000	-9.2%
W6Mo5Cr4V2/M2	59,000	62,000	-4.8%

Source: www.mysteel.com

If it is not with higher prices, can Tiangong achieve better gross margins with cost advantages?

⁴ Prices of 4Cr5MoSiV1/H13 and Cr12MoV are for FuGang. Price of W6Mo5Cr4V2/M2 is for HeYe.

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Special steel is usually produced with scrap steel. This is true for both FuGang and HeYe, the two industry leaders in China. In 2020, FuGang produced 504.6k tons of special steel through the consumption of 485.0k tons of scrap steel. This is a 96.1% ratio.

As we will further explain in Section 3.4 below, the production of special steel using scrap steel will again produce a certain amount of scrap steel. It is usual practice to further recycle this “internal” scrap steel.

The 2020 interim results presentation below claims that scrap steel recycling between Tiangong’s HSS division and its cutting tools division leads to a 5% cost advantage. But this is nothing special! Heye Zhushang Industrial Mould Co., Ltd. (河冶住商工模具有限公司, Heye Zhushang), a HeYe subsidiary, engages in cutting tools business. This also allows HeYe to achieve cost advantage by recycling scrap steel between the two divisions.

Exhibit 11 – Recycle production know-how achieves cost advantage?

Advanced waste material recycling production know-how leads to higher efficiency and low production costs

Recycle Production Know-how

1. Achieves ~5% cost advantage
2. Stable raw material supply
3. Enhances production and operations efficiency



Source: <http://tgj.cn/EN/uploads/soft/2020.pdf>, p.32

To sum up, we have not found any reason to believe that Tiangong can achieve higher gross margins than its peers.

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Part 2 Industry Association and Ex-staff Challenge Tiangong’s DS Output

Tiangong reported DS sales volume of 137.3k, 148.6k, 169.6k and 181.7k tons during 2017-20, respectively. But DS output disclosed by industry association and ex-staff are way below disclosed amount. In 2019, the company’s claimed DS exports even exceeded national total!

The special steel industry usually does not maintain a large stockpile - production volume in any given year is very similar to the sales volume that year. As an example, FuGang reported sales volume at 101.4%, 100.3% and 99.2% of production volume in 2018-20, respectively. For this reason, our discussions of volume will not distinguish between production volume and sales volume.

2.1 Tiangong Lies to Investors but Not to Industry Association

The Special Steel Enterprise Association of China (中國特鋼企業協會, SSEA) is a national-level industry association for the country’s special steel manufacturers. It tracks key industrial data for 26 major special steel manufacturers, and the numbers are widely quoted as authoritative.

Exhibit 12 below shows DS production volume of top 5 producers according to SSEA. Dongbei Special Steel Group Co., Ltd. (東北特殊鋼集團股份有限公司) is the parent company of FuGang. Pangang Group Jiangyou Changcheng Special Steel Co., Ltd. (攀鋼集團江油長城特殊鋼有限公司, 000569.SZ) was delisted in May 2009. Qilu Special Steel Co., Ltd. (齊魯特鋼有限公司) is controlled by Shandong Iraeta Heavy Industry Stock Co., Ltd. (山東伊萊特重工股份有限公司), a Sino-foreign joint venture in Shandong province.

Year ended Dec 31	2017	2018	2019
Tiangong	85.0	89.0	84.0
Dongbei Special Steel Group Co., Ltd.	81.0	68.0	62.0
Pangang Group Jiangyou Changcheng Special Steel Co., Ltd.	35.0	27.0	34.0
Baowu Special Metallurgy	33.0	23.0	24.0
Qilu Special Steel Co.,Ltd.	29.0	28.0	15.0
Tiangong reported sales volume	137.3	148.6	169.6
As % of sales volume	61.9%	59.9%	49.5%

Sources: SSEA, Tiangong and Emerson Analytics

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Some researchers suggest that “SSEA data do not include plastic DS”⁵. As the overwhelming majority of Tiangong’s production consists of hot-worked DS and cold-worked DS, the plastic DS number does not really affect Tiangong’s performance.

On the other hand, our discussions with an SSEA expert, whom we will identify as Expert A, suggest that if a particular enterprise member does produce plastic DS, that volume will be included in the reported numbers (**Audio Evidence 1**).

It is clear that Tiangong’s production volume as reported to SSEA was significantly less than the sales volume that it reported to the investing public. The company declared sales volume of 169.6k tons in 2019. But it reported production volume of 84.0k tons to SSEA, equivalent to merely 49.5% of its alleged sales volume.

2.2 Ex-staff Put 2020 DS Output at about 114k tons

Our investigators discussed Tiangong’s DS output with a former middle-level manager, whom we refer to as Ex-staff B. Ex-staff B revealed DS monthly sales volume data in 2020. These are volume ranges classified into steel plate, steel bar and forged products. Our discussion is translated into English and presented in Audio Evidence 2 below.

Audio Evidence 2 – DS monthly output in 2020 according to Ex-staff B

Emerson investigator:	What was your job while at Tiangong?
Tiangong Ex-staff B:	I was mainly involved in the rolling of steel.
.....	
Emerson investigator:	For DS, how much sales volume are you doing a year?
Tiangong Ex-staff B:	In terms of sales volume, steel plates amount to 5,000-6,000 tons a month last year, whereas steel bars are about 2,000-3,000 tons.
Emerson investigator:	So, they’re mostly steel plates and steel bars?
Tiangong Ex-staff B:	Yes. There’re also some forged products, about 1,000-2,000 tons a month.

Source: Emerson Analytics

Based on the above numbers, we can estimate that the biggest possible sales volume is 132k tons and the smallest is 96k tons, with a mid-value of 114k tons (= (5.5 + 2.5 + 1.5) x 12). Evidently, even the biggest possible value is way below the 181.7k tons alleged by the company.

⁵ http://www.hibor.com.cn/docdetail_3090289.html, p.9.

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2.3 Tiangong DS Exports Exceed National Total

What first drew our attention to Tiangong was this news report from www.mysteel.com saying that China’s DS exports in 2020 fell 22.97% year-on-year to 58.5k tons. This means the country’s exports in 2019 was 75.9k tons.

Exhibit 13 – National DS exports in 2020 at 58.5k tons

五、国外需求呈现弱势 国内模具钢成品材及下游行业出口受阻

受国际疫情形势影响，今年国内模具钢成品材及下游行业出口受阻，下游订单普遍不足。据我网所持续跟踪的十几家样本企业统计，2020年12月模具钢出口0.68万吨，同比下降15%；1-12月份模具钢出口量为5.85万吨，同比下降22.97%。China’s DS exports in 2020 fell 22.97% year-on-year to 58.5k tons. 若后期国外疫情仍然没有得到有效控制，模具钢的贸易逆差仍将继续持续，供需压力仍然存在。

Source: <https://tg.mysteel.com/21/0104/17/9A51EA63FF9C1E85.html>

How much did Tiangong account for in the whole country’s exports during 2019 and 2020? The company has never reported its export volume. Luckily for us - and unluckily for the crooks controlling Tiangong - the company proclaimed that in 2020, its exports and domestic sales volume registered annual growth rates of -29.4% and 37.8%, respectively⁶.

Let X be Tiangong export volume in 2019, according to the formula

$$X * (1 - 29.4\%) + (169.6 - X) * (1 + 37.8\%) = 181.7$$

where 169.6 is the 2019 total sales volume reported by Tiangong, and 181.7 is the 2020 volume, we can calculate that

$$X = 77.4.$$

Thus, Tiangong’s 2020 export volume was 54.6k tons (= 77.4 * (1 - 29.4%)).

Exhibit 14 below shows Tiangong’s export volume compared with the national total. According to the company’s disclosure, we can calculate that it accounted for 93% of the whole country’s export volume for 2020. For 2019, its claimed export volume exceeded the national total! How could this be possible?

⁶ Tiangong 2020 annual report, p.7

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Exhibit 14 – Tiangong DS exports exceed national total in 2019 (k tons)

Year ended Dec 31	2019	2020
China total	75.9	58.5
Tiangong	77.4	54.6
Tiangong market share	102%	93%

Sources: *Tiangong and Emerson Analytics*

We consulted an industry expert well versed in China’s DS exports, whom we will identify as Expert C. According to Tiangong’s exports as a ratio of output that Expert C told us (**Audio Evidence 3**), we can calculate that in reality, the company only exported 17k tons of DS products in 2020, about 31% of that implied by the company’s disclosure.

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Part 3 DS Output in 2020 Only Half of Disclosed Amount

In Part 2 above, we have shown that, according to the industry association and Ex-staff B, Tiangong’s real DS output was way below the amounts claimed by the company.

As shown in Exhibit 4 above, Tiangong has reported 181.7k tons of DS sales in 2020. In this section, we will show that, by careful deduction from key raw materials consumption, one can estimate that the actual output of its DS was only 91.3k tons in 2020, about half of the claimed amount.

3.1 Crude DS Production Comes from TG Aihe

The production of steel products is divided into two phases, the smelting phase and the processing phase. The first phase results in something termed crude steel, whereas the second phase yields steel products. Clearly, the volume of steel products is determined by the volume of crude steel produced in the first phase, which in turn is determined by the input of scrap steel and rare metals.

Exhibit 5 above shows that Tiangong’s DS production is mainly undertaken by TG Aihe. Tiangong has disclosed that the principal activity of Jurong Tiangong New Materials Technology Co., Ltd. (句容市天工新材料科技有限公司, TG New Materials) is “research and development, manufacture and sale of high speed steel, and die steel related products”. Does this subsidiary have smelting capacity to produce crude steel?

Exhibit 15 below shows the sewage discharge permits for TG Aihe and TG New Materials. We can see that only the TG Aihe license lists the smelting process. This means TG New Materials does not produce crude steel.



Sources:

<http://permit.mee.gov.cn/perxxgkinfo/syssb/xkqg/xkqg/downloadFile.action?method=download&fileType=fbfile&datafileid=e1730ae7c7294bf4895e64d04d0586b3&dataid=252a1384542b4c88b3751e8627e46beb> (left)

<http://permit.mee.gov.cn/perxxgkinfo/syssb/xkqg/xkqg/downloadFile.action?method=download&fileType=fbfile&datafileid=442edf02d4af48baa7a1a13b49718e63&dataid=8990884e57b346af87fead314605aecd> (right)

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TG Aihe is located in Danyang County while TG New Materials is 63 km away in Jurong County, both being part of Zhenjiang City in southern Jiangsu. A Tiangong engineer, whom we will identify as Staff D, told us that Tiangong would transfer small quantities of crude steel ingot with trucks from Danyang to Jurong for processing by TG New Materials (**Audio Evidence 4**). In Section 5.1 below, we will discuss in greater details the irregularities in TG New Materials’ operations and financial situation.

3.2 DS Output of 100k tons according to TG Aihe’s Disclosure

Readers who pay attention will see that TG Aihe’s waste transfer plan in Exhibit 5 also discloses its DS production volume. There are four such plan reports in Zhenjiang BEE’s website, dated June 28, 2019, March 15, 2020, August 25, 2020 and January 26, 2021. We can see that TG Aihe produced 100k tons of DS in 2020. This may not be a very precise number but is close enough to the truth. In any case, this is only 55% of the alleged sales volume that Tiangong disclosed to the investing public.

Exhibit 16 – TG Aihe reports 100k tons of DS production for 2020

Jun 28, 2019			Mar 15, 2020		
产品名称	主要成分化学名	年产量	产品名称	主要成分化学名	年产量
模具钢 DS	铁	10万吨 100k tons	模具钢	铁	10万吨 100k tons
<small>annual production volume</small>					
Aug 25, 2020			Jan 26, 2021		
产品名称	主要成分化学名	年产量	产品名称	主要成分化学名	年产量
模具钢	铁	10万吨 100k tons	模具钢	铁	12万吨 120k tons

Source: http://sthj.zhenjiang.gov.cn/sthj/qygfqj/xxgk_list.shtml

3.3 TG Aihe Outsourced 105.2k tons of Key Raw Materials in 2020

TG Aihe carries out its smelting process at three workshops, the so-called Old Smelting Workshop, New Smelting Workshop and Medium Frequency Furnace Workshop, as revealed in its *Environmental Impact*

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Report on the Construction Project for the 300k-t/a Die Steel Technological Upgrade (年產 30 萬噸高合金工模具新材料技改提升項目建設項目環境影響報告表) dated July 2, 2021. Data on the consumption of major raw materials in this document should pertain to those for 2020.

Exhibit 17 – Consumption of major raw materials at TG Aihe’s three smelting workshops

表 2-12· 现有工模具钢项目（炼钢+轧钢）主要原辅料消耗表

序号	车间	名称	规格	计量单位	年用量	贮存位置	来源及运输	
1	老炼钢车间 Old Smelting Workshop	合金废钢	/	t/a	29413.81	原材料库	国内、汽运	
2		80 钒铁	80	t/a	177.52	raw material warehouse		
3		低铬	59.99	t/a	276.28	辅材仓库		
4		高铬	59.54	t/a	2907.77			
5		钼铁	59	t/a	340.98	辅材仓库		
6		钨铁	76.5	t/a	56.66			
7		冶金活性石灰	85	t/a	1261.3			
8		萤石块	/	t/a	130.8	国内、汽运		
9		硅铁	70	t/a	581.07			
10		合金废钢	/	t/a	67271.63	原材料库		国内、汽运
11		80 钒铁	80	t/a	218.01	raw material warehouse		
12		低铬	59.99	t/a	469.43	辅材仓库		
13		高铬	59.54	t/a	6751.56			
14		钼铁	59	t/a	390.59			
15	中频感应炉车间 Medium Frequency Furnace Workshop	钨铁	76.5	t/a	27.08	国内、汽运		
16		冶金活性石灰	85	t/a	2660.68			
17		萤石块	/	t/a	79.33			
18		硅铁	70	t/a	726.04			
19		合金废钢	/	t/a	23239.85		国内、汽运	
20		80 钒铁	80	t/a	150.89			
21		低铬	59.99	t/a	193.61			
22		高铬	59.54	t/a	138.87			
23		金属铬	/	t/a	0.36			
24		钼铁	59	t/a	449.56			
25		钨铁	76.5	t/a	206.09			
26		冶金活性石灰	85	t/a	828.44		国内、汽运	
27		萤石块	/	t/a	3			
28	硅铁	70	t/a	124.36				

Source: <http://www.danyang.gov.cn/dysthj/zcid/202108/b17a66da648248d986ecc9a1c326853/files/95df3fe668e04ed48c8f91505f594062.doc>, p.29

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Certain input materials such as metallurgically active lime are used for slag formation, and should be excluded in the input-output analysis. As shown in Exhibit 18 below, TG Aihe fed in 132.7k tons of scrap steel and rare metals in 2020. How could this result in 181.7k tons of sales volume?

Exhibit 18 – Scrap steel and rare metals totalled 132.7k tons in 2020

Year ended Dec 31 (k tons)	Old Smelting Workshop	New Smelting Workshop	Medium Frequency Furnace Workshop	Total
Alloy scrap steel	29.4	67.3	23.2	119.9
Ferrovandium 80	0.2	0.2	0.2	0.5
Low carbon ferrochrome	0.3	0.5	0.2	0.9
High carbon ferrochrome	2.9	6.8	0.1	9.8
Chrome metal			0.0	0.0
Ferromolybdenum	0.3	0.4	0.4	1.2
Ferrotungsten	0.1	0.0	0.2	0.3
Total	33.2	75.1	24.4	132.7

Source: <http://www.danyang.gov.cn/dysthj/zcjd/202108/b17a66da648248d986ecc9a1c326853/files/95df3fe668e04ed48c8f91505f594062.doc>, p.29

In-house scrap steel produced in the special steel production process will be transferred to the raw material warehouse. The smelting workshops will then pick such scrap steel and other raw materials from the warehouse according to its needs and deploy them in the production. Another former middle-level management staff at Tiangong, whom we will refer to as Ex-staff E, confirmed to our investigators that this is true for TG Aihe (**Audio Evidence 5**). This means the key raw materials in the table above includes in-house scrap steel as well.

According to a research paper entitled “Optimized Utilization of Special Steel Scrap and Development of Usable Resources” (特鋼返回鋼優化利用及可利用資源的開發, the Baowu Paper) published by three technical staff at Baowu Special Metallurgy, in-house scrap steel accounts for 15-20% of total raw materials used⁷. Ex-staff E told our investigators that the proportion of in-house scrap steel at TG Aihe exceeds 20% (**Audio Evidence 5**). According to our estimates below, this proportion is about 20.7%.

We can calculate that TG Aihe outsourced about 105.2k (= 132.7 x (1 – 20.7%)) tons of scrap steel and rare metals in 2020. This amount of input cannot produce 181.7k tons of sales volume.

3.4 Steel Products Output Ratio At 68.8%

(1) steel products output ratio based on TG Aihe’s filing

TG Aihe submitted to Zhenjiang BEE in October 2018 *Environmental Impact Report on the Construction Project of 2k-t/a Powder Metallurgy (Phase 1)* (年產 2000 噸工模具鋼粉末冶金項目（一期工程）建設項目環境影響報告表). The document reveals that “TG Aihe’s designed capacity of molten steel is 300k t/d.

⁷ <https://max.book118.com/html/2013/1119/4994622.shtml>, p.18

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Nowadays, the real output amount approximates 130k t/d”. Obviously, t/d is a mistaken designation - it should be t/a.

Exhibit 19 – TG Aihe molten steel output is nearly 130k tons in 2018

(1) 金属粉末制粉所用的钢水由天工爱和特钢有限公司已建的 15 吨中频炉车间生产提供。天工爱和特钢有限公司钢水设计产能为 30 万 t/d, 目前实际生产规模约 13 万 t/d。公司通过内部调济划拨约 2000t/a 钢水用于本项目生产金属粉末, 全厂在本项目建成后不新增钢水产能。

TG Aihe's designed capacity of molten steel is 300k t/d. Nowadays, the real output amount approximates 130k t/d.

Source: <https://www.docin.com/p-2190147614.html>, p.29

Exhibit 12 earlier shows that Tiangong produced 89.0k tons of DS products in 2018, for an input-output ratio of 68.5% (= 89.0 / 130.0).

(2) steel yield and metal loss benchmarks

The Baowu Paper describes the recyclable scrap steel (such as cropping of front and back ends) generated in the special steel production as tangible metal loss. Unrecyclable metal loss such as oxide scale is termed intangible metal loss. The technology used by TG Aihe and the corresponding metal losses are highlighted in the red boxes in Exhibit 20 below.

Exhibit 20 – Metal Loss in smelting and processing procedure

电弧炉冶炼(含精炼)采用连铸工艺流程, 一般有形损耗为 65 ~ 85 kg/t, 无形损耗为 60 ~ 80 kg/t, 合计过程损耗为 125 ~ 165 kg/t; 采用模铸工艺流程有形损耗为 35 ~ 45 kg/t, 无形损耗为 60 ~ 80 kg/t, 合计过程损耗为 95 ~ 125 kg/t。

In mold casting procedure, tangible metal loss is about 35-45kg per ton while intangible metal loss amounts to 60-80kg per ton.

表 3 制造过程中的有形损耗量

Table 3 Tangible metal loss in the manufacturing procedure

	热加工	冷加工
casting ingots to finished products	冶炼→热加工	热加工→冷加工
模铸锭成材	155 ~ 185	185 ~ 275
连铸坯成材	85 ~ 115	115 ~ 205

Source: Baowu Paper

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In the smelting phase, the Baowu Paper says that “tangible metal loss is about 35-45kg per ton while intangible metal loss amounts to 60-80kg per ton”. In our estimates, we take the lower limits of these two ranges, 3.5% and 6%, respectively. This is the most advantageous assumption to the company.

From Exhibit 20, the entire production process from smelting procedure, hot working procedure to cold working procedure will yield 185-275kg/ton of tangible metal loss. Deducting mean value 40kg per ton of tangible metal loss in the smelting procedure, the tangible metal loss in the processing procedure is 145-235kg/ton. The mean value is 190kg/ton.

According to Ex-staff E, Tiangong’s DS products yield is about 76% of crude steel while its intangible metal loss is about 5% in the processing phase (**Audio Evidence 5**). The remaining 19% of tangible metal loss is in line with the mean value in the Baowu Paper. These are the benchmarks that we use in our calculation of Tiangong’s steel products output ratio.

Exhibit 21 – Steel yield and metal loss benchmarks

Line	Phase	Percent
<i>Phase 1 - Smelting</i>		
1	Intangible metal loss	6.0%
2	Tangible metal loss	3.5%
3	Crude steel yield	90.5%
<i>Phase 2 - Processing</i>		
4	Intangible metal loss	5.0%
5	Tangible metal loss	19.0%
6	Steel products yield	76.0%

Source: Emerson Analytics

(3) calculation of products yield

Exhibit 22 shows theoretical calculation of Tiangong’s DS products yield, with initial raw materials input set at 100. Interested readers may download [here](#) our Excel spreadsheet which contains all the formulae and reconciliations for the calculation. You may change the input variables (shown in blue color) to see how they change the outcome.

As shown in Exhibit 22, the recycled input is negligible after the second recycle. Due to the impact of in-house scrap steel, cumulative input amounts to 126.0. Relative to cumulative input, the output ratio is 68.8% (= 86.7 / 126.0). This is almost the same as the 68.5% output ratio for 2018 mentioned above.

Tiangong International – “Die” Steel

Exhibit 22 – Theoretical calculation of Tiangong’s DS products yield

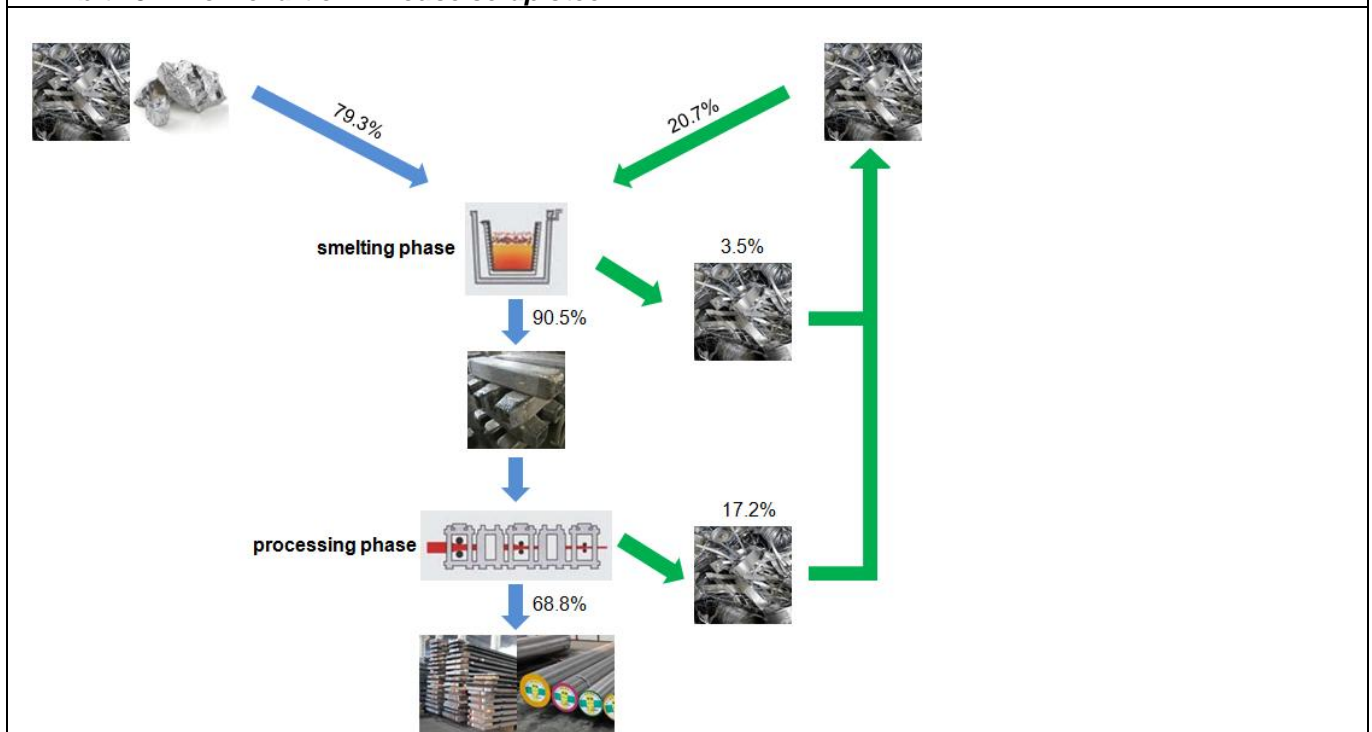
Line	Account	Fresh start	1st recycle	2nd recycle	3rd recycle	4th recycle	Formula
7	Initial input	100.0000					
8	Recycled input		20.6950	4.2828	0.8863	0.1834	(line 11 + 14) _{t-1}
9	Total input	100.0000	20.6950	4.2828	0.8863	0.1834	line 7 + 8
<i>Phase 1 - Smelting</i>							
10	Intangible metal loss	6.0000	1.2417	0.2570	0.0532	0.0110	line 7 or 8 x line 1
11	Tangible metal loss	3.5000	0.7243	0.1499	0.0310	0.0064	line 7 or 8 x line 2
12	Crude steel output	90.5000	18.7290	3.8760	0.8021	0.1660	line 7 or 8 x line 3
<i>Phase 2 - Processing</i>							
13	Intangible metal loss	4.5250	0.9364	0.1938	0.0401	0.0083	line 10 x line 4
14	Tangible metal loss	17.1950	3.5585	0.7364	0.1524	0.0315	line 10 x line 5
15	Steel products output	68.7800	14.2340	2.9457	0.6096	0.1262	line 10 x line 6
<i>Cumulative data</i>							
	Total input	100.0000	120.6950	124.9778	125.8642	126.0476	line 9
	Steel products output	68.7800	83.0140	85.9598	86.5694	86.6955	line 15

Source: Emerson Analytics

(4) flow chart of in-house scrap steel

The 100 initial raw materials input amounts to 79.3% of the 126.0 cumulative input, meaning in-house scrap steel is 20.7% of cumulative input. The flow chart of in-house scrap steel is shown in Exhibit 23.

Exhibit 23 – Flow chart of in-house scrap steel



Source: Emerson Analytics

Tiangong International – “Die” Steel

3.5 Raw Materials Use Implies 91.3k tons of DS Output in 2020

As mentioned earlier in Exhibit 18, TG Aihe smelting workshops recorded total raw materials input of 132.7k tons in 2020, including in-house scrap steel. Thus, the company should have produced 91.3k tons (= 132.7 x 68.8%) of DS products in 2020.

To summarize, we have discussed three ways to arrive at Tiangong’s DS production/sales volume for 2020:

- The mid-range figure according to Ex-staff B is 114k tons;
- TG Aihe’s report to Zhenjiang BEE shows annual production of about 100k tons; and
- Emerson Analytics estimates an output of 91.3k tons based on the consumption of key raw materials.

The three production figures converge around the 100k level and are way below the 181.7k sales volume reported by the company. Our subsequent discussions will be based on 91.3k tons, which is calculated by careful deductions.

We can now present a comparison of real and reported volume for 2017-20. In 2017-18, the actual output volume was about 60% of the sales volume announced by the company. In 2019-20 this ratio fell further to 50%. The average for the four years was about 54.8%.

Exhibit 24 – Real DS output only 55% of reported volume during 2017-20 (k tons)					
Year ended Dec 31	2017	2018	2019	2020	Total
Sales volume - disclosed	137.3	148.6	169.6	181.7	637.2
Production volume - actual	85.0	89.0	84.0	91.3	349.3
As % of sales volume	61.9%	59.9%	49.5%	50.2%	54.8%

Sources: Tiangong and Emerson Analytics

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Part 4 Gross Profit for DS Products Only Half of Disclosed Amount

We have shown in Parts 2 and 3 detailed evidence to prove that Tiangong seriously exaggerated its DS sales volume over the last few years.

In Exhibit 7 above, we can see that the gross margin of Tiangong’s HSS business was reportedly 3.9 percentage points higher than that of its peer in 2020, while its DS business enjoyed a gross margin that was 19 points higher.

So, what is the real profitability of Tiangong’s DS business?

4.1 Tiangong DS Unit GP for 2020 was 2.7x of its Peer

Exhibit 25 below shows Tiangong’s unit GPs, or gross profit per ton, for its DS and HSS businesses.

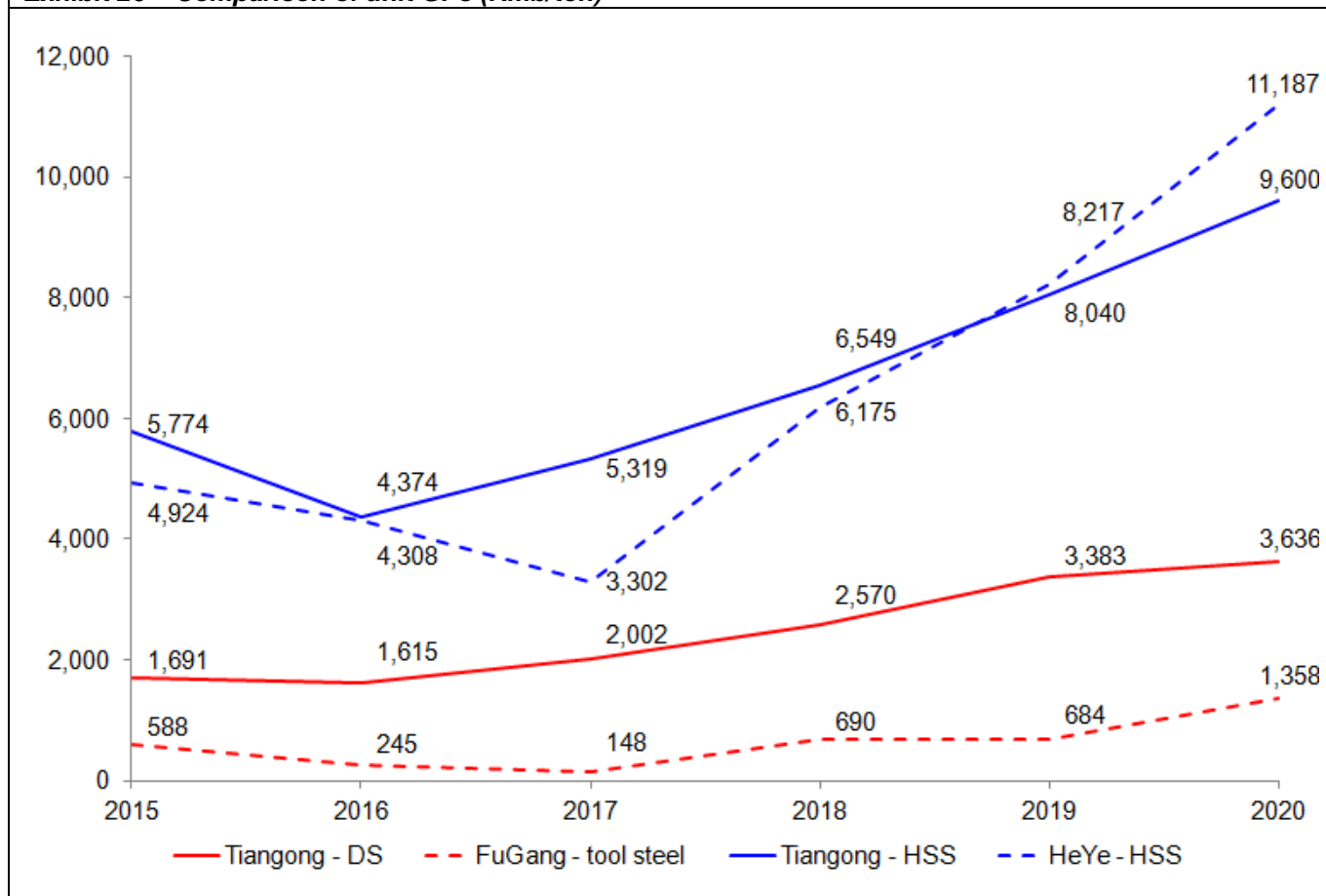
Year ended Dec 31	2015	2016	2017	2018	2019	2020
Gross profit (Rmb m)						
DS	155	198	275	382	574	661
HSS	188	151	151	224	272	356
Sales volume (k tons)						
DS	91.5	122.7	137.3	148.6	169.6	181.7
HSS	32.6	34.6	28.4	34.2	33.9	37.1
Unit GP (Rmb/ton)						
DS	1,691	1,615	2,002	2,570	3,383	3,636
HSS	5,774	4,374	5,319	6,549	8,040	9,600

Sources: *Tiangong and Emerson Analytics*

Exhibit 26 below compares Tiangong’s unit GPs for its two major businesses with those of its peers. In 2017 these two unit GPs increased by 24% and 22% for DS and HSS, respectively, while the two peers reported declines of 40% and 23%. For other years, the company’s unit GPs moved in line with the two peers.

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Exhibit 26 – Comparison of unit GPs (Rmb/ton)



Sources: Tiangong, FuGang, HeYe and Emerson Analytics

We can see from the above chart that during 2018-20, unit GP for Tiangong’s HSS business deviates slightly from that of its peer. However, its DS business was far more profitable, at 3.7x, 4.9x and 2.7x that of its peer.

As we have explained earlier, FuGang tool steel business is mainly in the DS products, though it also makes HSS products. Considering that the unit GP of HSS is far higher than that of DS, it is all the more unusual that Tiangong’s DS business could achieve extraordinarily higher unit GP than FuGang.

4.2 Sales Agent and Ex-staff Both Suggest DS Unit GP at Rmb2k/t

Our investigators discussed Tiangong’s unit GP for its DS products with its sales agent, whom we refer to as Sales Agent F. We also discussed this issue with Ex-staff E, who was well informed not only on production but also on market conditions, cost structure and profitability. Audio Evidences 6 and 7 below are English transcripts of our conversation.

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Audio Evidence 6 – Sales Agent F puts DS unit GP below Rmb2,000/ton

Emerson investigator:	DS gross profit should amount to Rmb2,000 a ton?
Tiangong Sales Agent F:	No, not quite 2,000.
Emerson investigator:	Your brand is so well known, you should be able to do that?
Tiangong Sales Agent F:	Not possible.

Source: Emerson Analytics

Audio Evidence 7 – Ex-staff E puts DS unit GP at about Rmb2,000/ton

Emerson investigator:	Where did you work in the past?
Tiangong Ex-staff E:	I used to work at Tiangong’s smelting workshop for many years.
.....	
Emerson investigator:	In terms of your production, how much gross profit of DS can be achieved per ton?
Tiangong Ex-staff E:	It’s less than that for HSS, just about Rmb2,000.

Source: Emerson Analytics

Thus, two separate well-placed sources agreed that the unit GP for Tiangong’s DS products was around the Rmb2,000 per ton level for 2020. This was 45% below the Rmb3,636 per ton claimed by the company. Our subsequent calculations will be based on this number. Given that the FuGang tool steel business could manage gross profit of Rmb1,358 a ton, we have no doubt that this assumption is very generous for Tiangong.

The conversations in this report were recorded in the second half of 2021. We are sharing the audio recordings and relevant information such as the interviewees’ names, positions, contact telephone numbers and dates of meeting with the Securities and Futures Commission (SFC) of Hong Kong.

Since our first report published in April 2014, we have always provided the regulators with all the details that we have unearthed during our investigation into the scams. Even if the regulators choose to ignore the clear evidence that we have shared with them and refuse to take the appropriate regulatory actions, we will continue to do so. We talk our talk and walk our walk. But do the regulators?

The Financial Reporting Council (FRC) is said to be a full-fledged independent regulator of auditors for Hong Kong-listed companies. In 2015, we reported to FRC about the serious accounting fraud and violation of fundamental accounting rules committed by China Fiber Optic Network System Group Ltd.

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(China Fiber, 3777.HK)⁸. With respect to China Fiber reporting to the State Administration of Industry and Commerce (SAIC) total revenue that was 75% less than that it reported to investors, FRC gave us this reply in March 2016 after its “investigation”:

The Group’s reported revenue in the Relevant Financial Statements that were prepared under IFRSs were different from those in the annual filings to the SAIC as the SAIC filings were not required to comply with IFRSs.

In October 2016 trading in China Fiber shares was suspended. In June 2017 a Hong Kong court ordered the liquidation of the company. In February 2019 the company’s listing was withdrawn. Clearly, FRC’s so-called “investigation” was no more than a joke.

We had a similar experience with Southern Energy Holdings Group Limited (Southern Energy, 1573.HK). The company’s revenue data reported the National Enterprise Credit Information Publicity System (NECIPS) for 2016/17 were merely 12% and 21% of those reported to investors. We also provided the SFC with detailed evidence to illustrate that the coal actual output was only 1/3 of its claim and the Luozhou Mine had never been in commercial production⁹. Was such information still “insufficient” for the regulators to take action?

In March 2020, a court in Bijie city of Guizhou province ordered the bankruptcy reorganization of Southern Energy’s core operating subsidiary. The following month, trading in Southern Energy shares was suspended. In October 2021 the listing of Southern Energy was withdrawn.

Tiangong’s actual DS production is in a similar situation to that of Southern Energy. We expect the regulators to take regulatory actions to safeguard the integrity of the Hong Kong financial markets rather than sitting on their hands.

⁸ http://emersonanalytics.cloud/downloads/ChinaFiber-HK_3777-Delisting.pdf

http://emersonanalytics.cloud/downloads/ChinaFiber-HK_3777-BreakingFundamentalAccountingRules.pdf

⁹ http://emersonanalytics.cloud/downloads/SouthernEnergy-HK_1573-Delisting.pdf

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Part 5 Financials and Valuation

Tiangong reported total revenue of Rmb5,221m for 2020. Excluding the barely profitable trading of goods division, sales of other divisions amounted to Rmb4,172m. The DS division accounted for 56.4% of this, at Rmb2,351m.

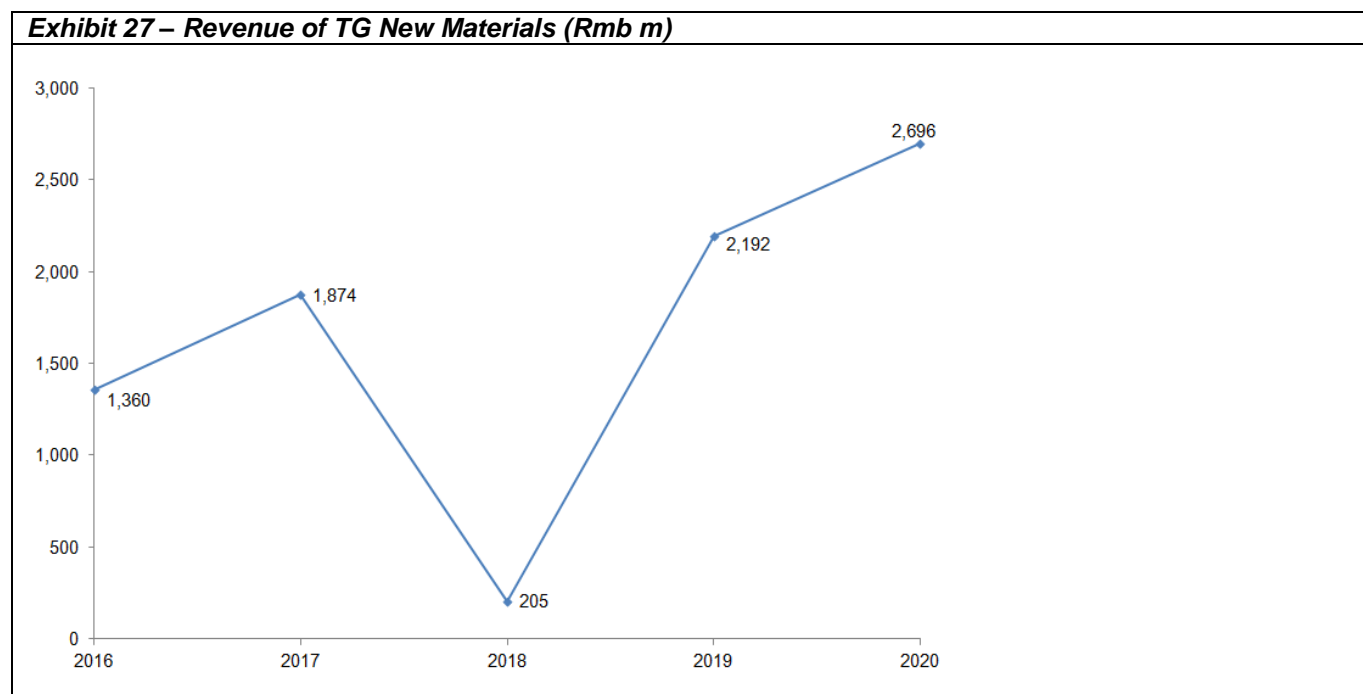
We have shown earlier that Tiangong grossly exaggerated the volume and unit GP of its DS products. Now we will estimate its real profitability.

5.1 The Strange Case of TG New Materials

In Section 3.1 earlier, we note that TG New Materials is Tiangong’s subsidiary undertaking some steel processing business.

- The company has got a mere steel processing workshop located inside a 26,055-square meter building. It used to pay an annual rent of Rmb3m to TG Technology, until it bought the building in December 2019 at a price of Rmb69.5m.
- The NECIPS data show that TG Tools and TG Aihe had 875 employees and 760 employees, respectively, on labor insurance at the end of 2020. TG New Materials had only 110 employees.

Strangely, the NECIPS data show that TG New Materials revenue in 2020 was a staggering Rmb2,696m. Even more mysteriously, its revenue in 2018 collapsed 90% year-on-year, only to surge 10x the next year.



Source: NECIPS

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Does TG New Materials undertake the trading of goods business for Tiangong? Exhibit 28 below compares revenue from the trading of goods division with that of Jiangsu Tiangong International Trading Co., Ltd. (江蘇天工國際貿易有限公司, TG Trading). TG Trading is a wholly-owned subsidiary of Tiangong and is described in its annual reports as engaging in trading of goods. The data for TG Trading below come from the NECIPS.

Year ended Dec 31 (Rmb m)	2016	2017	2018	2019	2020
Trading of goods	955.5	1,175.2	1,465.7	1,045.8	1,048.6
Revenue of TG Trading	956.4	859.2	1,315.0	1,384.6	1,048.6
Gap	0.9	-316.1	-150.7	338.9	0.0

Sources: *Tiangong, NECIPS and Emerson Analytics*

In 2019, TG New Materials sold Rmb306m worth of ordinary steel products to Zhenjiang New Area Urban Development Investment Co., Ltd. (鎮江新區城市建設投資有限公司, Zhenjiang New Area UDIC)¹⁰. This effectively plugs the Rmb339m revenue gap reported for 2019 in the above table.

However, in 2020, TG Trading’s revenue was exactly the same as the trading of goods revenue reported by Tiangong. This means TG New Materials did not do any trading business that year. So, how did it generate Rmb2,696m of revenue?

Tiangong might say that TG New Materials derived most of that revenue from purchasing raw materials for TG Aihe or TG Tools, or from the sale of finished products on behalf of the latter two. But we suspect that TG New Materials’ exceedingly high revenue may be related to the exaggerated production volume and fake profit margins that we have detailed in the previous sections.

5.2 Tiangong EBIT is 3x Real Level

Exhibit 29 below is our estimates of Tiangong’s real profitability in 2020. The red numbers are the two key drivers in the DS business that deviate significantly from those disclosed by the company. We assume that the revenue and gross profit of all other divisions are accurate, and that the sales, general and administrative (SG&A) expenses are accurate.

¹⁰ [Zhenjiang New Area UDIC 2019 annual report](#), p.24

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Exhibit 29 – Real EBIT 67% below disclosed

Year ended Dec 31 (Rmb m)	2020 - disclosed	2020 - actual	Difference (%)
DS ASP (Rmb/ton)	12,940	12,940	unchanged
DS sales volume (k tons)	181.7	91.3	-49.8%
DS revenue	2,351	1,181	-49.8%
Revenue from other segments	1,821	1,821	unchanged
Revenue	4,172	3,002	-28.0%
DS unit GP (Rmb/ton)	3,636	2,000	-45.0%
DS gross profit	661	183	-72.4%
Gross profit from other segments	553	553	unchanged
Gross profit	1,214	735	-39.4%
SG&A expenses	-501	-501	unchanged
EBIT	712	234	-67.1%
EBIT margin	17.1%	7.8%	-9.3%

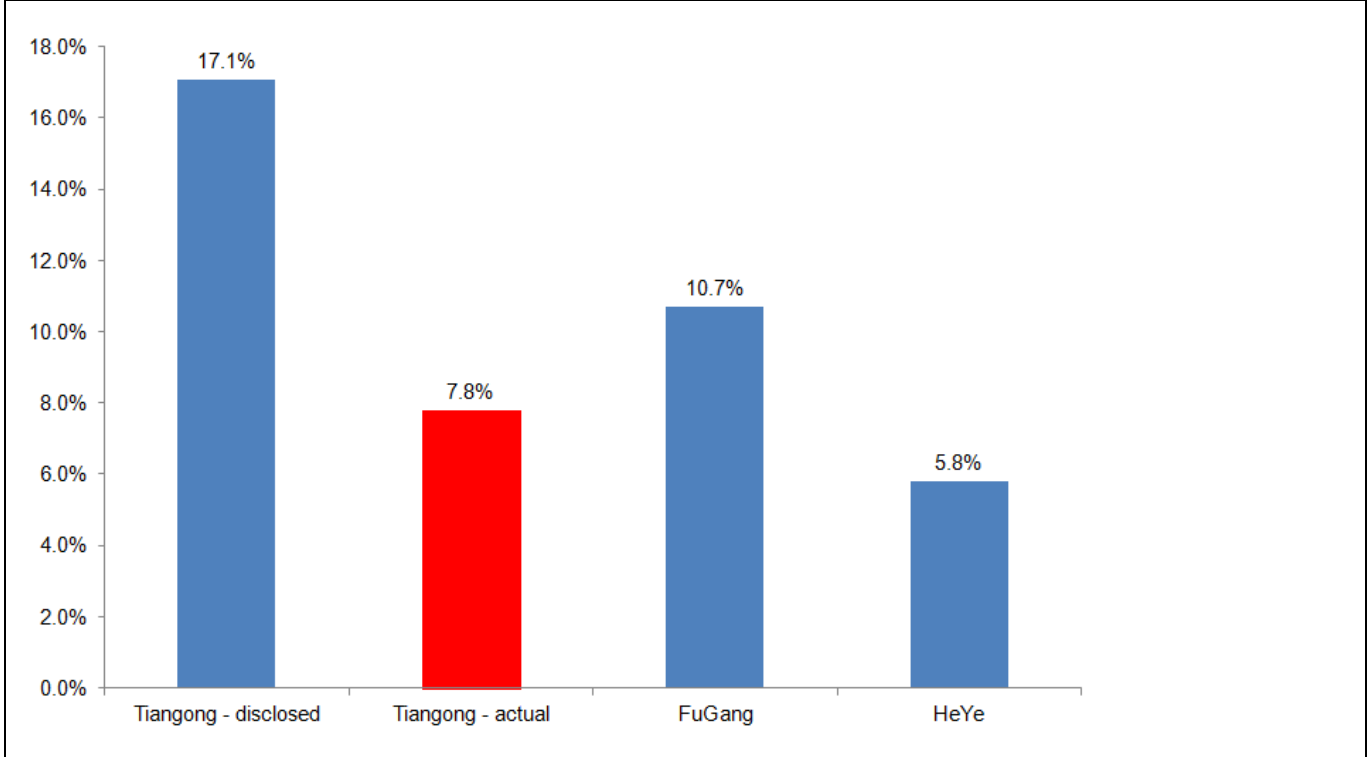
Sources: Tiangong and Emerson Analytics

With real DS sales volume just about half of that reported by Tiangong, real total revenue in 2020 was just about Rmb3bn, or 28% less than the reported number. Given unit GP of about Rmb2,000/ton, actual gross profit for DS in 2020 was Rmb183m or 72.4% below the Rmb661m proclaimed by the company. All in all, the 2020 real EBIT would be about Rmb234m or 67.1% less than reported.

Exhibit 30 below compares the three companies' EBIT margins. For 2020, Tiangong proclaimed an EBIT margin of 17.1%, but we reckon that its true EBIT margin was 7.8%. This was mid-way between 10.7% for FuGang and 5.8% for HeYe.

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Exhibit 30 – EBIT margin comparison, 2020



Sources: Tiangong, FuGang, HeYe and Emerson Analytics

5.3 Valuation

On February 15, 2022, Tiangong share price closed at HK\$4.04/share or 14.9x trailing 12-month P/E. Given that its real profitability was 67.1% below the reported level, we believe its fair value would be at most HK\$1.33/share, even on the same valuation benchmark.

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Appendix Estimates of HeYe Financial Performance

At the end of 2015, HeYe held a 51% stake in Erasteel Innovative Materials Co., Ltd. (河冶埃赫曼合金材料(天津)有限公司, Erasteel Materials) and a 55% stake in Heye Zhushang. In August 2017, it sold the Erasteel Materials stake to its foreign partner but continued to focus on HSS business. Heye Zhushang, meanwhile, has always focused on cutting tools.

Detailed financial numbers of HeYe for 2015 come from an asset valuation report in relation to the Erasteel Materials disposal¹¹. The numbers concern only HeYe itself without consolidating its two subsidiaries.

For 2016-20, HeYe’s consolidated revenue data come from AT&M annual reports. Heye Zhushang’s revenue numbers come from the NECIPS. Erasteel Materials was ignored in our 2016/17 HSS revenue calculation for it had very little revenue.

AT&M’s first tranche medium-term notes issuance prospectus in 2019 discloses consolidated cost of sales numbers from 2016 to 2018 for HeYe¹².

To estimate Heye Zhushang’s gross profit, we apply the gross margins of cutting tools in Exhibit 2.

AT&M’s annual reports disclosed HeYe’s operating profits. During 2013-16, HeYe finance charges had declined steadily. Assuming unchanged finance charge, we can arrive at EBIT by adding back the finance charge to its operating profits for 2017-20.

With EBIT data, we can work back HeYe’s SG&A expenses for 2016-18. For 2017 and 2018, these expenses amounted to 74.3% and 76.9%, respectively, of HeYe’s gross profit, for an average of 75.6%.

Assuming that HeYe maintained its SG&A expenses at 75.6% of gross profit during both 2019 and 2020, we can determine its gross profit and cost of sales for those two years.

HeYe’s 2015-18 HSS sales volume can be found in the credit valuation report on AT&M’s first tranche medium-term notes issuance in 2019¹³. Assuming unchanged sales volume for both 2019 and 2020, we can deduce the company’s ASP and unit GP for 2015-20.

¹¹ <http://static.cninfo.com.cn/finalpage/2017-05-11/1203491864.PDF>, p.110

¹² <https://www.chinamoney.com.cn/dqs/cm-s-notice-query/fileDownload.do?mode=open&contentId=1431509&priority=0>, p.38

¹³ <https://www.chinamoney.com.cn/dqs/cm-s-notice-query/fileDownload.do?mode=open&contentId=1431507&priority=0>, p.19

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Exhibit 31 – Estimates of HeYe financial performance

Year ended Dec 31 (Rmb m)	2015	2016	2017	2018	2019	2020
Revenue	689	720	990	1,012	1,027	1,041
Revenue of Heye Zhushang		86	97	106	98	77
Revenue from HSS	689	633	893	906	929	965
Cost of sales	608	634	882	871	830	783
Sales tax and surcharges	3	8	9	9	10	10
Gross profit	77	77	99	132	187	248
Gross profit of Heye Zhushang	0	-2	9	3	16	15
Gross profit from HSS	77	79	91	129	171	233
SG&A expenses	63	89	74	102	142	187
as % of gross profit	81.7%	115.3%	74.3%	76.9%	75.6%	75.6%
EBIT	14	-12	26	30	46	60
Interest expenses	13	11	11	11	11	11
Operating profit	1	-23	14	19	34	49
Gross margin	11.2%	10.7%	10.0%	13.0%	18.2%	23.8%
Gross margin of HSS	11.2%	12.5%	10.1%	14.2%	18.4%	24.2%
EBIT margin	2.0%	-1.6%	2.6%	3.0%	4.4%	5.8%
Sales volume (k tons)	15.6	18.4	27.5	20.9	20.9	20.9
ASP (Rmb/ton)	44,010	34,431	32,534	43,465	44,572	46,251
Unit GP (Rmb/ton)	4,924	4,308	3,302	6,175	8,217	11,187

Sources: AT&M, NECIPS and Emerson Analytics