

NON-HORIZONTAL MERGERS IN CHINA: A CASE STUDY OF *KLA-TENCOR/ORBOTTECH*



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I. INTRODUCTION

On February 13, 2019, China's State Administration for Market Regulation ("SAMR") conditionally approved KLA-Tencor Corporation's ("KLA-Tencor") acquisition of Orbotech Ltd. ("Orbotech"), which marks the final antitrust clearance of this global transaction in all the related jurisdictions around the globe.² KLA-Tencor and Orbotech (collectively the "Parties") reached an acquisition agreement on March 18, 2018, with KLA-Tencor planning to acquire all of Orbotech's shares in cash and stock. After the acquisition, Orbotech will become a KLA-Tencor wholly-owned subsidiary.

On April 28, 2018, SAMR received the filing application from the Parties, and commenced the preliminary review process on June 26, 2018. On July 25, 2018, SAMR decided to conduct further investigation into this merger request and extended the investigation period. When the extended phase of further investigation expired on December 18, 2018, the Parties of the merger request withdrew the application. However, on December 20, 2018, the Parties re-submitted the filing application. SAMR was concerned that this merger might have an adverse impact of excluding and restricting competition in the semiconductor deposition and etching equipment market where Orbotech operates.

Upon investigation, SAMR concluded that KLA-Tencor and Orbotech had both vertical and conglomerate relationship in the markets of process control equipment, deposition equipment, and etching equipment. To address the competition concerns of SAMR, the Parties submitted the remedial plan on February 1, 2019, which, according to SAMR, could ease the expressed unfavorable effects.

Considering the potential effect of excluding and restricting competition in the markets of semiconductor deposition and etching equipment, as well as the remedial plan, SAMR decided to approve the merger request with a set of conditions, which will be valid for five years from February 13, 2019. The Parties and the merged entity are required to continuously provide semiconductor process control equipment and related services to the manufacturers of deposition and/or etching equipment in the Chinese market by following the Fair, Reasonable and Non-Discriminatory ("FRAND") principle. They are also prohibited from conducting tying/bundling or imposing unreasonable transaction conditions without proper reasons when supplying semiconductor process control equipment and deposition and/or etching equipment in the Chinese market. Orbotech is also prohibited from accessing the protected information belonging to other manufacturers of deposition and/or etching equipment.

² Anti-Monopoly Bureau of the State Administration for Market Regulation, *Announcement of the State Administration for Market Regulation on Anti-Monopoly Review Decision regarding the Conditional Approval of KLA-Tencor's Acquisition of Orbotech*, 2019 No. 7 (February 13, 2019), available at http://gkml.samr.gov.cn/nsjg/xwxcsl/201902/t20190220_290940.html.

II. CASE ANALYSIS

Founded in the U.S. in 1997, KLA-Tencor is a NASDAQ-listed company. It provides advanced process control and process-enabling solutions for manufacturing wafers and reticles, integrated circuits, printed circuit boards, packaging, and flat panel displays. KLA-Tencor has businesses across the globe, covering the U.S., Germany, France, Italy, Mainland China, India, Korea, Japan, Taiwan, etc.³ KLA-Tencor is also expanding its businesses and has established ten offices in China.⁴

Founded in Israel in 1981 and also a NASDAQ-listed company, Orbotech's main products include production and inspection equipment for printed circuit boards ("PCBs"), advanced packaging, flat panel displays ("FPDs"), and etching and deposition equipment for front-end specialty applications and back-end advanced packaging for the semiconductor industry.⁵ In May 2011, Orbotech established Orbotech Electronics (Suzhou) Co., Ltd. in Suzhou, China, which is engaged in the test and development of automated optical inspection ("AOI") equipment software and maintenance services.⁶

A. Market Definition

According to the SAMR decision, SAMR defined a global market of process control equipment, deposition equipment for specialty and advanced packaging, and etching equipment for specialty and advanced packaging as the relevant markets and concluded that the merger has or may have the effect of potentially excluding and restricting competition in the markets of semiconductor deposition and etching equipment.

Process control equipment is used to monitor the manufacturing and packaging procedures of semiconductor components, inspect the defects during the manufacturing procedures and measure the key indicators, which can be divided into the categories of leading-edge applications (for leading-edge devices manufacturing wafers smaller than 28 nanometers), specialty applications (for specialty devices manufacturing wafer bigger than 28 nanometers) and advanced packaging applications (for detecting defects and measuring indicators in back-end wafer packaging) according to the applicable procedures and various precision requirements. Deposition equipment adds thin layers of conductive or non-conductive materials to a wafer, while etching equipment selectively removes materials from unmasked portions of a wafer. Etching and deposition equipment can also be divided into the categories of leading-edge, specialties and advanced packaging applications.

With the rapid development of the manufacturing and packaging techniques for semiconductor components, there are no constant and well-defined boundaries for leading-edge applications, specialty applications, and advanced packaging applications.

KLA-Tencor's businesses cover process control equipment mostly for leading-edge applications, although its products are also finding some limited usages for specialties and advanced packaging applications. Orbotech products cover specialties and advanced packaging etching and deposition equipment. But as technology evolves, it may have the possibility of entering the leading-edge etching and deposition equipment market. Therefore, SAMR defined the following relevant product markets: i.e. process control equipment, deposition equipment for specialty and advanced packaging applications, and etching equipment for specialty and advanced packaging applications. Meanwhile, SAMR also analyzed the potential effect of the transaction on the market of deposition and etching equipment for leading-edge applications.

Due to no obvious barrier on cross-border sales of semiconductor equipment and the global supply and procurement nature of semiconductor equipment, the geographic market is naturally defined as the global market. However, as more than 80 percent of China's semiconductor equipment is imported, SAMR also focused on the merger impact on the China market.

³ KLA-Tencor, *Company Factsheet*, KLA-TENCOR.COM, available at https://www.kla-tencor.com/documents/KLA_Fact-Sheet.pdf.

⁴ *KLA-Tencor: Continuing to Increase Investment in China, Process Control Being the Key*, EE TIMES, November 14, 2017, available at <https://www.eet-china.com/news/201711140851.html>.

⁵ Orbotech, *About Orbotech*, available at: <https://www.orbotech.com/company/about>, accessed on March 16, 2019.

⁶ Suzhou Industrial Park, *Orbotech Electronics (Suzhou) Opens in SIP*, SIPAC.GOV.CN, May 26, 2011, available at http://www.sipac.gov.cn/english/categoryreport/IndustriesAnd-Enterprises/201105/t20110526_90443.htm.

B. Theory of Harm

Upon investigation, SAMR raised concerns regarding the merger's potential adverse impact of harming competition in the relevant markets. The theory of harm is essentially built on the spillover effect which is related to the nature of a conglomerate merger. In other words, the competition concern comes from the possibility that the merged entity would leverage its market position in one relevant market to exclude and restrict competition in another relevant market.

The most important is how the theory of harm works in this case. According to SAMR, the merged entity would have a dominant position in the market of process control equipment, with the market share of 50-55 percent and 55-60 percent respectively in the global and China markets. Note that the process control equipment is used mostly for leading edge applications. Market power is then hypothesized to be leveraged to expand and strengthen the merged entity's (Orbotech's) position in the market of etching and deposition equipment, which are almost exclusively used for specialty and advanced packaging applications. SAMR was concerned that the merged entity would conduct vertical foreclosure against other etching and deposition equipment manufacturers through the measures of refusal to deal, differentiated treatment, unreasonably excessive pricing, etc. SAMR also looked into the possibility of bundling, which might harm competition in the etching and deposition equipment markets.

As experts retained by the filing Parties, our view is that there is no horizontally overlapping business and very limited vertical relationship between the two merging companies. This merger is a conglomerate merger, which involves the acquisition of complementary products in neighboring markets (the market of process control equipment and the market of etching and deposition equipment). As a matter of antitrust economics, a conglomerate merger may raise limited or no antitrust concerns, which is generally procompetitive and often brings efficiency gains to the industry.

Conglomerate transactions potentially harm competition only when a party with significant market power in one market is able to engage in tying, bundling, or other means to gain market share in another relevant market. Although this type of transaction is technically and hypothetically possible, we show that there is a decided lack of economic incentive to do so. In other words, there are costs, in the form of loss of sales for example, associated with this type of tying conduct, and the upside gains in the deposition and etching markets pale in comparison to this loss. Furthermore, even if the Parties could do so, the conduct does not necessarily cause harm to competition or overall consumer welfare. On the contrary, a mixed bundling strategy could in fact be welfare-enhancing and beneficial to the demand side under normal circumstances.⁷

Considering the low entry threshold in the relevant markets of both process control equipment for specialty application and for wafer-level advanced packaging applications, and the vibrant competition in the areas from many alternative suppliers and the second-hand equipment brokers, even if KLA-Tencor has a high market share, it lacks substantive market power in the relevant markets. Thus, although tying and bundling are technically and hypothetically feasible, whether it is commercially capable of doing so is very much questionable. That is, even if KLA-Tencor engaged in tying and bundling, customers of KLA-Tencor or Orbotech may easily respond by simply switching to an alternative supplier. There would be no harm to competition.

⁷ Christine Halmenschlager & Andrea Mantovani, *On the Private and Social Desirability of Mixed Bundling in Complementary Markets with Cost Savings*, 39 INFO. ECON. & POLICY 45 (2017).

III. POLICY IMPLICATIONS

A. Remedies

Based on our analysis, the merger would cause little harm to competition in any of the relevant markets of concern to SAMR. Nevertheless, SAMR still took a remedial approach, presumably out of an abundance of caution, which is all understandable given the Chinese government’s intense interest of developing the semiconductor industry through indigenous innovation. The tying and bundling practice, albeit totally unlikely in our view, is still explicitly prohibited by SAMR for five years after the approval of the merger. In addition, according to the remedial plan, which only includes behavioral remedies, KLA-Tencor, Orbotech, and the merged entity shall continue to provide semiconductor process control equipment and services to etching and/or deposition equipment manufacturers in China under the FRAND principle. Moreover, they cannot impose unreasonable transaction conditions without proper reasons. Orbotech is also prohibited from accessing the protected information of other manufacturers of deposition and/or etching equipment.

B. Patterns of Remedies from Previous Cases

As far as we know, SAMR has conditionally approved 8 conglomerate mergers and blocked 1 merger (*Coca-Cola/Huiyuan*) from 2008 to 2019. It certainly has an obvious preference for behavioral remedies versus structural remedies, as all of the 8 mergers were imposed with behavioral remedies. In Table 1 below, we summarize these mergers and the associated remedies imposed by SAMR.

These mergers cover a wide range of industries, including energy, e-commerce, electronics, semiconductor, printer, glasses, and aviation. The duration of these behavioral remedies was mostly 5 years.

SAMR imposed only behavioral remedies on the pure conglomerate mergers and vertical and conglomerate mergers, which are *GE/Shenhua*, *Walmart/Yihaodian*, *Merck/AZ Electronics*, *Broadcom/Brocade*, and *KLA-Tencor/Orbotech*. Regarding the three mergers which are at least horizontal and conglomerate, only one was imposed with both structural and behavioral remedies, which is *United Technologies/Rockwell Collins*. The structural remedies require the divestiture of relevant assets but do not require an upfront buyer before the completion of the merger. And the behavioral remedies are mostly relevant to no tying or bundling practices, continued supply of relevant products and services, no differentiated treatment, no disclosure of relevant business information, etc.

Table 1. Remedy for Conditionally Approved Conglomerate Mergers

Case	Date of Approval	Merger Type	Overlapping Industry	Remedy Type	Duration of Behavioral Remedy
<i>GE/Shenhua</i>	11/10/11	Conglomerate	Energy	Behavioral	7 Years
<i>Walmart/Yihaodian</i>	08/13/12	Conglomerate	E-Commerce	Behavioral	4 Years
<i>Merck/AZ Electronics</i>	04/30/14	Conglomerate	Electronics	Behavioral	3 Years
<i>Broadcom/ Brocade</i>	08/22/17	Vertical and Conglomerate	Semiconductor	Behavioral	10 Years
<i>HP/Samsung</i>	10/05/17	Horizontal and Conglomerate	Printer	Behavioral	5 Years
<i>Essilor/ Luxottica</i>	07/25/18	Vertical, Horizontal and Conglomerate	Glasses	Behavioral	5 Years
<i>United Technologies/ Rockwell Collins</i>	11/23/18	Horizontal and Conglomerate	Aviation	Structural and Behavioral	5 Years
<i>KLA-Tencor/ Orbotech</i>	02/13/19	Vertical and Conglomerate	Semiconductor	Behavioral	5 Years

There have been five mergers that SAMR approved with conditions in the semiconductor industry. Table 2 below shows the remedies that SAMR imposed. In *MediaTek/Mstar* and *Advanced Semiconductor Engineering/Siliconware*, SAMR imposed unique hold-separate remedies. This might be interpreted as a type of hybrid of structural and behavioral remedies. In *NXP/Freescale*, SAMR required that the transaction could not close until the divestiture took place. We note that SAMR tends to have a less interventionist approach in the semiconductor industry, as it imposed only behavioral remedies in both *Broadcom/Brocade* and *KLA-Tencor/Orbotech*, and the duration of behavioral remedies decreased from 10 years to 5 years. It's also encouraging to see that in *Advanced Semiconductor Engineering/Siliconware*, SAMR used an economic analysis in its merger review process. SAMR analyzed the correlation coefficient of the profit margins of the involved parties, and concluded that they were close competitors.

Table 2. Remedy for Conditionally Approved Mergers in the Semiconductor Industry

Case	Date of Approval	Merger Type	Remedy	Duration of Behavioral Remedy	Time of Antitrust Investigation
<i>MediaTek/Mstar</i>	08/26/13	Horizontal	Hold Separate	3 Years	13 Months
<i>NXP/Freescale</i>	11/25/15	Horizontal	Divestiture	N/A	7.5 Months
<i>Broadcom/ Brocade</i>	08/22/17	Vertical and Conglomerate	Guarantee of Interoperability, Information Firewall, No Tying or Bundling	10 Years	7 Months
<i>ASE/SPIL</i>	11/24/17	Horizontal	Hold Separate, Reasonable Transaction Terms	24 Months	15 Months
<i>KLA-Tencor/ Orbotech</i>	02/13/19	Vertical and Conglomerate	Guarantee of Supply, No Tying or Bundling, Information Protection	5 Years	9.5 Months

Generally speaking, SAMR imposed more strict remedies on semiconductor concentrations than antitrust authorities in other jurisdictions. In *MediaTek/Mstar*, Taiwan's Fair Trade Commission ("TFTC") approved the acquisition and concluded that the merger would not hamper market competition but benefit the local economy. South Korea's Fair Trade Commission ("KFTC") also granted its approval but required no supply interruption for clients of both companies and no price monopoly. However, SAMR concluded that the concentration would eliminate and restrict competition in the relevant market in mainland China and imposed hold-separate remedies.

The *Broadcom/Brocade* transaction was conditionally approved in the EU, the U.S., and China. However, the antitrust authorities in those three jurisdictions imposed different behavioral remedies on the deal. European Commission required Broadcom to cooperate closely and in a timely manner with competing suppliers to achieve the same level of interoperability,⁸ while the U.S. Federal Trade Commission approved the deal with Broadcom's commitment to establish a firewall in order not to use the sensitive confidential information of Cisco, Brocade's only competitor in the worldwide market for fiber channel switches.⁹ In China, the remedies encompassed both the guarantee of the interoperability and the establishment of the firewall. Furthermore, SAMR also required no tying or bundling of fiber channel switches.¹⁰

SAMR's attitude towards *ASE/SPIL* (*Advanced Semiconductor Engineering/Siliconware Precision Industries*) was quite similar to the two transactions above. Both the Taiwan Fair Trade Commission and the U.S. Federal Trade Commission gave clearance to the merger, while SAMR conditionally approved the transactions with China's unique hold-separate remedy, in addition to some other behavioral remedies.

8 European Commission, Press Release, *Mergers: Commission clears acquisition of Brocade by Broadcom, subject to conditions*, May 12, 2017, available at http://europa.eu/rapid/press-release_IP-17-1309_en.htm.

9 *In the Matter of Broadcom Ltd. and Brocade Communications Systems, Inc.*, FTC Dkt. C-4622, FTC Decision and Order (August 17, 2017), available at <https://www.ftc.gov/enforcement/cases-proceedings/171-0027/broadcomlimitedbrocade-communications-systems>.

10 Ministry of Commerce, *Announcement of the Ministry of Commerce on Anti-Monopoly Review Decision regarding the Conditional Approval of Broadcom's Acquisition of Brocade*, 2017 No. 46 (August 22, 2017), available at <http://www.mofcom.gov.cn/article/b/c/201708/20170802632069.shtml>.

It appears that SAMR continues to be cautious with merger requests in the semiconductor industry in 2019. In *KLA-Tencor/Orbotech*, behavioral remedies were imposed in China, in contrast to unconditional approvals in all other relevant jurisdictions.

Meanwhile, China's antitrust authority is sometimes in line with the European and U.S. authorities in merger reviews. In *NXP/Freescale*, the remedies that SAMR imposed were quite similar to those imposed by the European Commission and the KFTC, including the divestiture of NXP's RF power business.

IV. CONCLUSION

The *KLA-Tencor/Orbotech* case is presumably a difficult case from SAMR's perspective, given the large market power of KLA-Tencor in the process control equipment market. This is particularly the case due to the overwhelmingly zealous attitude of the Chinese government towards indigenous innovation in the semiconductor industry. However, we are relieved to see that antitrust economic reasoning at the bureau prevailed over anything else. The bottom line is that a competition harm theory in the case of a conglomerate merger needs to be carefully examined, not just from a technically and hypothetically feasible perspective, but also from the economic incentive and viability perspective.

We also observe from this case that SAMR appears to adopt a less interventionist approach to merger control in that it prefers using behavioral remedies instead of structural remedies. However, it's still worthwhile to point out that the semiconductor industry, due to its sensitive nature, is still one of the focuses of SAMR's merger reviews. China has its own unique characteristics in the wake of its industrial policies and industry development, which may be quite different from other jurisdictions such as the U.S. and the EU. Therefore, the antitrust authority's competition concerns may, accordingly, be quite different.

With China's increasing role and influence in the global semiconductor industry, parties that file global mergers worldwide should pay more attention to the antitrust regulatory approval process in China, prepare the merger filing with sound and rigorous economic analysis, and always be ready to address the unique competition concerns from China's antitrust authority.



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