FINAL REPORT No. 404
ITEM No. 22

GERMAN ASBESTOS INDUSTRY

BRITISH INTELLIGENCE OBJECTIVES
SUB-COMMITTEE

LONDON - H.M. STATIONERY OFFICE.

Price 6s. 6d. net

G E R M A N A S B E S T O S I N D U S T R Y

Reported by:

J. D. Blakeley	M. of W.
E. L. Dawson	M. of W.
R. Gaze	M. of W.
M. B. Henderson	M. of W.

BIOS Target Numbers ; See Table of Contents

BRITISH INTELLIGENCE OBJECTIVES SUB-COMMITTEE,
32 BRYANSTON SQUARE, W.1.

TABLE OF CONTENTS

TABLE OF CONTENTS
(contd.)

TABLE OF CONTENTS
(contd.)

TABLE OF CONTENTS
(contd.)

PERSONNEL OF TEAM

J. D. Blakeley	M. of Wks.
E. L. Dawson	M. of Wks.
R. Gaze	M. of Wks.
M. B. Henderson	M. of Wks.

SECTION 1

INTRODUCTION & GENERAL

[redacted]ry

The technical development of the German asbestos industry has been retarded during the war by the shortage of asbestos.

At the same time, considerable energy has been devoted to the production of conventional asbestos products from substitute materials.

The use of slag wool, mineral wool, steel wool and cellulose as substitute fibres is of some interest, and ingenious methods of incorporating short asbestos fibres into textiles have been devised.

[redacted]jects of Investigation

The investigation was made at the request of the Ministry of Supply and the Ministry of Works with the object of making a general survey of the asbestos industry of Germany, and as a working basis, eighteen specific targets were given.

Our official instructions were as follows:-

"In view of the uncertainty in regard to the present location of the specified targets and location of personal contacts it is suggested that the visit should be of an exploratory nature with the object of obtaining as much information as possible in the time available, by inspection of targets, by enquiry through military channels at Army Group H.Q., and by interrogation of German technical personnel encountered. From the report submitted by the team it will be decided whether further parties of investigators should be sent to obtain more detailed information of specific objectives."

Prior Information Available

A copy of the report by J. P. Kottcamp of T.I.I.C. on the German building materials industry, dated July 1945, was available, giving a full account of the efforts made by the Germans to mine asbestos in the occupied countries, notably Yugo-Slavia, together with a survey of a number of important asbestos works in Germany.

His conclusions were as follows:-

"While many of the plants visited were of interest from the standpoint of the use of substitute materials, there was little of real value to the building material industry as a whole. In conclusion, it is reasonable to state that the section of the building materials industry covered by this report is far behind both England and the United States, and further studies do not seem warranted."

Apart from this, we had available two Foreign Office publications, i.e., Economic Surveys of the Mineral Industries, and the Building Industries of Germany, both accurate, so far as we can assess, with regard to the use of asbestos.

There was little else of real value to us in the files at F.I.A.T. or British Headquarters.

From this information, it was obvious that Germany had been very short of raw asbestos, particularly in the spinning grades, and that the chief efforts of the industry had been to find substitutes of various kinds.

It was known that some of the occupied countries, notably France, had large stocks of asbestos. This, together with material from Finland, Italy and Russia, had probably enabled the Germans to build up a considerable stock in the early part of the war.

Organisation of the Asbestos Industry

It was quite late in the investigation when we were able to get some sort of clear picture of the internal organisation of the industry, so that all the details may not be complete, but the information given to us by E. Merkel (23) indicated that the German asbestos manufacturing industry was administered by the W.D.A. (Wirkschaftstelle Deutsche Asbest) through the following branch groups:-

Asbestos/Cement	Leader:	Dr. Hugo Buschmann of Eternit. Rudow. Berlin.
Asbestos/Rubber Sheeting	Leader:	Herr R. Eisermann of Klinger. Vienna.
Ring & Joint Cutting	Leader:	Herr Paul Eistetter of Diring. Stuttgart.
Textiles & Packings	Leader:	Herr Ewald Merkel of Martin Merkel. Hamburg.

The head of the Reichstelle for asbestos and rubber was Dr. E. Jehle who was familiar only with the rubber trade, so that the actual administrative work fell to his assistant, Hr. Heyl.

Dr. Buschmann, the leader of the A/C Section, is now Secretary of State for Commerce and Provision in the Russian occupied sector of Germany.

So far as textiles and packings are concerned, Herr Merkel still is acting as spokesman for the group and we found him to be very helpful. He told us that the industry now comes under the plastics section of Military Government, but that his colleagues would prefer to be grouped along with the rubber section.

Stocks & Sources of Supply of Raw Asbestos

According to the information given to us, the total stock of raw asbestos in the twenty-four firms visited is of the following order:-

Spinning Fibre	14 tons
Short Fibre	540 tons
Asbestos Meal	140 tons

The short fibre material was from a variety of sources, including Italy, Russia, Czecho-Slovakia, and Finland, while the asbestos meal apparently was of German origin, being mined at Hof (Wurlitz) in Bavaria. This meal is of very short staple, and is useful only as a filler.

We were informed by Paul Kind (1) that it was the wartime policy of the German government to import asbestos yarn "already spun" from Italy, rather than to import long-fibre Italian asbestos. As a result, existing stocks of spinning fibre had dwindled rapidly.

A further aspect of their policy seems to have been the withdrawal of stocks of asbestos from the asbestos/cement firms relatively early in the war, and it is possible that this withdrawal followed the discovery that short fibres could be used in spinning mixes.

In several cases, we were told that "the asbestos was sent to us from Berlin" suggesting the concentration of stocks, and probable central distribution of material removed from other countries.

Research & Development

Our conclusions confirm those of Kottcamp that little or no research work on new applications for asbestos has been done during the war years, and we are of the opinion that all the energy of their technicians was devoted to finding substitutes, particularly for long fibre asbestos which was in very short supply. Even technical control of output appeared to have been sacrificed.

The use of substitutes falls into three classes, i.e.,

(a) The modification of their machinery to spin asbestos of very short staple.

(b) The use of non-asbestos fibres of comparatively long staple.

(c) Attempts to produce a synthetic asbestos.

(a) Use of short staple asbestos

The first developments seem to have been made by a small spinner, Kuechemmeister of Freiburg in Saxony, and later his method was copied by other asbestos spinners.

In this process short fibre is introduced into a previously carded web of longer fibre, usually cotton or zell-wolle, and two methods were seen:

(1) A lap of cotton or zell-wolle, formed on a standard roller and clearer card equipped with a cross folder, is led by a Scotch feed on to the feed lattice of a second card. Over the feed lattice of this second card is a conventional hopper fitted with a spike lattice, and weighing action, so that short asbestos can be fed continuously onto the entering lap, which is then carded on a roller and clearer card as before.

It was claimed that using 50% short fibre in the mix, 100 kilos of raw material would make 60 kilos of yarn (18).

(2) The short fibre is introduced between two webs of cotton or zell-wolle, formed on a double-doffer card, by means of a feed between the two doffers. This box is hand fed, and the "sandwich" web is divided by leather bands in the usual way.

Some relatively new Gessner cards (24) had this type of feed trough as a standard fitting.

(b) Use of non-asbestos fibres

Obviously, many different fibres had been tried, but the ones in general use were glass fibre, mineral wool, steel wool, and in one case (24) peat. Zell-wolle was used, commonly, to replace cotton.

In some cases, glass yarns were doubled with asbestos yarns, but in other cases, the glass was put into the hopper of the card (20).

Mineral (slag) wool was the most common substitute, and a special quality for spinning was supplied by Deutsche Eisenwerke of Gelsenkirchen. One mixture for carding was 20% cotton or zell-wolle and 80% mineral wool, and in one case (18) 15% of steel wool was included in the mix for carding.

Short mineral wool, and asbestos meal were common diluents for asbestos in the manufacture of millboard. For "asbestos cement" sheeting, the asbestos was replaced entirely by shredded paper pulp.

(c) Synthetic asbestos

It had been known for some time that the Germans had been making attempts to produce synthetic asbestos, but so far as we understood, no samples had been seen in England and there had been no reports of the results of these experiments.

We were told of three different places where the experiments had been made, but the only samples ever seen by the industry were of no commercial value, since they were so short as to be almost like powder.

The three references are as follows:-

(1) Samples made at Dessau by Dr. Zschacke, who was the principal of the Ceramic School. The material was very brittle and the maximum fibre length was of the order of $\frac{1}{2}$ mm. The melting point was claimed to be higher than 1100°C. Frankfurt(1) told us that they tried the material on instructions from Berlin, but that there was no bulk production.

(2) Dr. Ludke worked on the production of synthetic asbestos in the high school at Clausthal (Thuringen-Leipzig). This material was of the amphibole type, and was made under heat and high pressure, but the fibres were never more than 2 - 3 mms. long.

(3) At a conference of the whole industry in 1943 at the Technical University, Dresden, the delegates were told that I.G. were working on the production of synthetic asbestos. No results were reported to the industry. It seemed to be the general opinion that the publicity given to the production of synthetic asbestos was entirely propaganda, and certainly none of the works people took it seriously.

Attitude of Personnel Interviewed

While invariably there was a certain amount of initial reserve, or even suspicion about the reason for our visit, we found the personnel quite ready to answer any questions put to them, although rarely willing to volunteer information.

We were shown all details of the machinery, but, on the few occasions that we asked for working drawings, we were told either that they had been destroyed in the raids, or that they had been stolen.

We had no difficulty in obtaining formulae for mixings, and any samples asked for were given readily.

The attitude of senior officials seemed to vary in relation to the amount of damage which their plants had suffered. In many of the factories we found the people working very industriously either to maintain production of some kind, or to rebuild damaged machinery so that production could be resumed. For example, in one case (19) toys were being made from parts of unused land mines, and another firm (10) were building a production machine from spare parts.

In a few of the partially damaged works, we encountered a hope that the allies would supply raw materials, and secondhand machinery so that production could be resumed. This hope obviously has encouraged their co-operative attitude.

SECTION II

INDUSTRY REPORTS

Summary

Plant generally is old and methods behind the best British and American practice. Few firms have any technical control of quality, and working conditions have been poor. Some jointing manufacturers had modern plants and high quality output.

Only two brake lining firms and three asbestos cement firms are in operation, the latter having replaced asbestos almost entirely with cellulose pulp.

In texiles, brake lining, and millboard, substitution of asbestos by mineral wool has taken place, and short asbestos fibres have been used for spinning.

A. TEXILES & PACKINGS GROUP

General While many small firms were equipped with braiding machines for the production of asbestos rope, and plaited packings, the production of yarn was confined to a very few firms. Apart from those in Saxony, the main ones were as follows:-

Georgi Reinhold	Berlin & Mannheim
Paul Kind	Frankfurt
Danco Wetzell	Dortmund
Deutsche Kay	Bergedorf (Hamburg)
Seelzer	Hanover
Kurt Weber	Hamburg

Products Conventional types of products were made, including yarns, cloths, tapes, brake-lining fabrics, plaited and twisted rope. One firm (18) made a rope filled with loose fibre, and we were told of another firm making insulati rope filled with kieselguhr.

Many of the firms were using glass fibres, both alone and in combination with asbestos.

Plant & Methods

Without exception, the plant used was not in advance of the best British and American practice, and in most cases was definitely antiquated. It is appreciated that some machinery must have been moved about, either because of, or to avoid, damage; but the general impression was of haphazard crowding of plant in badly lighted factories.

Some of the firms obviously had studied the dust problem and had installed comprehensive exhaust plant, although in a surprising number of cases, no attempt had been made to guard dangerous machinery.

In no case did we find dust respirators supplied to, or used by, the operatives.

The latest cards were of conventional roller and clearer types modified only to allow the feeding of short fibre on to pre-formed web. All were single cards, although almost invariably, they were paired together with a Scotch feed between them.

Spinning machinery was conventional, and in one case (18) the sliver was being "drawn" during spinning. The general practice was to use ring spinning for finer yarns, and flier spinning for coarse yarns.

The looms were of the normal type and were generally old.

Notable exceptions were the tape looms in two of the factories (18/20), where glass tape for the electrical insulation trade was being woven on multiple looms which could weave up to 20 tapes at a time.

Other single unit tape machines (20) made by Saurer of Switzerland gave the impression of being very efficient.

Plaiting machinery was conventional and generally old, but one machine (20) was plaiting 2½" rope in one operation. The carrier plate was vertical and had 32 large size spindles.

Their methods of "opening" asbestos were usually less severe than those employed in England and America, and consisted mainly of a short crushing in a "kollergang" followed by a passage through one vertical opener (Crighton) for white asbestos, or through two vertical openers for blue and amosite.

In two cases the crushed material was fed into a machine which was intermediate between a "pickering machine" and a "garnet card". It was fitted with a cylinder and worker rollers, all having large saw-tooth spikes at about 1" centres. The cylinder was approximately 1 metre diameter and was revolving at a speed of the order of 240 rev/min.

All processing up to the weaving was done dry, but in some cases the warp was sprayed with water, or water and oil, before weaving.

Packings were usually impregnated during plaiting. When rubber (Buna S) was used, they were either wrapped round a mandrel, and vulcanised in an autoclave, or were press cured in a mould.

The carrier fibre in most of the spinning mixes was zell-wolle which appeared to have replaced cotton entirely. The zell-wolle was a good quality fibre, about 1½" in staple length, supplied by Zellstoffe of Mannheim or Courtaulds of Cologne.

The amount of zell-wolle used varied from 5% when mixed with a good asbestos fibre, to 20% with short fibre or mineral wool.

Typical mixes were as follows:-

1. 20% zell-wolle
   80% mineral wool

2. 20% zell-wolle
   30% asbestos waste
   50% short fibre asbestos (10-6 or shorter)

In another case (18) a fine steel wool was included in the carding mix for brake lining yarns, the mix being:

20% zell-wolle waste
20% asbestos spinning waste
15% steel wool
45% mineral wool

The best mineral wool for the purpose was made by Deutsche Eisenwerke of Gelsenkirchen, and we were told that the carding loss with the 80% mineral wool yarns was of the order of 30 - 40%.

The finest yarns of all had been made in Berlin (8) where they had produced 200's (200,000 m/kilo) but this yarn had contained 30% of good cotton. Present day counts are not finer than 80's in those factories which are working, with a limit in coarse yarns of 1,000 m/kilo or 500 m/kilo, the latter mainly for brake-linings.

In general, where mineral wool was used, it was put into the hopper of the cards, whereas short asbestos was fed on to the web (see page 5). Glass was preferably put in by doubling, but they did not mind carding mixtures of asbestos and glass.

Quality of Finished Products

In all cases we were told that if asbestos were available there would be no hesitation in changing back to it. They will continue to use substitutes until supplies of natural fibre reach them, but their products are inferior to the corresponding Allied materials both in strength and in period of useful life.

Comments

The textile and packings industry of Germany has nothing to teach us about the manufacture of asbestos products.

With the possible exception of Mannheim (6) there is now no manufacture of yarns in the American Zone, nor in Berlin, and those factories operating in the British Zone have practically no good spinning yarn.

There still is a reasonable amount of plant in good working order, and the firms are working very hard to get every machine started, only being held up by lack of coal, and adequate supplies of raw materials.

D. JOINTING GROUP (IT SHEETING)

General It was our impression that the jointing manufacturers had suffered very little damage, and subject to adequate supplies of coal and manufacturing materials becoming available, immediate production is possible.

Of the firms visited, ten had produced sheet jointing materials, (1, 4, 6, 9, 11, 18, 20, 22, 23, 24) and, of these, seven can still produce.

Additionally, there are two other firms (Goetzwerke & Pahl), the latter during the war having produced 20% of the jointing in Germany.

The firm of Richard Klinger which produced 35% of the jointing supplies is now stopped, the plant having been removed by the Russians.

Products Some products in this branch may be of interest to Great Britain and America.

High pressure steam jointing (IT sheeting) was made in most of the plants, using Buna S, or Buna SS, to replace rubber, but the products of two firms (4,9) deserve special mention.

One firm (4) was producing a Buna-steel jointing of thickness 0.6 to 1.0 mms. for high temperature, high pressure work, and the other (9) was producing a high duty steel-reinforced asbestos-Buna jointing of thickness 0.75 to 1.2 mms.