



Case Summary

24 November 2014

Clearance of Merger between Tokyo Electron and Applied Materials

Sector: Semiconductor manufacturing equipment

Ref: B5-138/13

Date of Decision: 12.11.2014

Following an in-depth examination the Bundeskartellamt has cleared the proposed merger between Tokyo Electron Ltd. (Japan) and Applied Materials, Inc. (USA) to form the new company Eteris (NL). The merger project, which is of international significance, was also examined by seven other national competition authorities. In examining the merger the Bundeskartellamt worked closely together with several other competition authorities, especially with the United States Department of Justice. The competition authorities in Israel and Singapore have already cleared the merger project. The decisions of the competition authorities in the USA, South Korea, Japan, Taiwan and China were still pending at the time of the Bundeskartellamt's decision. The focus of the Bundeskartellamt's examination was whether the merger would create horizontal or conglomerate effects or whether it would affect innovation in the production of equipment for semiconductor manufacture.

Both parties to the merger develop and produce equipment for the manufacture of semiconductors¹ (chips). This includes many different and very sophisticated types of equipment, each of which covers a specific stage in the manufacturing process. If all the types of equipment produced are taken together, based on figures for 2013, Applied Materials is the number one manufacturer in this sector and Tokyo Electron the number four. The parties to the merger also develop and produce equipment for the manufacture of flat panel displays. These markets are only marginally affected by the merger because the relevant business divisions of the two companies only account for an extremely small share of the parties' total turnover. The merger is not expected to significantly impede effective competition in these markets.

¹ Semiconductors are solid substances which have electrical conductivity which ranges between that of a conductor and a non-conductor. They are key components in electronics, especially in microelectronics. The parties develop and produce machinery for the manufacture of microelectronic components and microelectronic assemblies (integrated circuits).

In an intensive one-year investigation the Bundeskartellamt examined whether the proposed merger would have anticompetitive effects, in particular in respect of the equipment for the manufacture of semiconductors.

It could be ruled out that the merger will create horizontal effects in the markets under examination. The merger results in only a few overlaps in the parties' areas of activity. Although in a sector-wide analysis the parties represent the number one and four in the market, the authority's investigations have shown that a sector-wide analysis would not be an appropriate means for assessing this merger project under merger control. Based on the concept of substitutability of the equipment from the customers' perspective (so-called demand-side substitutability), a more differentiated product market definition is necessary in this case. The individual types of equipment only cover single stages² of the semiconductor manufacturing process and do not stand in competition with equipment used in other stages of this process. Consequently, almost 40 individual markets for the production of semiconductor manufacturing equipment had to be closely examined to find out whether the merger would result in the elimination of a competitor from the market and an anticompetitive increase in market power. In geographic terms all the markets had to be defined as worldwide. However, the investigations have shown that the merger will not lead to any significant market share additions in spite of the large number of markets concerned. There are only overlaps in the activities of Tokyo Electron and Applied Materials on nine individual markets. In all the other markets only one of the companies is active.

Of the almost 40 individual markets affected in total, only 18 are subject to the intervention powers of the Bundeskartellamt. The remaining 22 are so-called de-minimis markets. Under German competition law this term refers to markets which have existed for at least five years and in which less than 15 million Euros in turnover was achieved in Germany in the last calendar year. The Bundeskartellamt's intervention in these markets is expressly excluded by

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In semiconductor manufacture the individual components of microelectronic circuits are produced on a semiconductor substrate, usually a so-called wafer (i.e. in most cases a silicon wafer), by doping / alloying the substrate material and applying layers of functional material. Firstly, a photosensitive film, usually a photo-resistant film, is applied to the wafer ("photoresist processing (track)"). Then thin layers of isolating or conductive material are deposited on the substrate ("deposition"), structured by exposure to light ("lithography") and transferred by means of etching ("etch") into the layer underneath. These steps are repeated several times until the semiconductor displays the desired properties. Any uneven areas emerging within the production process are flattened ("planarisation") and the wafers are cleaned before each new lithography process by removing residue and particles ("clean"). Further fabrication steps include "rapid thermal processing - RTP", where the wafers are exposed to extreme heat for a very short time to enhance their electrical attributes and "ion implant", where neutral atoms are implanted into a wafer substrate by means of ion (gun) sputtering in order to attain the desired electrical properties in defined areas of the wafers. These and several other production stages require specialised machines, which are the subject of this examination.

law. This also applies if the markets concerned, such as in the Tokyo Electron/Applied Materials merger, are considered in economic terms as worldwide.

Initially indicators for possible competition problems caused by horizontal overlaps could only be detected on one market. This was the dielectric etch (including bump)³ market, which is not a de-minimis market. Tokyo Electron has a strong position in this market. The concentration leads to a small increase in market share. However, after intensive investigation and examination an overall appraisal of the competitive conditions in this market has shown that the parties' scope of action will be sufficiently limited (even) after the merger or will not change to a degree which would be of relevance for the decision. The parties are not close competitors. Moreover, they are exposed to strong competitive pressure from LAM Research, which is also a well-placed competitor. This situation is expected to continue after the merger is implemented.

The other eight markets in which there are horizontal overlaps are either de-minimis markets or markets in which the merger is not expected to significantly impede effective competition post merger due to the parties' comparably weak market position.

Anticompetitive conglomerate effects could also be ruled out. In particular, the parties are not expected to adopt anticompetitive bundling strategies. On account of the view expressed by market participants the Bundeskartellamt closely examined whether the further combination of product portfolios by the parties as a result of the merger would restrict competition. However, an extensive analysis of the market situation has shown that there is insufficient likelihood that the merger would significantly impede effective competition as a consequence of conglomerate effects. Although the parties were found to have strong market power on several individual markets and despite the fact that they have complementary products with largely identical customers, the merger is ultimately not expected to significantly impede effective competition on account of any bundling or tying strategies because the parties lack the ability and incentives for such a foreclosure strategy. The fact that the Bundeskartellamt's investigations found no indications of any successful bundling strategies in the past supported this conclusion. It was also evident from the results of the investigations that different types of equipment are often not purchased at the same time. Decisive factors in the procurement of equipment were the type of procurement process and the clear preference of the customer for the best technical solution for each individual stage of the manufacturing process. The investigations also revealed the possibility of counter strategies at least by the leading customers, e.g. the threat to purchase

³ This special etching process (dielectric etch) is characterised by its very low electrical conductivity. Dielectric etchants are used exclusively in the etching of dielectric films.

fewer of the other products offered by the same supplier or by supporting the entry into the market of newcomers or supporting the expansion of other established suppliers.

Finally, the merger is also unlikely to significantly hinder innovation. As chip production is a highly dynamic sector, the upstream level of chip production equipment, i.e. the level affected in this case, also depends on constant technological change. The Bundeskartellamt also investigated the extent to which the proposed merger is likely to affect competition in innovation and concluded that the merger would also have no significant effect on innovation within the time-frame relevant for German merger control of three to five years. The investigations have not provided sufficiently convincing indications that research and development (R&D) and innovation will be limited or delayed by the two companies within this relevant time-frame to an extent that would harm competition. Similarly, it could not be predicted with a sufficient degree of likelihood that the merged company will in future significantly impede effective competition in the new markets for equipment for the manufacture of 450 mm wafers⁴.

In examining all three aspects (horizontal and conglomerate effects as well as effects on innovation competition) the Bundeskartellamt also had to consider that there are a number of large international companies with strong buyer power among the customers of semiconductor manufacturing equipment. These companies can be expected to counter the exertion of market power by the parties to the merger. In the final analysis the merger is not expected to significantly impede effective competition in this sector.

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This area of semiconductor manufacture is characterised by the following technological innovation: Up to now wafers with a diameter of 200 mm and 300 mm have been processed which are then cut into the respective number of chips. Research and development is now being undertaken to explore the possibility of using 450 mm wafers. This increase in the size of wafers makes it possible for the semiconductor manufacturers to manufacture more chips per wafer. However, in order to achieve this the entire equipment used in the semiconductor manufacturing line would have to be redesigned to accommodate the new wafer size.