

Overhead runways had been provided for handling plant components and the larger vessels had been built up in either welded or riveted construction in situ.

The whole of the installation was deteriorating rapidly with the excessive humidity condition of the air as already observed under the section dealing with ventilation.

Production and Layout

This plant had been installed underground and was intended to deal with 300 tons of topped crude oil per day. The installation within the workings was about 90% complete, the remaining 10% of work yet to be done involved the completion of the internal production storage tanks and general inter-connection of pipe lines.

Since this factory has already been the subject of a comprehensive report in Subject:- (Oil Refinery NH/903/5, Reference 307/1724/1 dated 29th May, 1945) there is no need to add further detail. Nevertheless, we would express the opinion that the installing of this plant underground was an engineering feat of no mean order, particularly since it was essentially standard equipment and not subjected to any major modifications. For general reference we have added a plan of the workings and indicated thereon the areas allocated to the various refining operations.

(L) HAMMERWERKE FACTORY, near Hausberg
Porta Westfalica, Minden

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This factory, of the multi-storey type, was constructed in underground quarries on the East side of the Weser gap south of Minden. The quarries were situated in the Porta Sandstone above the Dachs I Refinery, and had been enlarged by the Gewerkschaft Porta to house the Phillips Radio Valve factory from Eindhoven, in Holland.

Constructional work is said to have started in March, 1944 and to have been completed in September, 1944. Production started in February, 1945.

Contracts

The following were interrogated:-

Herr Goosens, engineer, Dutch, speaks English.

Herr Pott, mining engineer, manager of the Gewerkschaft,

18444

64.

Porta.

Herr Haupt, formerly engineer on plant installation,
now custodian of the factory for the Military Government.

Geology

The geology of the area has already been described in the sections dealing with Dachs I and Denkmal Stollen. The Hammerwerke factory nine storeys high was constructed in the Porta sandstone (photograph No. 21) and being south of Dachs I was at a higher level as a result of the dip of this stratum as can be seen in the geological section attached to this report (Fig. 8A.) The two factories were to have been connected by an internal shaft.

There was no evidence of rock falls in the factory area.

Lining & Support

The workings were for the most part unsupported and the rock surface only whitewashed. At a few points steel joists and timber laggings had been used.

Excavation

The little excavation done on this site was carried out simultaneously with Dachs I and no separate data was available on labour, costs or progress.

Entrance

The main entrance, on the seventh floor, was protected by a blast wall of concrete 1.1 metres thick, and was connected with the main road at Hausberg by a funicular railway.

Water Supply

Process water was pumped from the River Weser. Water was available from the town supply.

Sewage Disposal

Sewage was disposed by gravity into the Weser after treatment.

Air Attack

There was no evidence of air attack on this site.

Engineering Services

(a) Heating

The Boiler House was located on the surface at road
65.

level adjacent to the entrance of the Porta (Dachs I) factory.

The boiler was of the horizontal type in three sections:-

1. Cornish boiler design with corrugated flue.
2. Section comprising smoke tubes
3. Smoke box section.

Steam was taken off the middle section, which was also provided with dead weight safety valve, and thence proceeds to the super heater section located round the crown of the smoke box.

Steam and condense mains were taken through the entrance of the Dachs I factory and thence by means of a sloping tunnel up to the ground floor of the Hammerwerke Factory and to the various steam heater batteries associated with the ventilation plants.

(b) Ventilation

Six separate plenum extract systems were installed, all of similar character and dealing with the floors in groups. Each system draws fresh air from, and discharges vitiated air to, the cliff face.

Each inlet system comprised a main inlet fitted with a wire grill leading into a concrete spray chamber thence to an eliminator and finally to the fan chamber. The water sprays were not connected, but it was clear that they were to be supplied with water from the main supply and that this water would be rejected to waste.

Two types of delivery fans were used -

1. Double inlet type in an enclosed fan chamber following spray and eliminator chamber.
2. Single inlet fan with duct connection to the spray and eliminator chamber.

Each inlet fan discharged into a main delivery duct constructed in building board, at the respective ceiling level, and vertical metal ducts were taken down to floors as required with adjustable discharge openings near each floor level.

Vertical extraction ducts with inlets at high level, as required, were connected to a main extraction duct, also constructed in building board, running adjacent to the corresponding main fresh air delivery duct. The main extraction duct was connected to the extraction fan chamber and thence to atmosphere. At the time of the inspection all fans were running but heater batteries and water sprays were out of commission. Condensation was evident on the lower floors but the general state of the factory suggests that production heat energy in conjunction with the use of steam heater batteries had resulted in a reasonable air condition.

(c) Electric Power and Lighting

The electric supply was taken from the sub-station at Porta (Dachs I) at 6,000 volts and the high tension cables were brought up through the service tunnel and taken to four transformer stations. The voltage was then transformed from 6,000 volts to 400 volts 3 phase 4 wire, each of these transformers was rated at 800 KVA.

Low tension feeder cables were taken as risers to metal closed cabinets containing main switches, fuses, circuit breakers and relays.

Circuit wiring was taken at high level and in general was supported by a series of galvanised multi-strand steel cables which also served as an earthing wire collectors. Each steel cable was thoroughly bonded to the rising watermain.

Drops to machines and table inspection lights were taken from special metal junction boxes with porcelain interiors.

All metal parts and components were earthed on to the galvanised straining cables by means of single strand cables, approximately No. 18 gauge.

An attempt was made by interrogation to gain information regarding the type of earth leakage system installed but the only information offered was that every power unit had a leakage trip and that transformers were earthed at the star point.

The general illumination and local bench lighting were of a high standard for example 4 kilowatts of lighting load has been installed in an inspection bay approximately 25' x 25'.

(d) Fire Protection

Fire hydrants complete with hose reels were provided in metal cabinets fixed to walls and connected to the rising waterman. Portable fire extinguishers were also provided.

(e) Gas Installation

Gas for process work was obtained from the town supply and the installation followed conventional standards for the class of work under consideration.

Production and Layout

This factory consisted of nine floors with layout as shown on the attached print and situated in the same hill as the Oil Refinery, Dachs I, which is the subject of a separate report. This factory was first put into operation in February, 1945 when it was intended to reinstate the production hitherto obtained from Philips Eindhoven factory, Holland. All plant and equipment, even down to the inspection benches and stools, were transferred from Eindhoven. This factory was very impressive in so far that there was ample spacing, and lighting was particularly good.

The ultimate production was to have been 12,000 radio valves per day, but it was ascertained that up to the date of ceasing production, some 7,000 serviceable valves only had been issued. This in no way represents the total number of valves actually manufactured since it was made clear by the Production Engineer (Dutch) that the number of defectives was considerable and this in the main was due to inclusion of dust at the final assembly stages. It should be appreciated that this dust trouble would not be discernible by casual observation. Nevertheless, the question of dust did not apparently interfere with the manufacture of component parts nor did it affect work carried out in the tool room and maintenance shop. Walls had been whitewashed but not otherwise treated or lined.

The total labour force spread over three shifts would have been 1,200/1,400, the vast majority being females, mainly young Jewish girls from concentration camps. Three shifts were arranged viz:- two of 6 hours, and one of 8 hours, the break coming between 3.0 a.m. and 7.0 a.m.

Production arrangements were as follows:-

1st floor - Toolroom and general maintenance shop. This plant was in first class condition, amply spaced and machines were of first class make, including several American tools such as Gorton and Milwaukee Milling machines. This floor also housed the gas

mixing plant required in production and was distributed to the required stations on the other floors by normal pipe distributing system.

- 2nd floor - This was essentially devoted to grid rolling and all the requisite plant for this operation had been installed and its condition was good.
- 3rd floor - Allocated to component assembly. This floor was also used as a main stores for component parts.
- 4th floor - Mainly for assembly and testing.
- 5th floor - This was laid out for the drawing of filament wires and testing, but it was obviously not yet in full production. A side gallery on this floor was occupied by a separate firm, Carsten of Hamburg, who were apparently responsible for stamping out the mica parts which were subsequently used by Philips in the assembly.
- 6th floor - Had no defined use at the time of visit, except for a few offices and it was understood to have been used as sleeping quarters.
- 7th floor - This was the main entrance and exit for the whole factory, and contained a certain amount of plant for preparation of cathodes and filaments.
- 8th floor - Preparation of cathodes and filaments.
- 9th floor - This was used for offices and ablution, and had a small exit probably used by staff only.

Access for employees to the respective floors was by stairway, and for goods, a lift 4 x 3 metres and having a capacity of 5,000 kilograms was installed to serve floors 1 to 7.

The only external access provided to this factory from the main road was by means of a funicular railway which terminated at the level of floor 7 and about 200 ft. from the tunnel entrance.