50X1-HUM

CENTRAL INTELLIGENCE AGENCY

# INFORMATION REPORT



CONFIDENTIAL

50X1

| | | | |
|---|---|---|---|
| COUNTRY | USSR (Kuybyshev Oblast) | REPORT | |
| SUBJECT | Aircraft Production and Research at Zavod No. 2, Kuybyshev | DATE DISTR. | 8 January 1954 |
| | | NO. OF PAGES | 7 50X1-HUM |
| DATE OF INFO. | | REQUIREMENT | 50X1 |
| PLACE ACQUIRED | | REFERENCES | |

*THE SOURCE EVALUATIONS IN THIS REPORT ARE DEFINITIVE. THE APPRAISAL OF CONTENT IS TENTATIVE. (FOR KEY SEE REVERSE)*

50X1-HUM

50X1

CONFIDENTIAL

| STATE | #x | ARMY | #x | NAVY | #x | AIR | #x | FBI | | AEC | | ATIC Ev x | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

(Note: Washington Distribution indicated By "X"; Field Distribution By "#".)

50X1

CONFIDENTIAL

REPORT

50X1-HUM

COUNTRY : USSR (Kuybyshev Oblast)

DATE DISTR. 23 NOV 53

SUBJECT : Aircraft Production and Research at Zavod No. 2, Kuybyshev

NO. OF PAGES 6

PLACE ACQUIRED :

NO. OF ENCLS. (LISTED BELOW) 50X1-HUM

DATE ACQUIRED

SUPPLEMENT TO REPORT NO.

DATE OF INFORMATION :

THIS IS UNEVALUATED INFORMATION

50X1-HUM

ZAVOD NO. 2 KUYBYSHEV, USSR

012 Jet Engine

1. I was deported from Dessau in October 1946 and sent with a group of Junker's engineers to Zavod No. 2, Kuybyshev, USSR. The first mission of this group was to install the equipment and machines which the Soviets took from the Junker's Dessau plant. This was completed in early 1947 and actual work was then started by this group under Dr. SCHEIBE / See page 6 for an organizational chart of Zavod No. 2/.

2. I was assigned to the Dynamic Calculations Branch. My main work during my entire stay in the USSR was concerned with working out the strength of materials used in the turbine and compressor wheels of the JUMO 004, 012 and 022 jet engines and TS-1 turbo-starter. Not being a design engineer, I performed the necessary calculations and preparation of tables showing strength of materials under high temperature and centrifugal forces. Dr. HEINRICH, in the Preliminary

50X1

Design Section headed by Dr. VOGTS, prepared tables and formulas with which I did the actual calculations. I was never directly involved in any laboratory materials testing, but worked only with theory. The information resulting from this work was used as reference material. This was, for the most part, a continuation of the work started in Dessau. Since there were different materials available in the USSR much of the information on German materials had to be extended to include higher temperatures and higher forces. Many charts and material characteristic curves had to be redone. I believe that turbine wheels were built from these calculations and tested but I have no definite information on this. No new information on recent developments in other countries was given me during this phase of my work.

3. Early in 1947, Dr. SCHEIBE was given the task of designing a jet engine to satisfy certain specifications handed him by the Soviets. The Preliminary Design Group under Dr. VOGTS was told the engine must produce so much thrust, use so much fuel, have such and such an area, use so many combustion chambers, etc. I am unable to recall any of these figures. This group then required Ing. DEINHART, Compressor Section, to produce drawings of the compressor necessary to meet the requirements of the engine. My job was to work out just how thin and what shape the turbine and compressor wheels should be.

4. The JUMO 012 engine was handled in this way. The original design, had already been started in Dessau and all drawings, including some parts were shipped to the USSR. This engine was of the same type as that suggested by the Soviet specifications. During its development, many modifications (lighter weight more thrust) were required by the Soviets. Finally in mid-1949, ten or twelve engines had been constructed and it passed the 100-hour test. Immediately after this, all engines and drawings were taken away. I am unable to recall any performance figures for the 012 but remember that it had ten stages in the compressor and two in the turbine. I also remember the following power ratings:

| | | |
|---|---|---|
| Take-off (STARLEISTUNG) | 120 % power | 7,000 rpm |
| Rated power (NENNLEISTUNG) | 100 % power | 6,500 rpm |
| Cruising (REISELEISTUNG) | 80 % power | 6,000 rpm |

5. I believe that the 012 was satisfactory for production and that it was put into production. This was the common opinion among all of the engineers who worked on the engine. It was rumored that it was to be manufactured in Besymyanka, but there were no facts to support this. I heard from Ing. KERWIN (test stand group) that the engine was installed in an aircraft (type unknown) in Moscow that had been designed by BAADE. I cannot remember the date I heard this. The Germans were told by the Soviets that the Soviets had a native designed jet engine much better than the 012, but we Germans did not believe this.

<u>022 Turbo-prop engine</u>

6. Work had started on this engine when the 012 work was

50X1

terminated. It was understood that this engine was for a bomber-type aircraft. It was a completely new design initiated in the USSR and was not a carry-over from the Dessau days like the 012 engine. The specification and design details were handled the same as they were for the 012 [See paragraph 37] and I did calculations on the turbine and compressor wheels. I have heard, from other returnees since returning to Germany that the engine completed its State tests (100 hours) soon after I left. It had been operated up to 60 or 70 hours when I left. I believe 14 complete engines were built at Kuybyshev and all engines after the 6th and 7th were able to run 50 hours. All those after the 10th could operate more than 50 hours. Just prior to my departure, as I had little else to do, I worked in the test stand where the 022 was being run. My job was to read and record the various manometers and other instruments during testing. I am very vague on performance and characteristics figures of the engine and can only remember (not certain) the following:

| Specific fuel consumption [1] g/PS/hr | Power rating % | rpm | |
|---|---|---|---|
| 326 | 80 | 5,600 | cruising power |
| 565 | 100 | 6,500 | rated power |
| 787 | 120 | 6,700 | take-off |

Comp. states - 14
Turbine stage - 3
Turbine temp. (blade root) 680 to 720°C
Turbine temp. (center of wheel) 350°C

7. Since I worked in the test stand during my last few months, I am able to give a certain amount of detail regarding the testing procedure.

a. Data taken during the test run included time, barometric pressure, air temperature, pressure in compressor at four points, oil pressure and temperature, oil and fuel consumption, rpm temperature before and after turbine, exhaust gas temperature and thrust (hydraulic method).

b. The official test running of the engine was as follows:

| | |
|---|---|
| Warming up | 30 minutes(not part of test) |
| Idle to take-off power (6,700 rpm) | 30 - 40 seconds |
| Back to cruise (5,600 rpm) | 1 minute |
| To take-off power | 30 - 40 seconds |
| Take-off power | 8 minutes |
| Rated power (6,500 rpm) | 20 minutes |
| Cruise power (5,600 rpm) | 30 minutes |

This took one hour and was repeated for five hours. Then the

1) PS is German designation for h.p.

engine was shut down for two hours, started up and run again for another five hours. This cycle was continued until the engine accumulated 100 hours. The State test was followed by a tear down inspection at which time all wear was carefully recorded and made a part of the final report which was turned in with all test data sheets. No parts could be removed or adjusted during the State test. All removable items and controls were sealed. There were no attempts to test the engine under extreme temperature conditions or unusual positions. An engine, selected for the State test would have only five or ten hours on it. I never heard of a 200 hour State test run, but I recall that one 012 engine had run over 170 hours total time. During this testing the noise in the test cell was so bad that work was divided into four shifts per day, six hours at a time. Testing was carried out night and day.

8. I knew of very few malfunctions in the 022 engine during development. Once the propeller flew off as a result of the failure of some reduction gear teeth. Also, the guide vanes in the turbine cracked due to high temperature and engine vibration. This problem was solved but I do not know exactly how.

9. In mid-1949, I worked on the turbine wheel for a small turbo-starter. This was designed by SCHNEIDER (Preliminary Design) and was called the "TS-1" by both the Germans and Soviets. It was used on all the 012 and 022 engines. It was rated at 75 ps, employed a radial compressor, and ran at 42,000 rpm. The starter itself was started by a 24-volt battery. This was a new piece of equipment and all design work was done in the USSR.

EVALUATION OF SOVIET ENGINEERS

10. The same type of fuel (a type kerosene) was used in both the 012 and 022 engines. It came into Krasnaya Glinka by railway car, then by tanker truck to Zavod No. 2. These trucks ran day and night. They ran out of fuel only once. I believe this fuel was different (had an unpleasant smell) from that used in Germany and therefore, believe it to be Soviet produced. This difference in fuel required no change in the engine design. I have no knowledge of fuel additives and know nothing of the fuel designations or specifications.

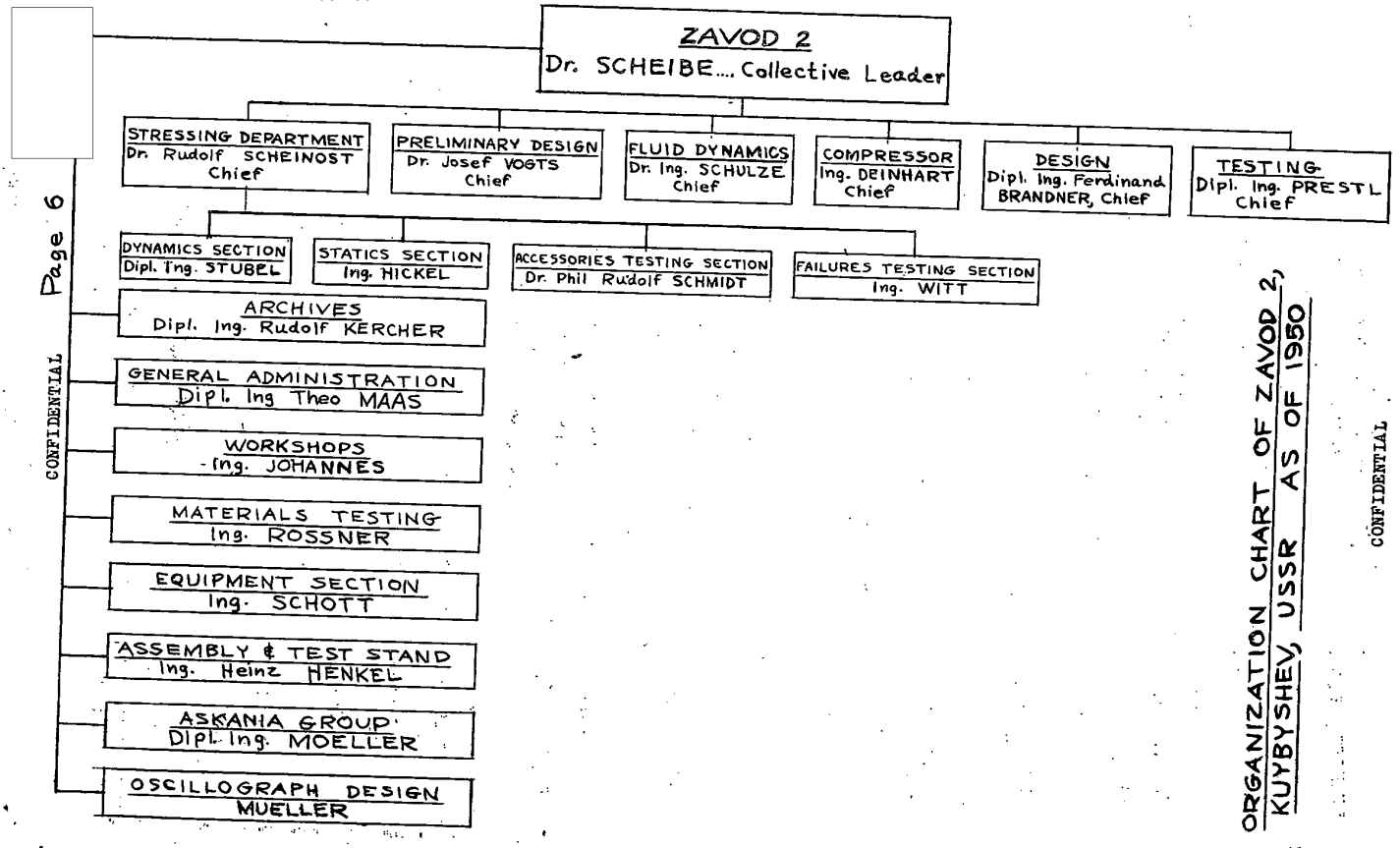
11. The Soviets always told us Germans that they had their own jet engines which were, of course, much better, but no one really believed this. From my contact with the Soviet engineers and their equipment, I believe that the Soviets were not able to design or produce a jet engine of their own design. However, based on the German assistance between 1946 to the present time, the Soviets could now produce on their own an engine equivalent to the 022. Anything newer or more advanced was impossible since the young Soviet engineers did nothing but study the German reports. I had heard sometime in 1951 (I think from Otto MUELLER, a returnee) that the Soviets were working in Kuybyshev on a version of a coupled (twin) 012 engine, side by side and geared together to run a

propeller. I have no other information on this subject.

12. I believe that the Soviet engineers are too specialized and know only their own specific job. The Soviets were amazed that a German draftsman also knew something about electricity and mechanics.

13. I had no contact with any Soviet equipment since everything (including nuts and bolts) the Germans used at Zavod No. 2 came from Dessau. At the start of turbine wheel development a high temperature, scale-proof, high value steel was used and had the Soviet designation of El-408. Later a similar steel, designated El-415 was used. This was comparable to the former German FKDM-10 steel. The compressor wheels used some other lighter metal. I also recall that non-rusting steel was used in the 022 jet engine combustion chambers. I have no knowledge of any other metals or alloys used.

14. I have no information on guided missiles in the USSR. I know that the V-1 was tested at Dessau in 1946, but know nothing more. I know that a small group of people who worked on the Junker's KM-8 (torpedo motor) went to Odessa in October 1946. The group was headed by Dipl. Ing. STUBEL, but he fled during the move to the USSR.




ORGANIZATION CHART OF ZAVOD 2,
KUYBYSHEV, USSR AS OF 1950

CONFIDENTIAL

Page 6

CONFIDENTIAL