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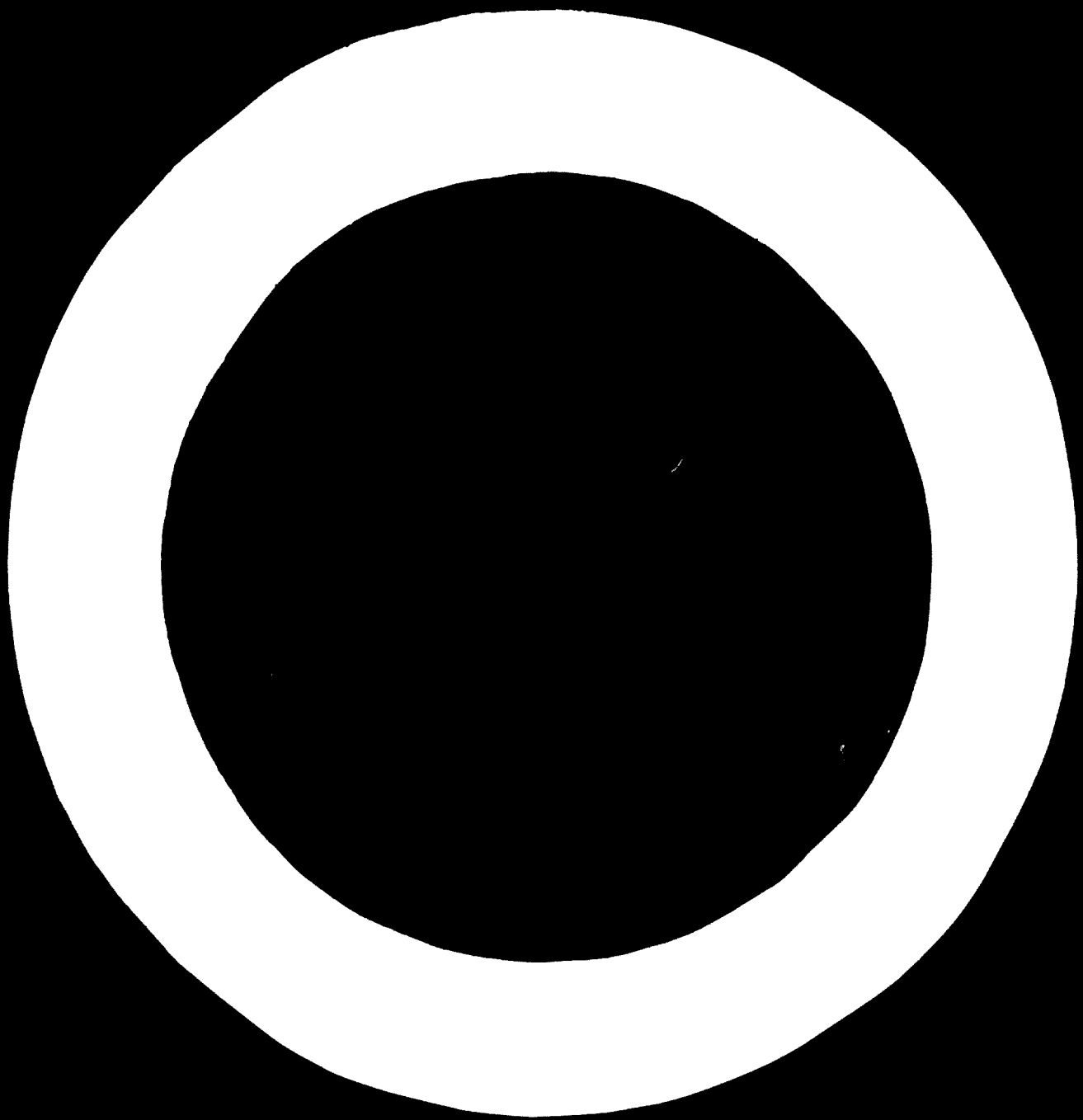
REPORT ON INDUSTRIAL TRAINING OF ENGINEERS
AND TECHNICIANS IN THE IRON AND STEEL INDUSTRY
UNDER UNITED NATIONS FELLOWSHIPS
Zaporozhstal Plant, Zaporozhje
Ukrainian Soviet Socialist Republic

by

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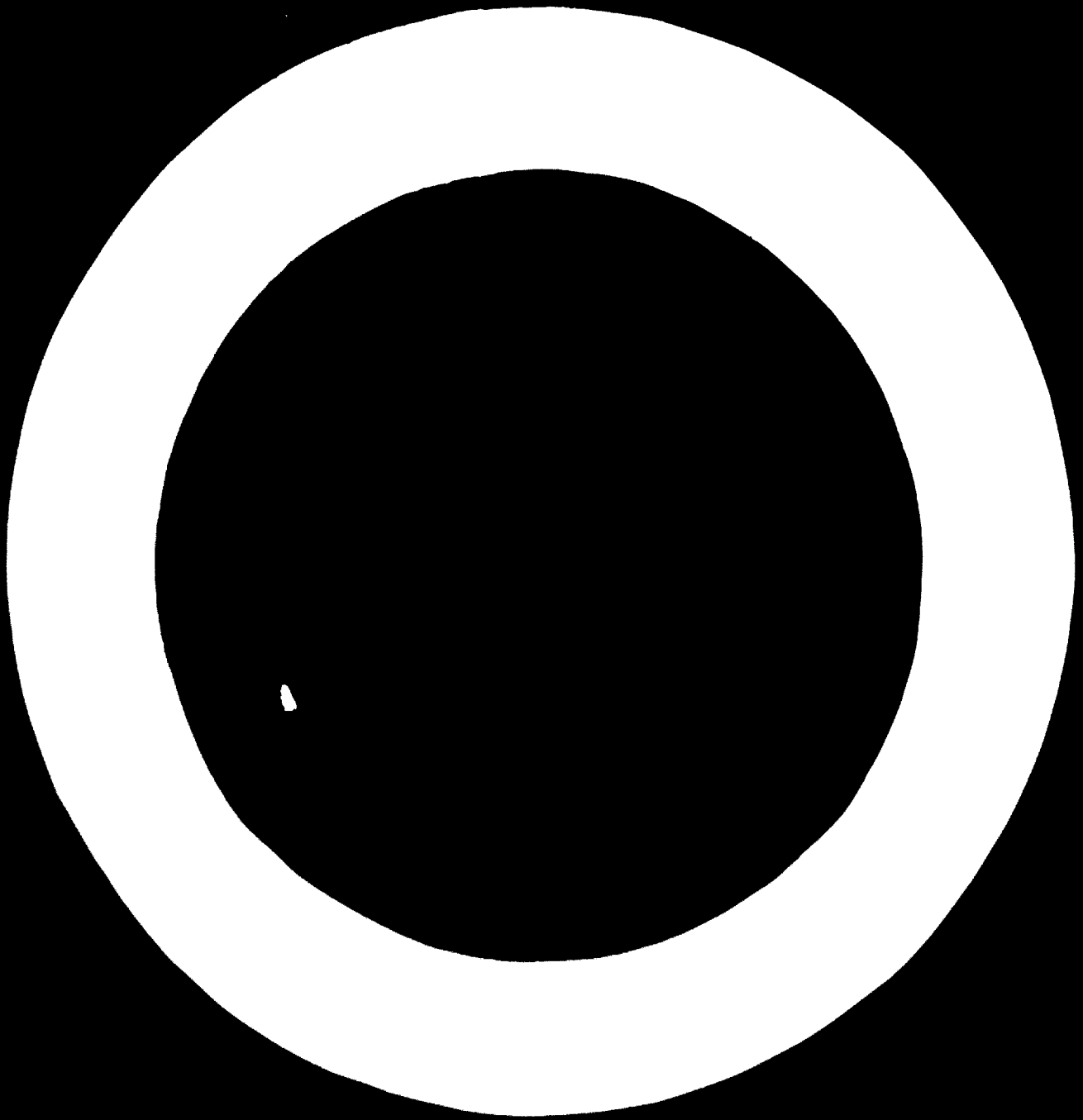
I. INTRODUCTION

We sincerely welcome the meeting of the leaders of international training centres and special courses for theoretical and practical training of specialists from developing countries - fellow participants of the U.N.O in the beautiful capital of the hospitable Austria-Vienna.

Such a meeting is of great necessity, and it is expected that we as practical workers of the courses shall benefit much from this meeting.

We hope that the exchange of experience and mutual business-like discussions of the prospects to improve the efficiency in training will help to overcome the difficulties in the work of the course and find the ways to develop successfully this noble cause. That is why on behalf of all the employees and workers of the Zaporozhje courses I would like to express deep gratitude to the organizers of that highly useful meeting.

We, Soviet people, profoundly understand that the technical experience of the industrially developed countries is of great value for the people who due to some reasons have quite recently taken the road of their national economy development. Provided, however, that this experience is disinterestedly passed on to the national cadres of developing countries.



Our employees, on their part, put every effort so that the UN participants coming to this country could acquire necessary knowledge and know-how, and efficiently apply the experience gained by the Soviet metallurgists in their countries.

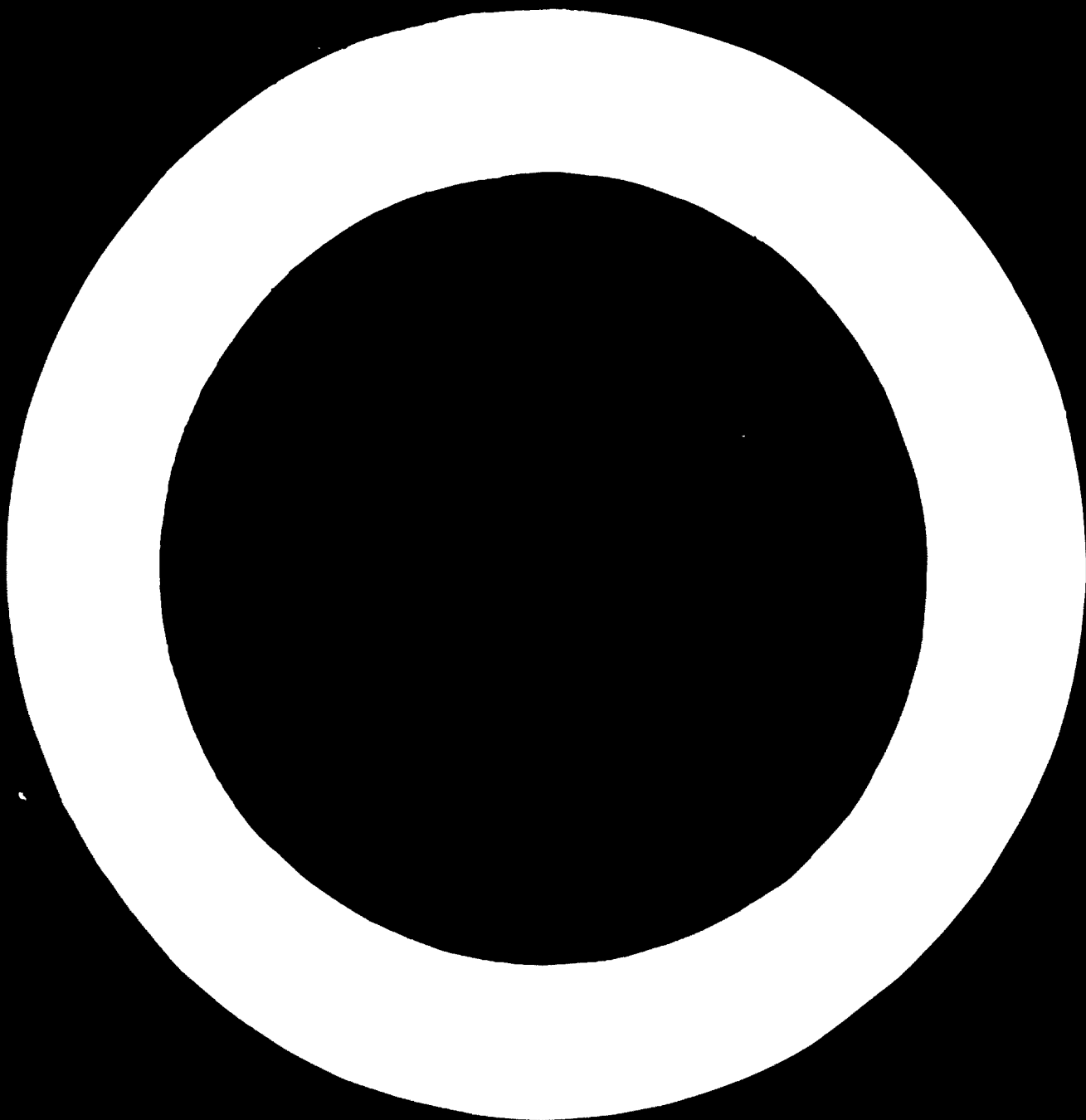
My report deals with brief information on prerequisites of setting up the courses, a base enterprise where fellow participants are trained, organization and training methods as well as our proposals.

According to the agreement reached between the UN Secretariat and competent Soviet organizations in 1965 5-months courses were established in the USSR for industrial training of engineers and technicians for the iron and steel industries from developing countries.

The Zaporozhstal plant will be a base enterprise for their training (in the town of Zaporozhje, the Ukrainian Soviet Socialist Republic).

From 1965 to 1967 three groups of the UN fellow participants were trained - 25 specialists from 9 countries, in 1965, 37 specialists from 12 countries in 1966, and 43 specialists from 16 countries, this year.

In the Memorandum of the UN Organization for Industrial development it was stated that the industrial training of



engineers and technicians engaged in iron and steel industry should be conducted at the fellow participants' courses in working groups.

The main aim of training is to help engineers and technicians from developing countries in combining the fundamentals of theoretical knowledge acquired at educational establishments with the practical skill. The curriculum should provide for the training on the matters of technology and equipment, economic planning, management of repairs and safety precautions.

The trainees are to take up the basic industrial course at the Integrated Iron and Steel Plant and visit other metallurgical plants and other industries with a view of additional training.

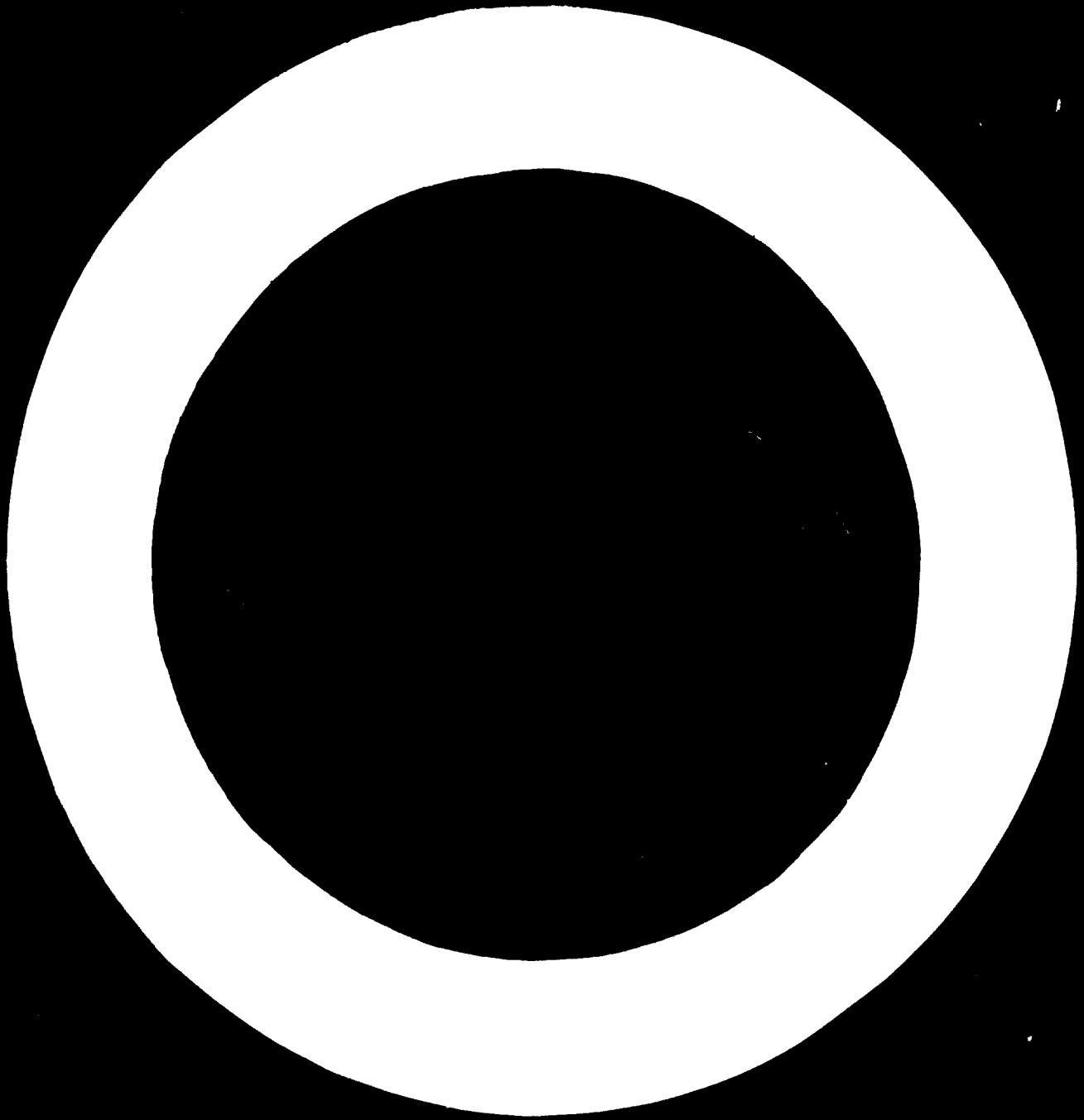
This suggestion should constitute a basis of the industrial training arrangements.

The main aim of the programmes was to give an opportunity for the trainees to study the operational experience at the base training enterprise "Zaporozhstal" and the country's modern iron and steel enterprises.

II. The training enterprise

The Zaporozhstal plant is one of the largest Integrated Iron and Steel Works.

At present the plant produces above 4 mill.tons of steel per annum i.e. the output of the plant equals to that of the whole iron and steel industry in pre-revolutionary Russia.



Although its main units were built in the forties the plant perfectly meets the modern requirements and shows high technical-economic efficiency in all metallurgical processes as a result of the modernization, up-to-date equipment and the introduction of the modern engineering techniques and technology.

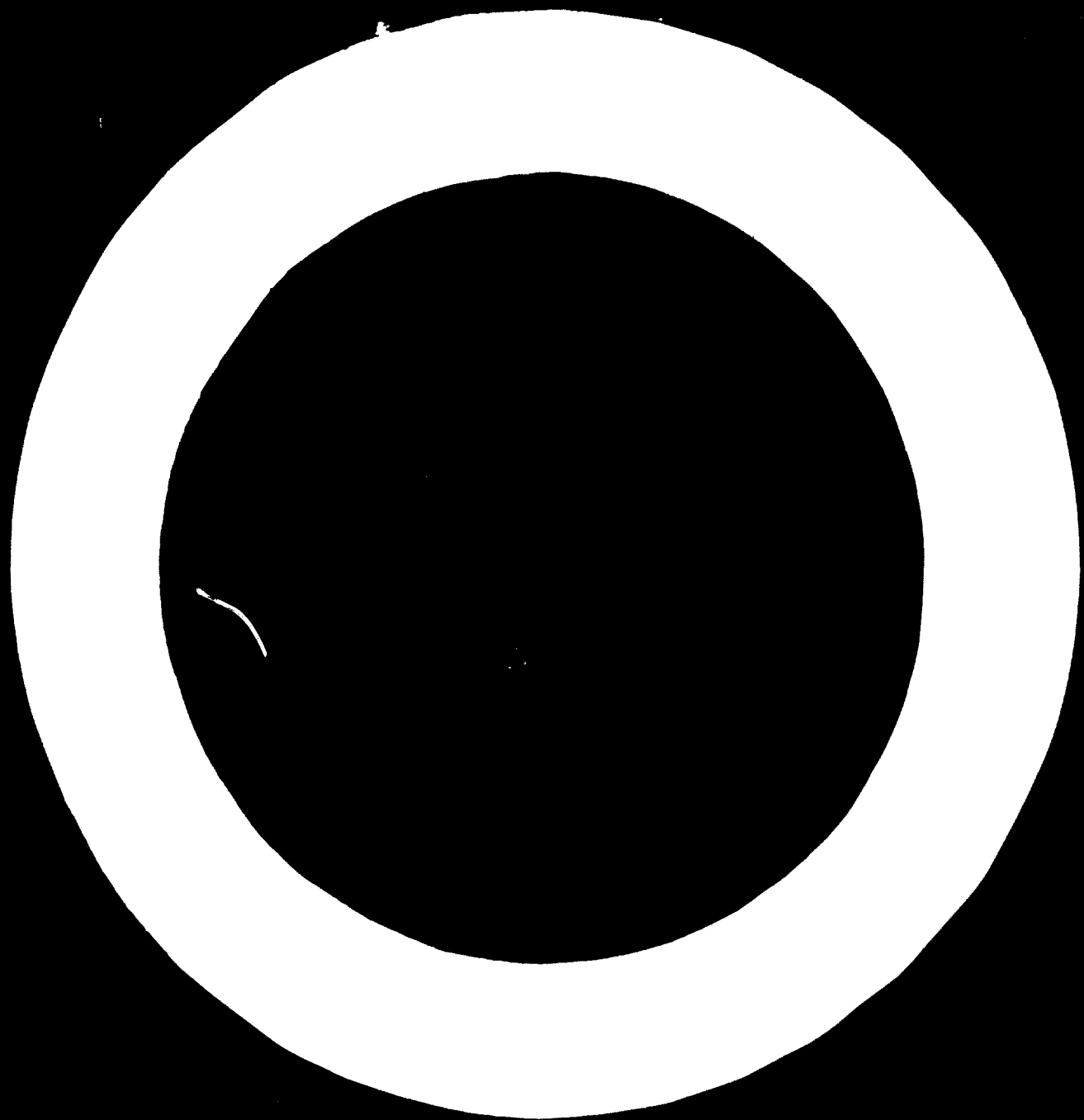
For the intensification of metallurgical processes at the plant oxygen and natural gas are widely used. The effect of these and other modern technical achievements may be highly evaluated because the plant is one of the advanced enterprises in the country from the point of view of production capacities of all the metallurgical units and of the technical-economic progress achieved.

It is not by mere coincidence that one 200-ton. open-hearth furnace of the plant produces more than 500 thousand tons of steel per annum.

The mould and core manufacturing unit, where liquid self-hardening mixtures are used, is in operation at the plant for the first time in the foundry practice.

This innovation makes a technical revolution in foundry industries.

A lot of other similar examples could also be given here, but the most obvious demonstration of the progress at the plant is the fact that for the successful introduction into production of the latest scientific and technological achievements and advanced organization of work for the past 5 years. The Plant was awarded with 11 Honour diplomas of the Exhibition of Achie-



vements of National Economy and 244 workers and engineers of the plant were awarded with medals of the Exhibition.

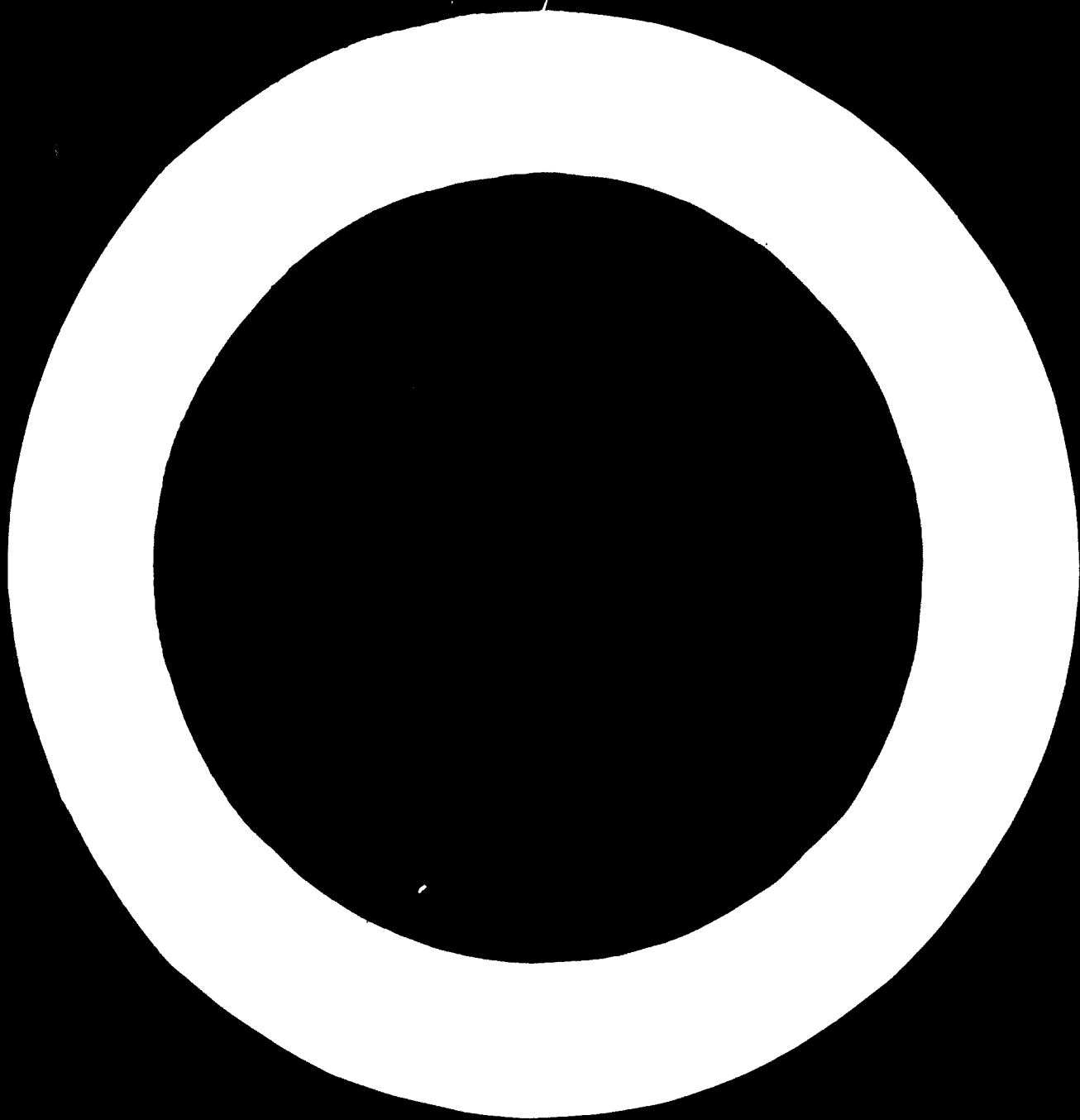
Our plant has at its disposal a sufficient number of the highly qualified personnel, it has accumulated a wide organizational and technical experience and its staff greatly contributed to the development of the Soviet metallurgy.

The initial rated capacity of the metallurgical units built at the plant has been increased by 2.5 times in pig iron production, 3.4 times in steel production and 4.3 times in rolled products.

The experience of practical fulfilment of a large technical programme is of great interest to the wide circle of metallurgists.

The "Zaporozhstal" to a certain extent, is an outstanding school of technical and practical experience. Every year more than 2 thousand persons from the related enterprises of our country come to this plant to study the experience of its work. Many workers of the "Zaporozhstal" are invited to other enterprises of our country and to foreign countries for rendering technical assistance and for introduction of the advanced methods of work.

Over a long period of time rich traditions have been established at this enterprise not only in the field of continuous technical improvement of the production, but in preparation of skilled personnel both for its own plant and for many other enterprises in our country. This experience has been widely brought into practice at many metallurgical enterprises for the past 10 years due to the fact that a great number of specialists and workers from many foreign



countries have been educated in the field of iron and steel industry. During this period 1878 persons from 28 countries took prolonged training.

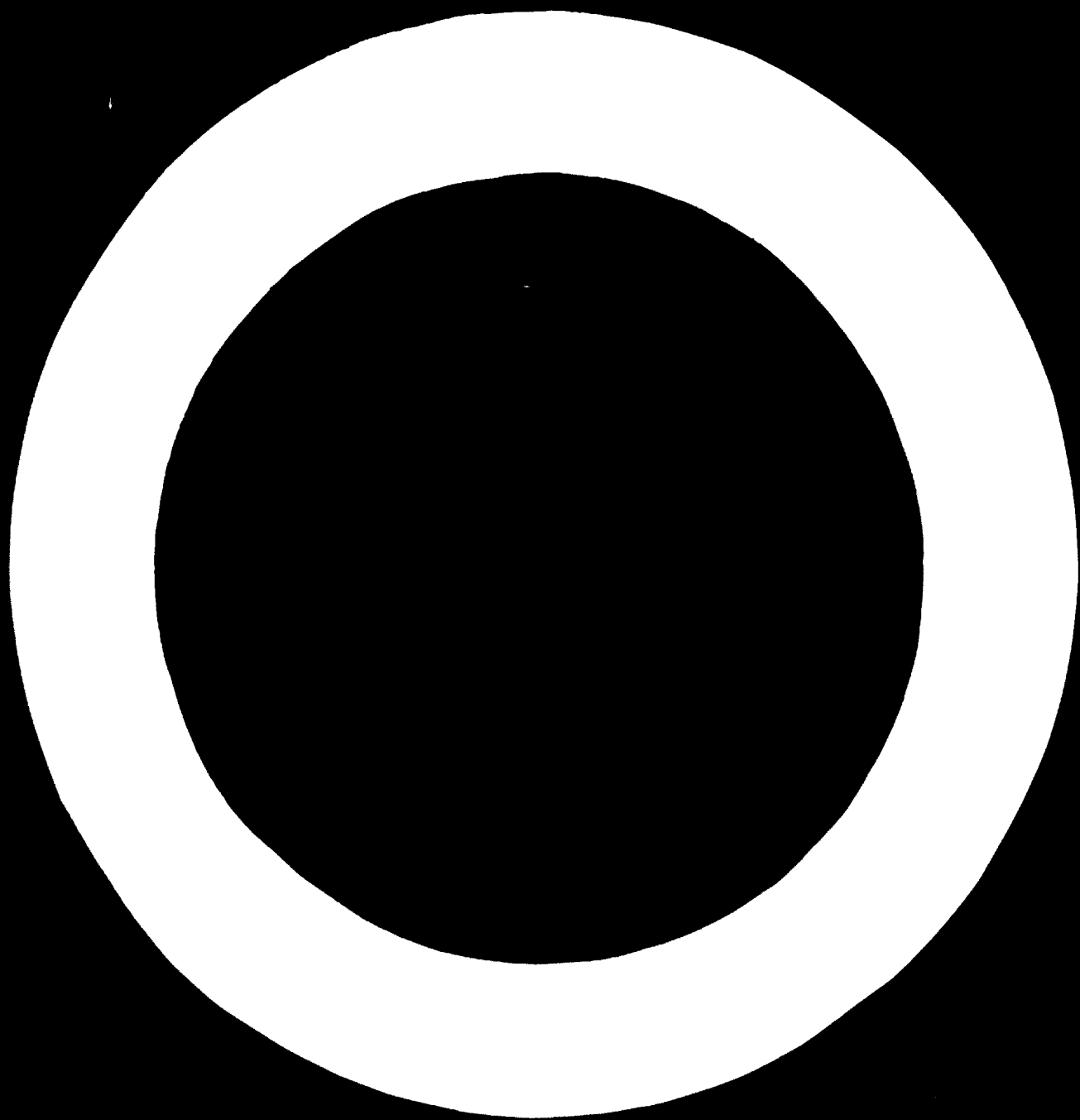
Thus, the "Zaporozhstal" is not accidentally chosen as the main industrial training centre of the UN fellow participants since the plant was a prominent school for industrial-technical training of workers, technicians and engineers in the field of ferrous metallurgy in this country prior to the organization of these courses.

III. Organization and training methods applied at the courses

The first group of UN fellow participants (25 persons in number) underwent industrial training on the basis of one general programme in 1965. The courses provided for the study of experience in the field of technology of all metallurgical processes, acquaintance with operation and repair of metallurgical equipment, production planning, labour organization, enterprise management, organization of work on labour protection and safety precautions.

Since not all the participants had an experience in a wide range of problems and a considerable number of them were preparing themselves for work as specialists in a certain profile there is no doubt that the training based on a general programme could not meet the desire of each.

These shortcomings in training the first group of the UN fellow participants had been eliminated and in 1966



37 persons were trained in 4 groups and 5 persons on the basis of individual programmes.

For this purpose 4 programmes were prepared for the general personnel to be trained in groups and for those to be specialized in the main metallurgical processes, as well as 5 programmes for individual training for different services at the plant.

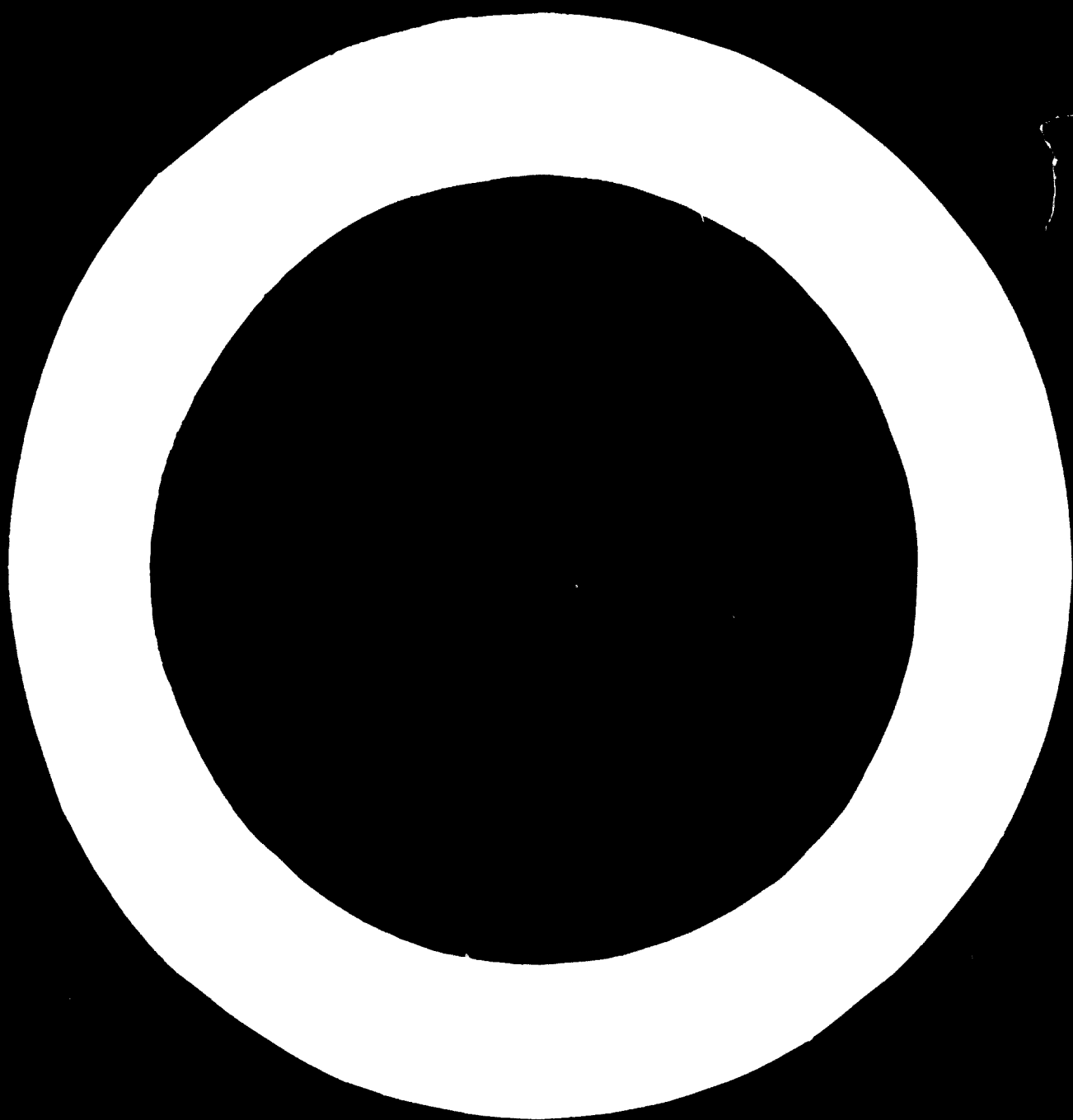
The first programme was worked out for industrial training of engineers who deal with general production, control and technology of metallurgical processes at the plants as company consultants and at the ministries. This group was trained according to the 1965 modified programme with addition of sections covering the study of work of the leading departments:

labour organization, planning, production, engineering and the central laboratory of the plant.

For engineers - technologists in iron and steel production the programmes were worked out and 3 groups were set up for training how to manage sintering and blast furnace production, steel smelting and mill production.

Participants were divided into training groups, their desire being taken into account.

The experience of work shows that individual training is the most expensive and less effective than the training in groups.



In 1967 all UN participants (43 in number) were divided into 8 training groups. Each group was trained according to a special programme corresponding to a certain specialization of metallurgical engineers.

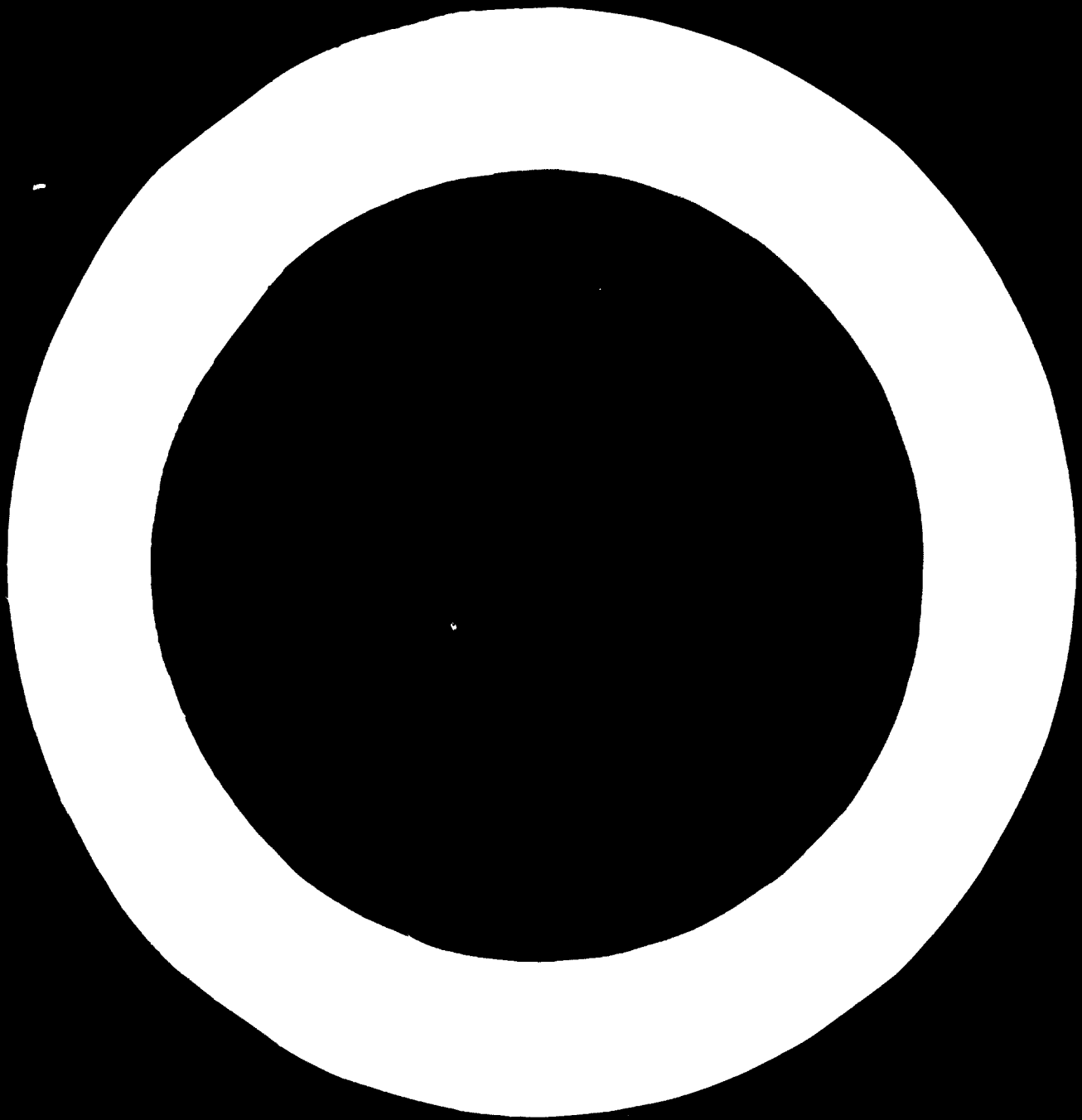
Production engineers and engineers-technologists of metallurgical process (sintering and blast furnace, steel smelting and rolled mills production) were trained in groups according to the 1966 revised and supplemented programmes; and for other specialities the following programmes were compiled:

mechanical engineers on metallurgical equipment, engineers-electricians and electricians on automation and mechanization of metallurgical processes and engineers engaged in railway transport at iron and steel enterprises.

The scope of each programme covers 150-200 hours of classroom studies and up to 200 hours of practical training directly in the shops of the base plant.

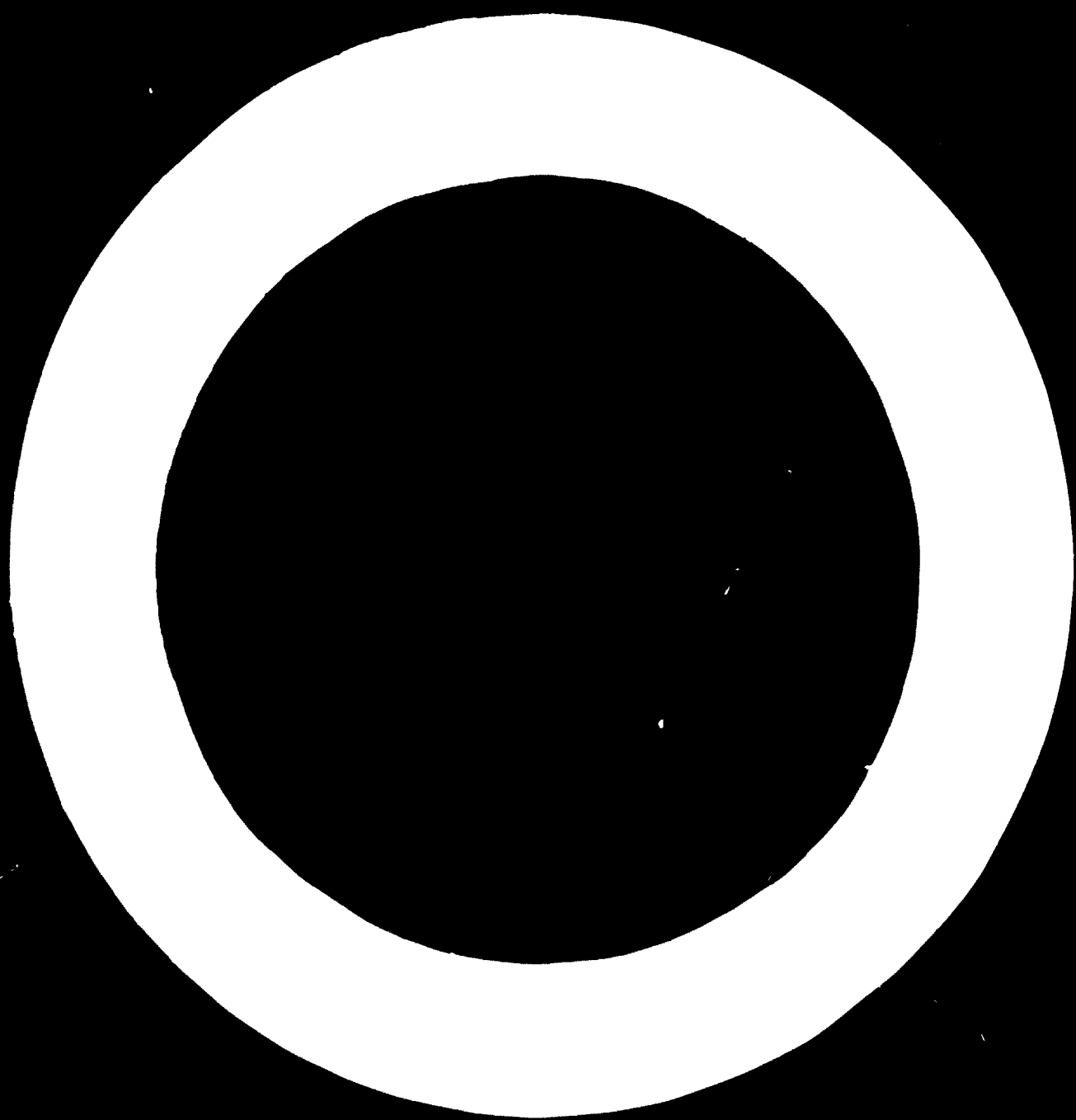
The training process of the UN fellow participants at the courses consists of several parts.

After getting brief information on the organization and operation of the training enterprises from the talks with the chief engineer of the plant and by going round the main production shops the fellow participants studied the training programmes and in accordance with their specialization and future work each of them selected one of the training groups.



To give the audience the general information on organization, planning and development of iron and steel industry of the country the review lectures on the following themes were delivered:

1. The structure of the country's control and principles of production planning.
2. Iron and Steel Industry in the USSR.
3. Organization of planning and economy management at an iron and steel plant.
4. Production of fluxed iron ore sinter and pellets, trends for its development in the USSR.
5. Casting of basic pig iron and trends in its further development.
6. Modern open hearth scrap-iron ore process.
7. Modifications in the design of open hearth furnaces.
8. Production of slabs for^{con}tinuous and semi-continuous wide strip mills.
9. Production of hot rolled rolls and sheet steel and its finishing.
10. Production of cold rolled rolls and sheet steel.
11. Automation and mechanization of production processes in ferrous metallurgy.



Each review lecture lasted for 2-3 hours. All of them were delivered by well-known professors and lecturers of the Dnepropetrovsk Metallurgical Institute.

Some review lectures were repeated for engineers of some trades with more detailed account of the material at the participants' request.

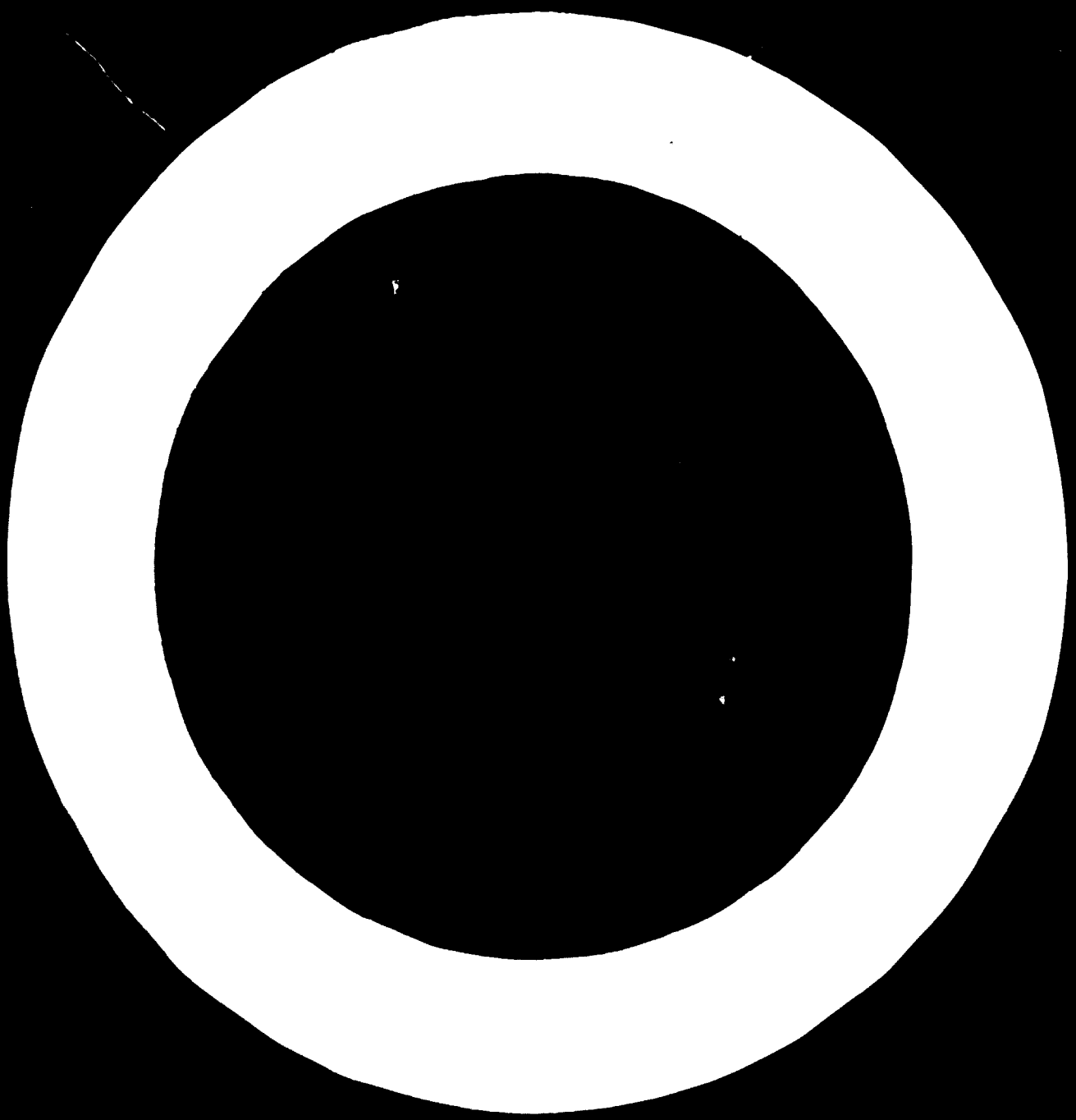
The Study of the material was realized in accordance with the curriculum in each group by means of delivering lectures in lecture-halls and carrying out practical training and tutorials directly in the plant shops.

The lecturer in the class-room gave an account of the material either on this or that curriculum part using visual aids and relevant plant documentation.

Depending on the participants' grounding and complication of the material a lecturer did his best regulating rationally school-hours to expound the essence of processes and to elucidate the experience accumulated in the Soviet metallurgy.

It is a pity, but very often the lecturer had to get off the contemplated point of a lesson to explain in plain words the essence of processes and theoretical grounds of those processes, as some of the participants had no proper training and couldn't sensibly understand the material.

As a rule the participants had their classes in the first half of a school-day and in the second half they, under the



guidance of a professional instructor were shown the relevant sections of the shop in compliance with the curriculum that was studied in the class-room.

The compulsory classes on school-days lasted according to the time-table for 5-6 hours. The rest of the time was set for independent work.

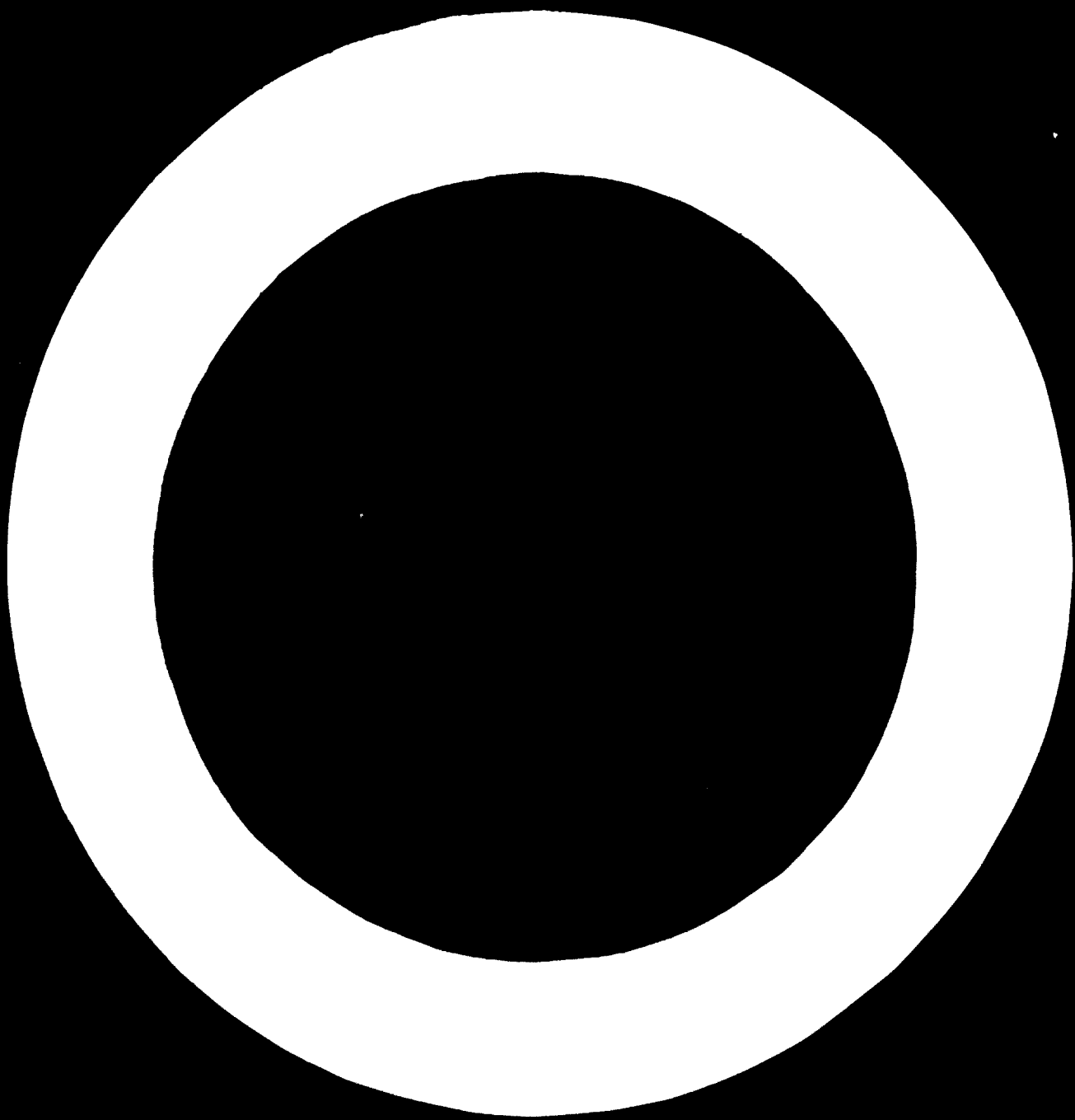
The lectures in the class-rooms were delivered by the professors and lecturers of the Dnepropetrovsk Metallurgical Institute and engineers of the "Zaporozhstal" plant including 13 Institute lecturers and 31 engineers of the plant.

The plant engineers are distributed according to the posts held in the following way: chief specialists, department and shop superintendents - 11 ; laboratory chiefs - 8 and of other services - 12 persons.

Industrial training was conducted only by the plant engineers, who worked directly at the corresponding departments.

The Participants were given an opportunity of visiting a number of enterprises to make them more completely acquainted with the Soviet modern metallurgy and all the branches of metallurgical production studied, mainly, the peculiarities of their organization and industrial processes.

With that aim the participants visited the following enterprises:



1) The largest enterprise in the Krivorozhnye basin is the Yuzhny Ore-Dressing Plant which performs Mining enrichment and sintering of iron-ore.

2) Zaporozhske refractory plant.

3) Zaporozhske ferroalloy plant.

4) Krivorozhskiy metallurgical plant.

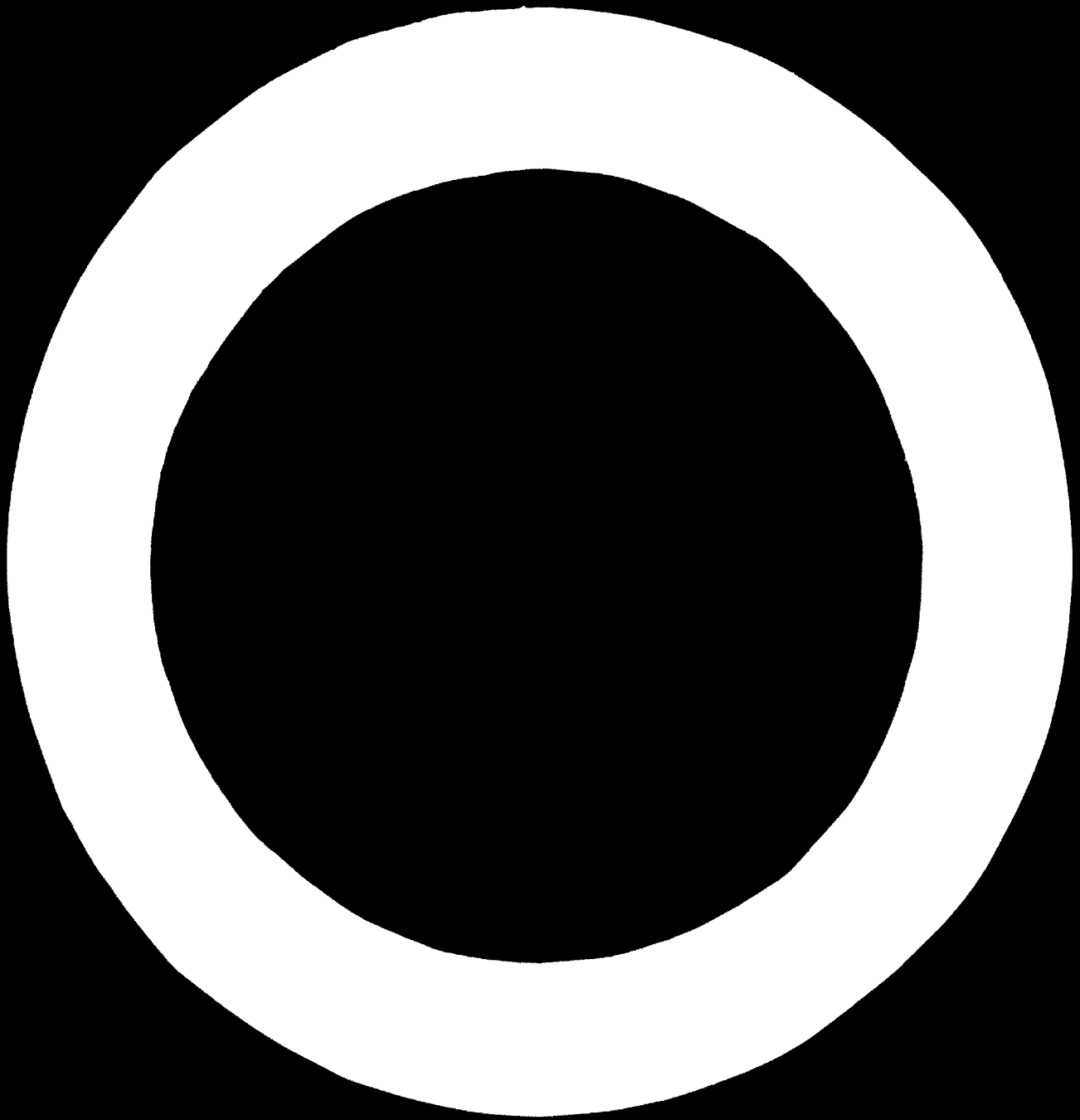
5) Novolipetzk metallurgical plant.

The two last plants are of particular interest. Both of these plants are more modern than the "Zaporozhstal" one. The first of them produces section rolled steel, and the second one produces sheet steel and they add, therefor, very well to metallurgical technology of the training enterprise.

Blast furnaces of high capacity are set at the Krivorozhsky metallurgical plant, one of them is of 2700 cubic meters in volume and is the largest in the world.

Steel is smelt in two converter and one steel shops. Blooming No.2 rated capacity is 6 mln. tons per year, and continuous light-section rolling-mills "250" produce up to one mln tons per year each. Acquaintance with such plant is of great interest for metallurgists.

The Novolipetzk metallurgical plant like the "Zaporozhstal" produces sheet rolled steel but more modern metallurgical technical equipment^{is} in use there. In addition the plant is unique in the world metallurgical practice.



The whole amount of steel from highly efficient steel furnaces is cast by highly productive continuous casting units not into ingots, but into billets and so there are no cogging stands there.

This largest plant of high-quality metal operates according to a new modern technological scheme.

The participants spent 4-5 days at each of those plants and had an opportunity to observe all the processes metallurgical technology at modern plants.

IV. Living Conditions and Leisure Time

All the participants were accommodated in comfortable rooms of a town hotel, had meals in the restaurant and partly in the plant canteens.

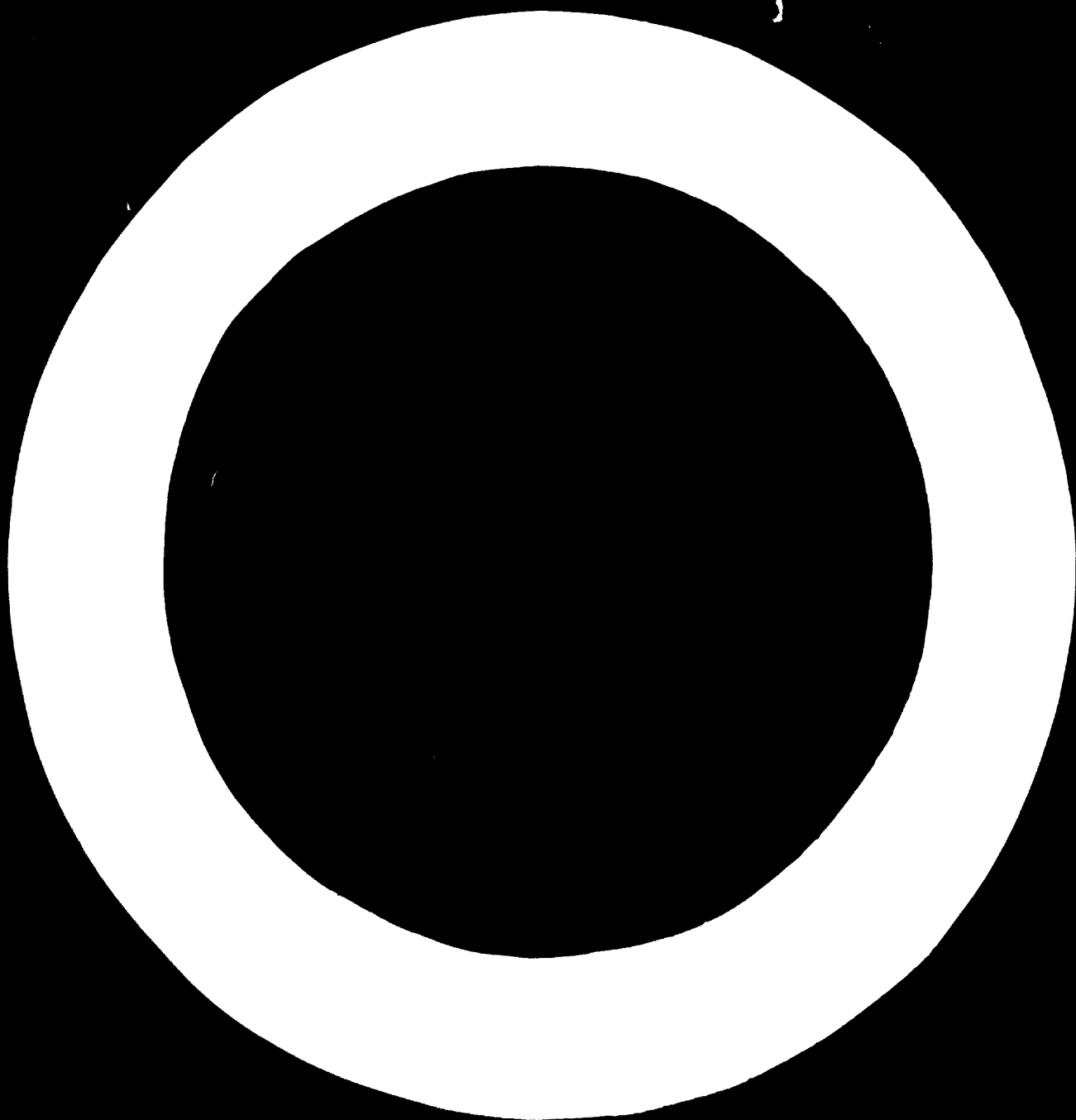
As the participants lived at a considerable distance from the plant and the educational establishment, they were taken there the cars specially ordered for this purpose.

At leisure time the participants went for sightseeing, visited theatres, museums country side and had a rest.

The excursions were organized for them to the Dneprovsk hydro-electric power station, the Zaporozhye transformer plant to the suburb collective farms and other places of interest.

Meeting the participants' request tours were arranged to the Crimea, Kiev, Leningrad and Moscow.

Those trainees who wanted to go in for sports joined the corresponding section of the "Metallurg" sport club.



Thus, the engineers of the UN participants courses could not only study the metallurgists' experience in full measure but they also were given great opportunities of getting acquainted with the Soviet people and their life.

V. Our Proposals Dealing with Courses Work and Training Process Improvements

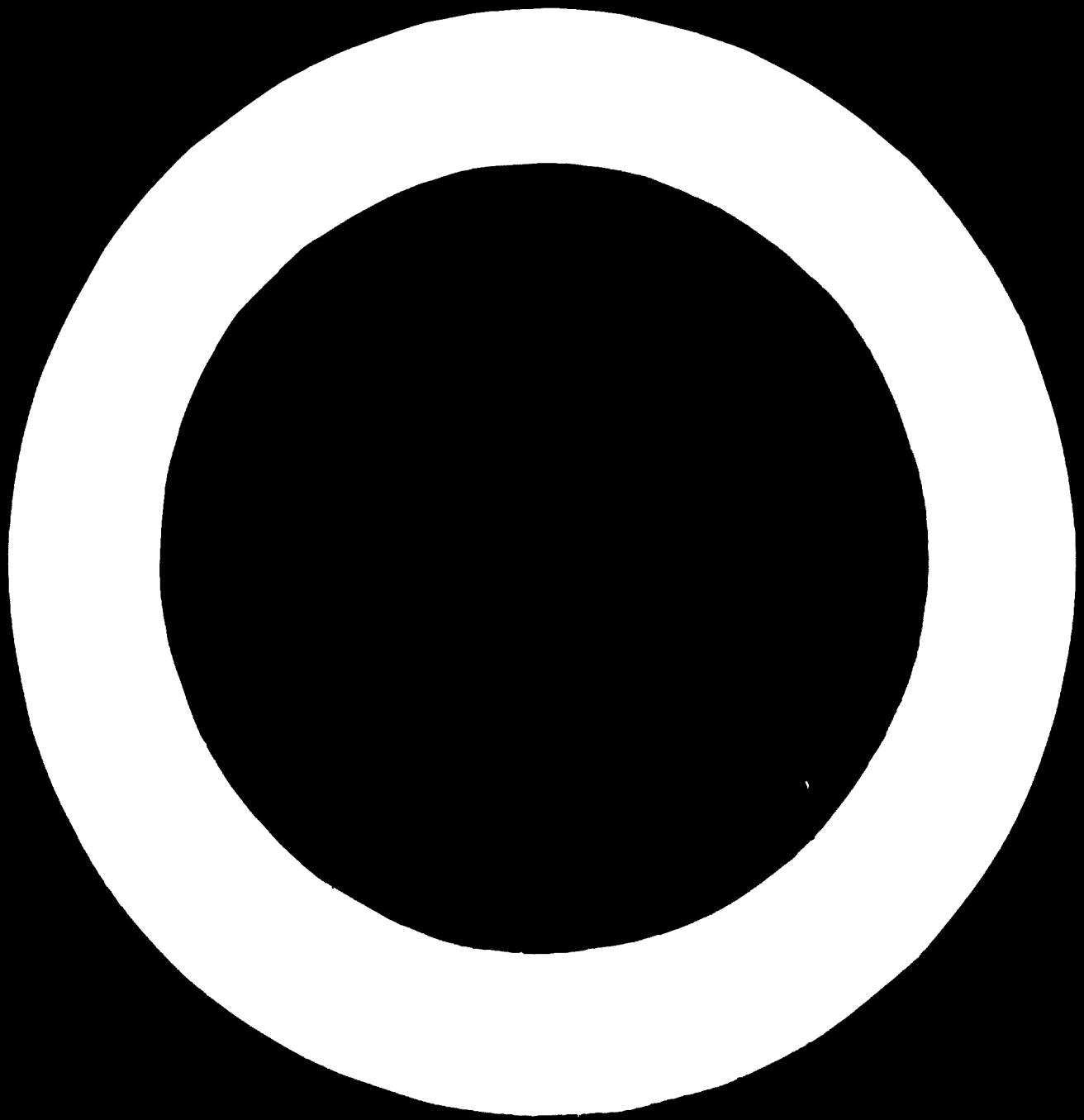
On the bases of practice of the work of the UN participants courses at the "Zaporoshstal" plant even now it is possible to make some conclusions on the measures to improve the work of the courses.

As the result of the exchange of views at the Vienna conference it will be possible to put forward more complete proposals on the problems of improving of the industrial training of the engineers of from developing countries.

Our proposals are based on the fact that teaching the theories and technological processes at these courses must be reduced to the minimum. The main aim of training is to improve the engineers' professional skill and professional experience in a corresponding branch, especially in the field of effective use of the organization and modern technology in industry.

To our mind, to improve the work of the courses, the following important problems are to be solved:

1. "Common Status for the UNO Courses Participants" which would determine the structure, activities.



and the most important methodic recommendations on organization of training are to be worked out and approved.

It is impossible to perfect successfully professional training without solving such practical problems.

2. To determine the future developments and specialization of engineers to be trained in each course unit. It will allow to spend means expediently for establishment of professional training basis and life conditions of the trainees, to prepare training appliances in time, to staff the lectures, and more successfully to solve all the matters, dealing with professional training.

3. To work out standart curricula on each speciality.

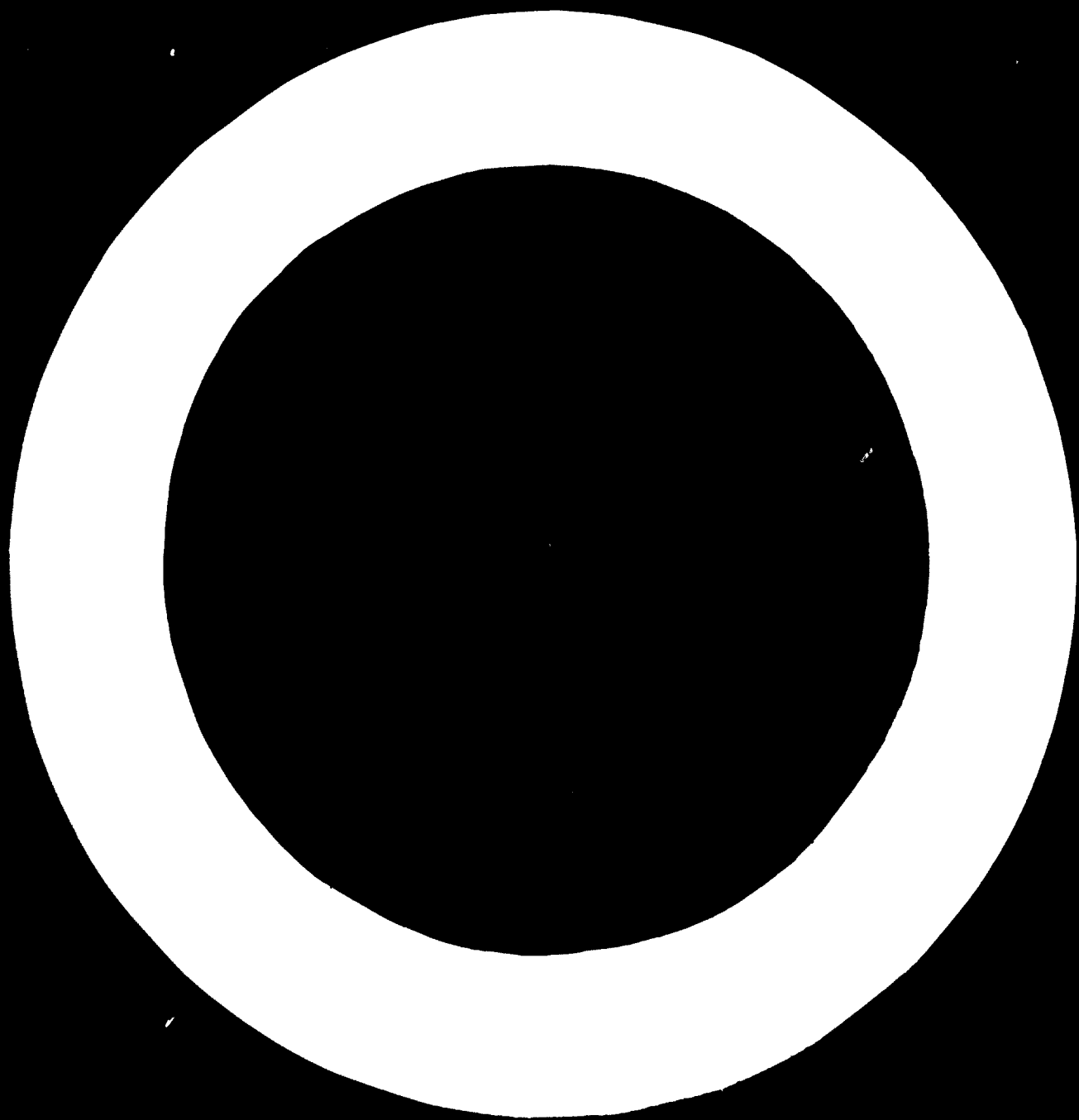
The courses administration is to be granted the right to revise these curricula adapted to peculiarities of professional training at the enterprise.

Such curricula must, first of all, underline the selection of courses participants and be the basic leading document in the period of training.

It will allow to determine more correctly the trend in training and to avoid in some cases non correspondance of the speciality of fellows with training programmes.

Among 43 trainees of the last group 14 participants had not very high education level and it was necessary to provide them more detailed theoretical principles and essence of metallurgical production.

On the other hand, about 19 participants possessed good special theoretical grounding and quite sufficient practical experience in metallurgy and so they were interested in the material dealing only with industrial experience, modern



technology application and so on.

It is very difficult to work out a single curriculum for such differently trained participants staff and it is more difficult to train them within one group.

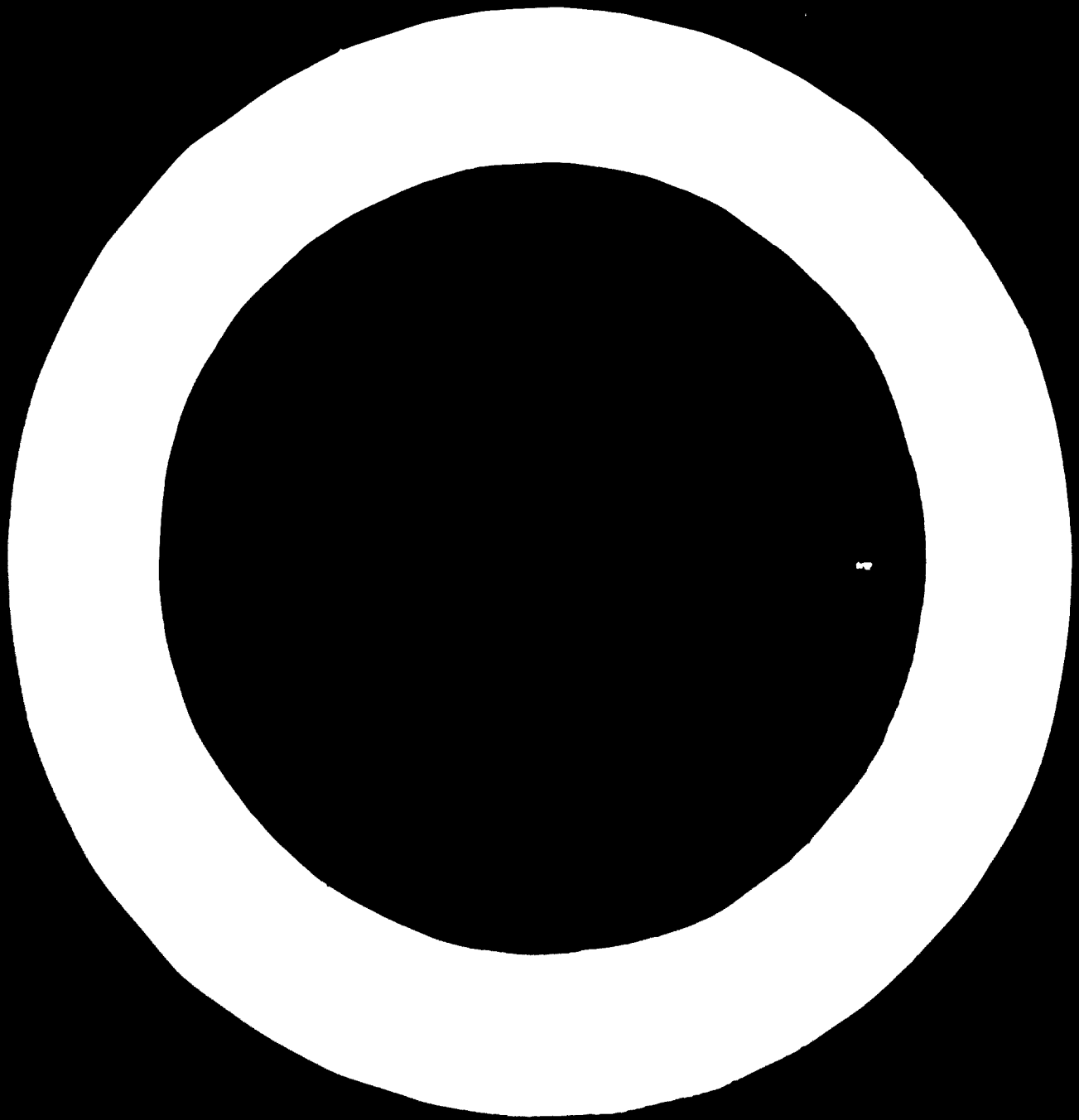
4. To transfer the courses to all year-round work, making 2 admissions in turn with the training courses lasting for 5 months.

Brakes in the courses work increase expenditures for training and prevents from staffing more constant and qualified instructors.

5. To consider the matter about issuing special documents to the participants, certifying their training at the courses. A lot of the UNO participants repeatedly made a request for such a document to be given to each of them.

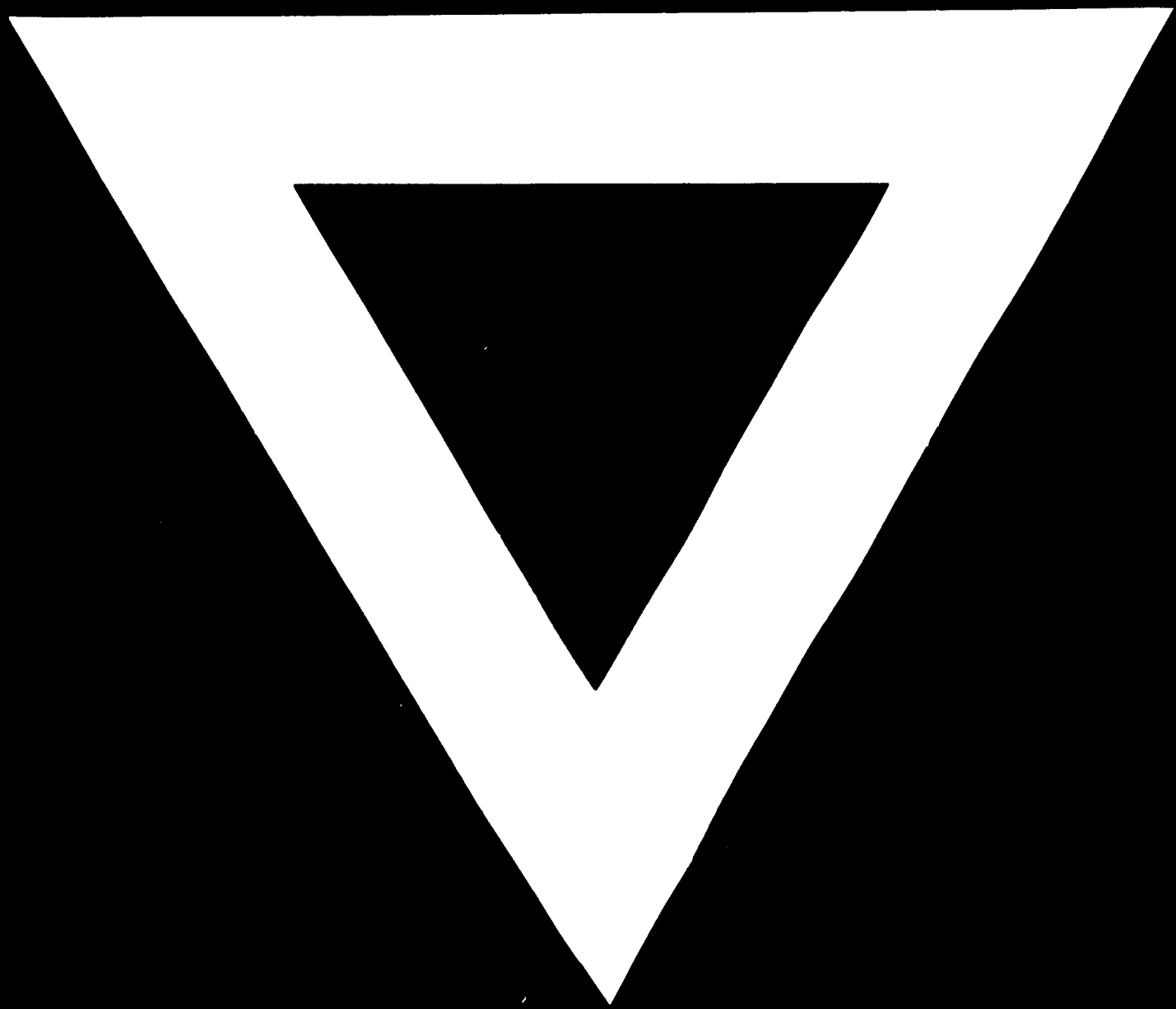
Our point of view is that the request should be considered, because its positive solution may contribute to the courses work.

6. The participants' arrival should be limited to a week period of time since the date of training at the courses is announced.



We are looking forward to a wide exchange of the training centres and special UNO courses chiefs' experience which will be very helpful in working out concrete measures to improve the organization of work at the courses and training national specialists for the developing countries.





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