

Schweizer Rüstungsindustrie und Kriegsmaterialhandel zur Zeit des Nationalsozialismus.

Unternehmensstrategien – Marktentwicklung – politische Überwachung

The Swiss armaments industry and trade in war material during the National Socialist period. Corporate strategies – market trends - political control

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Summary

The study examines Swiss industry's role in National Socialist Germany's military procurement before and during the Second World War and the extent to which political monitoring attempts influenced military technology relations. It focuses especially on war materiel as a factor influencing research and development, construction, testing, market launch and sales of weaponry in the narrower sense over the long term, and aims to shed light on the attitudes, underlying motives and scope for action of the companies involved. In terms of methodology, three investigative stages were developed: 1) company and sectoral analysis; 2) market trends; 3) analysis of the interplay between corporate strategies and political/legal control measures. The study draws on a substantial body of source material from numerous companies, interest groups and public archives in seven countries.

Customs statistics analysed for the first time reveal that Swiss exports of weapons, weapon components and ammunition totalled CHF 751 million between 1940 and 1944, thus accounting for 10.6% of total merchandise exports during this five-year period (Table 24). Including exports of fuses amounting to at least CHF 228 million (Customs Tariff 948a, Table 23) and military optical equipment with a value of around CHF 38 million (Customs Tariff 937, Table 13), these exports exceeded CHF 1 billion, i.e. 14.3% of merchandise exports during this period. The range of products was extremely limited: rapid-firing 20-mm-guns and their components for use against ground targets, in air defence and for equipping aircraft and warships; 20-mm-ammunition; mechanical timer fuses and components (German type S/30) for 88-mm-shells and above; Dixi GPA fuses; and military optical equipment, primarily coincidence rangefinders (80 cm and 150 cm).

Between 1940 and 1944, 84% of Swiss munitions exports went to Axis countries, the remaining 16% being divided equally between the Allies and neutral countries (Table 22). The neutral countries maintained close military technology relations with the Axis powers and may well have re-exported the imports from Switzerland. At the start of the war, most Swiss exports of war materiel went to the Western powers. Until the first year of the war, Germany's industrial imports consisted mainly of capital goods such as machine tools or special parts; it did not begin to import manufactured goods such as weapons from Switzerland until late 1940 and early 1941. Between 1941 and 1944, 89% of all exports of Swiss precision tools, 87% of camouflage positions for fuses, 81% of iron and steel products, 75% of ball-bearings, 68% of weapons, 66% of machine tools and 65% of automotive electricals went to Germany (Table 21).

In the highly politicized environment governing the production and marketing of munitions, power centres invariably emerged which were able to draw companies into existing or new business and then drop them again. These more or less formalized networks of companies were termed «production rings» (*Fertigungskreise*) by the National Socialist planners. The Allies, too, made a clear distinction between the major munitions companies and their associated networks of sub-contractors and suppliers. From an analytical perspective, the

arrangement was akin to the «extended workbench» model and could encompass numerous companies in a hierarchical structure which also transcended national borders. At the bottom were the firms manufacturing individual components in accordance with precise specifications; at the top were the companies which controlled capital, technology and business connections and whose status – generally unbeknownst to the general public – was acquired through political wheeling and dealing and pledges from identifiable groups within the military or procurement agencies.

The group of companies to be studied was therefore very limited. Four companies in Switzerland had the technology to manufacture rapid-firing 20-mm-guns during the war: *Werkzeugmaschinenfabrik Oerlikon Bührle & Co.* in Zurich-Oerlikon, *Hispano Suiza (Suisse) SA* in Geneva, *Waffenfabrik Solothurn AG* in Solothurn, and the state-owned *Eidgenössische Waffenfabrik Bern* in Berne. *Oerlikon Bührle*, *Hispano Suiza* and the state-owned *Eidgenössische Munitionsfabrik Altdorf* in Altdorf manufactured 20-mm-ammunition. Finished S/30 fuses were assembled by *Tavaro SA* in Geneva and *Oerlikon Bührle*; a third production ring for S/30 fuse components was headed by *Machines Dixi SA* in Le Locle, with *Gebrüder Junghans GmbH* in Schramberg, a watch- and fuse-making factory in the Black Forest, being responsible for assembly. Rangefinders were manufactured by *Verkaufs-Aktiengesellschaft Heinrich Wilds geodätischer Instrumente* in Heerbrugg. Whereas the state-owned enterprises mainly served the domestic market, the six private companies named above were the market leaders among the munitions-exporting companies. Of the total exports of war materiel approved between 1940 and 1944, *Oerlikon Bührle* accounted for 52%, *Tavaro* 11%, *Dixi* 10%, *Hispano Suiza* 7%, *Waffenfabrik Solothurn* 4% and *Wild Heerbrugg* 2%, with all the other suppliers accounting for lesser shares (Table 25).

These companies found it difficult to break into the German market. During the first three years of the war, *Oerlikon Bührle* therefore paid out higher sums in commission and bribes than in wages for its entire workforce of more than 3000 employees (Table 46). The commission and bribes paid by *Tavaro* in 1942 almost equalled its total payroll for 1940 or half its payroll for 1942 (Table 73). After 1938, the German munitions industry was so highly politicized that safeguarding the power positions of the authorities and companies involved – rather than increasing military/industrial efficiency – was often the main priority (Chapter 6.1.1). Without direct access to the key informal networks, it was almost impossible for outsiders to break into the core areas of Germany's munitions market. In the case of *Tavaro*, it was only the seeming departure of Jewish industrialists from its Board of Directors which opened the way for the company to supply fuses to Germany (Chapter 5.2.3).

Oerlikon Bührle faced at least three obstacles in Germany. Firstly, until the end of 1944, *Rheinische Metallwaren- und Maschinenfabrik* in Düsseldorf (*Rheinmetall*) and *Mauser-Werke AG* in Oberndorf produced sufficient quantities of high-quality rapid-firing 20-mm-guns which were popular with the German troops (Table 31). *Oerlikon's* rival product, on the other hand, had repeatedly failed the tests carried out by the German Army Ordnance Department (*Heereswaffenamt*): the *Oerlikon* gun's performance in automatic firing was inferior, changing the barrel was a complicated process, and it could only fire specially manufactured ammunition. Secondly, the German Government's policy was to use its extremely limited supplies of foreign currency to purchase scarce items such as capital goods, precision instruments, ball-bearings or precision engineering components rather than spending them on the relatively straightforward assembly of manufactured goods such as weapons. Thirdly, although the German rival companies made every effort to obtain capital goods and general components from sub-contractors in Germany and abroad as necessary, they were determined to control the profitable sales of finished weapons themselves.

So despite considerable efforts throughout the war, the leading private manufacturer of small arms in Switzerland, *Schweizerische Industrie-Gesellschaft (SIG)* in Neuhausen, was unable to supply weapons or even weapons components to Germany. However, a very different

situation applied with regard to the supply of equipment to manufacture German weapons. Before and during the war, SIG exported barrel-processing machines to Germany on a substantial scale (Chapter 4.2.2) and also was one of *Oerlikon Bührle's* main sub-contractors. Given its lack of competitiveness on the export markets, the domestic market was crucial for SIG. The Neuhausen firm managed to recoup its losses by concluding clandestine market agreements which pushed up the prices of supplies to the Swiss army and pushed down quality standards (Chapter 4.2.1).

Although Germany could have dispensed with its arms imports from Switzerland quite easily, it was heavily dependent on specific components in order to manufacture ammunition and fuses. Once the Oerlikon gun had been introduced in the German army and navy, Germany was reliant, for its manufacture of 20-mm-Oerlikon ammunition, on purchases of specially designed cartridge cases which were mainly produced by *Eidgenössische Munitionsfabrik Altdorf Junghans* and the other German manufacturer of S/30 mechanical timer fuses, *Gebr. Thiel GmbH* in Ruhla (Thuringia), were also dependent from the outset on imports of watchmakers' toothed parts («pinions») from Switzerland. Two Swiss pinion manufacturers, *Arnold Charpilloz*, *Fabrique Hélios* in Bévillard and *Vereinigte Pignons-Fabriken AG* in Grenchen, were the main suppliers even during the war (Table 25 and Chapter 6.5.2).

Overall, between 1940 and 1944, Germany imported roughly as many 20-mm-guns and their components from Switzerland as it manufactured itself in six months in 1941 and in two months in 1944 (Table 31). The 14.3 million rounds of 20-mm-ammunition supplied by *Oerlikon Bührle* and *Hispano* to Axis countries during the war were roughly equivalent to the amount used by Germany to shoot down between 2200 and 2850 Allied aircraft. Germany's production of S/30 timer fuses would have run into difficulties without supplies of Swiss components. However, as a proportion of Germany's total munitions production capacity, these supplies were of negligible significance. German imports of ball-bearings, precision instruments, machine tools etc. – which were not included in this study – were probably more important than Switzerland's exports of armaments in the narrower sense, for the German munitions industry was immensely productive and had been geared to self-sufficiency for years.

The German munitions industry's massive capacity resulted from the meticulous planning of a 102 division armed force and the mass industrial production of armaments since the early 1920s. Contravening the arms control provisions set forth in the Treaty of Versailles, German munitions companies – with great initiative, and coordinated by German army command in Berlin – had clandestinely prepared the re-arming of Germany in both technological and industrial terms. This study reveals for the first time the extent to which the development of an export-oriented Swiss munitions industry was based on the outflow of German military technology and capital, with markets being organized via German military advisors (Chapter 2). In a second phase, export-oriented companies were set up in Switzerland when French firms attempted to circumvent their government's nationalization policy by establishing branches in Geneva (Chapter 4.3).

Swiss industry played a less significant role in Germany's clandestine military procurement than Sweden and the Netherlands or, indeed, the Soviet Union. It was not the Becker gun – the basis of weapons production at *Werkzeugmaschinenfabrik Oerlikon*, which had passed into German ownership in 1923-24 – which emerged as the winner in German army command's selection process in 1931-32, but the weapons made by *Krupp* and *Rheinmetall*. *Waffenfabrik Solothurn* – which, with *Rheinmetall*, was taken over with Austrian arms capital in 1929 – was only of interest as a manufacturing site as long as the key objective was to circumvent the Allies' arms control provisions in Austria and Hungary by supplying light machine-guns on a massive scale and shipping other camouflaged supplies of heavy machine-guns to the Soviet Union via Italy. The company's fortunes declined as early as

October 1932, when Germany stepped up weapons production at domestic level, as this was more advantageous in terms of wealth creation and foreign exchange acquisition.

Apart from the availability of a well-trained workforce, Switzerland's locational advantage was not its industrial infrastructure or transport network, but the absence of official controls over the production and sale of weapons and ammunition. Until 1938, there was no legal basis – or, indeed, any bureaucratic capacity – to monitor its output and exports of war materiel. Furthermore, Swiss foreign policy consistently opposed the harsh «victors' logic» of the Versailles Treaty and worked actively within the League of Nations to restore Germany's rights. Swiss disarmament policy was based on a concept of «balance» which required Germany to re-arm and the Allies to disarm. Germany's export-oriented off-shore munitions production was also welcomed in Switzerland as it resulted in the award of sub-contracts to Switzerland's hard-pressed state-owned munitions factories and provided at least a measure of camouflage for the exports of their products to belligerent states, which were problematical in terms of neutrality law.

The weapons technology which had been developed clandestinely in Switzerland during the 1920s and early 1930s was thus re-exported to Germany in two phases. The German side initiated the first phase. In the case of *Werkzeugmaschinenfabrik Oerlikon*, the German Army Ordnance Department arranged for the return, in 1930, of the specifications for the mass production of the Becker gun which had continued to undergo development at Oerlikon. Georg Thomas, Chief of Staff and future Head of the Defence Economy (*Wehrwirtschaft*) noted with satisfaction that Oerlikon had achieved the targets set out in the contract with German army command on 28 November 1924. *Rheinmetall*, too, transferred the weapons technology developed at *Waffenfabrik Solothurn* to Düsseldorf around 1932. The German munitions industry benefited additionally from the know-how transfer resulting when leading weapons design engineers moved between firms working on the development of 20-mm-guns.

The second phase of weapons technology transfer was initiated not by the recipient states but by the munitions companies based in the neutral countries. For example, when *Werkzeugmaschinenfabrik Oerlikon* sought to break into the self-sufficient German munitions market while retaining its main production site in Switzerland, it had to transfer its technology to the Reich. In 1934, in conjunction with *Reichswehr* authorities in Berlin, Oerlikon therefore set up a subsidiary company, *Ikaria Gesellschaft für Flugzeugzubehör mbH*, which manufactured 20-mm-aircraft-guns in substantial quantities until the end of the war. Even Germany's allies based their arms procurement on German technology which had been developed clandestinely in Switzerland in the late 1920s and early 1930s. In Italy, *Breda* acquired licences from *Waffenfabrik Solothurn*, and *Armiscotti* from *Oerlikon*, to manufacture rapid-firing 20-mm-guns in 1932; the Japanese Government followed suit in 1935 and the Japanese navy in 1936. The latter also set up assembly lines in 1940 to manufacture Oerlikon shells. The political and technological support for German's clandestine arms procurement in the 1920s and early 1930s, combined with the (re-)export of technology for rapid-firing 20-mm-weapons, probably did more to enhance the Axis powers' military capabilities than direct exports of war materiel from Switzerland to Germany, Italy and Japan during the war (Chapter 3).

Apart from the exorbitant profits for the industrialists concerned, the Swiss munitions exports to Germany and Italy during the war offered no advantage to Switzerland. The key companies involved did little to benefit national defence, but greatly increased Switzerland's vulnerability to blackmail. They also depleted its reserves of strategically important raw materials, frequently breached neutrality law, and created very few jobs as little of the receipts – which were bankrolled by the Swiss taxpayers – flowed into wages. At the crucial moment, *Oerlikon Bührle*, *Dixi*, *Hispano Suiza* and *Waffenfabrik Solothurn* gave priority to the foreign rather than the domestic market. Far higher prices could be obtained from exports than from sales to the Swiss military authorities, so this latter option was only taken when there was a need to offset

fluctuations in the export market. Only *Tavaro* and *Wild Heerbrugg* played any significant role in Swiss military procurement alongside their export trade; Switzerland's state-owned munitions factories did not produce timer fuses or military optical equipment themselves and were therefore reliant on the products supplied by these companies.

The export-oriented Swiss munitions industry increased Switzerland's vulnerability to blackmail in 1939-40, because Germany was no longer prepared to accept Switzerland's massive and one-sided exports of munitions to the Western Allies. It therefore issued an ultimatum: the exports had to be curbed, and German raw materials were no longer to be used for them. Otherwise, Germany would cut its coal exports to Switzerland. The Swiss authorities declined to meet these demands, however; instead, they sought a solution which aimed to increase the parity of war materiel exports to both sides, thus continuing a policy developed since 1938. These efforts proved fruitless for some time as Germany had no intention of using its limited foreign currency reserves to purchase ready-made weapons and ammunition when it could manufacture them itself – the result, not least, of its successful clandestine military procurement measures. Even in summer 1940, the Berne authorities had to work very hard to ensure that the flow of exports of war materiel could be channelled away from the Western powers and towards Germany. Due to continuing reservations on the part of the German military authorities, the only companies initially involved in the German market were firms which maintained their own contacts with the relevant authorities in Berlin and could pay generous bribes. The others did not manage to break into the German market until after the Eastern campaigns and the first defeats.

There was substantial scope for corporate action, as well as considerable freedom to produce for the domestic market, the Allies or the Axis powers. Companies which opted to supply arms primarily or exclusively to the Axis companies were unconcerned if they were blacklisted by the Allies or if pressure was brought to bear in some other way. They also encountered no difficulties with the Berne authorities. In two listing campaigns launched in spring 1942 and late summer 1943, the Allies attempted to exert pressure on subcontractors which were also supplying to the Western powers. This made no difference to total Swiss exports to the Axis countries as companies cutting back their exports to Germany and Italy could easily be replaced with others. The Swiss authorities also played a part by reclassifying goods in the customs tariffs in order to exploit the remaining quotas to the maximum extent. Swiss exports of war materiel to the Axis powers were therefore limited solely by the recipient's solvency or the amount of clearing credit provided by Switzerland. By 1946 and 1947 respectively, British and US interest in the technology pioneered by Switzerland's leading munitions companies was so substantial that they disregarded the companies' involvement with Nazi Germany and the other Axis powers. By this time, neither the Swiss authorities and companies nor the Allies themselves were keen to reveal the details of these relations.

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