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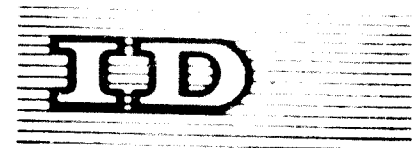
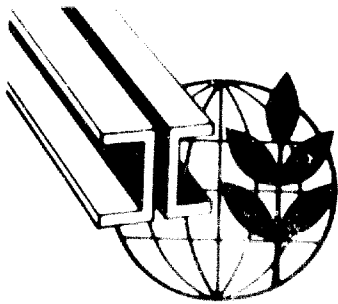
Moscow, USSR, 19 September - 9 October 1968

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THE MOST ESSENTIAL METAL PRODUCTION FOR  
DEVELOPING COUNTRIES <sup>1/</sup>

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Leningrad, USSR

<sup>1/</sup> The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the secretariat of UNIDO.



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SUMMARY

THE MOST ESSENTIAL METAL PRODUCTION FOR  
DEVELOPING COUNTRIES <sup>1/</sup>

by

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According to the classification of the United Nations Economic Commission for Europe the group of developing countries includes all countries of Latin America, those of Africa (except the South African Republic), those of the South-East Asia and the Far East (except Japan and CPR), and those of the Middle East.

Almost 40 developing countries (of about 60) presently possess metallurgical enterprises mainly established after World War II.

In the most of these countries the ferrous metallurgy is in the early stage of development (except Argentina, Brazil, Venezuela, Mexico, UAR, India and some others.)

It should be noted the relatively high average annual growth rates of metallurgical products manufactured in the developing countries. During the period of last 15 years it amounted to 15 pct in Latin America, to 13 pct and 12 pct in the South-East Asia and the Middle East, respectively. It was promoted by re-establishment of economic relations disrupted by World War II and by liberation of a number of countries from the colonial dependence.

Political independence achieved by developing countries served as an incentive to create economic independence, which could be gained through industrialization of national economy.

The ferrous metallurgy is of particular concern in solving these common problems as a principal branch of national economy creating conditions for extending the building of industrial enterprises and housing as well as for an appearance of a number of industries to process home raw materials.

As a result of constructing the metallurgical enterprises the share of total metal consumption met by imports is decreased in the 1957-1965 period by 25 pct in countries of Latin America, by 44 pct in India, by 20 pct in the UAR.

The USSR has rendered a great assistance in establishment of iron and steel industry in developing countries. Some iron and steel works have been build or planned to be built with the help of the USSR in India, Ceylon, the UAR, Iran, Pakistan, Algeria and in other countries.

In 1965 all the developing countries imported 11.0 million tons of rolled products. The principal importers are Pakistan, the Phillipines, Thailand.

#### A. Countries of Latin America

In a total rolled products output the proportion of bar sections is considerable (up to 40 pct.)

The proportion of flat products output is relatively high in three countries only, viz. Chile, Mexico, Brazil; the rest of the countries with a limited metal production depend on

their import. Almost all the countries also import tubes for oil industry.

A considerable number of the countries of Latin America without iron and steel industry (Bolivia, Honduras, Costa Rica, Nicaragua and others) import profiles, flats and tubes. The proportion of import relative to the apparent consumption sharply ranges amounting from 80-100 pct (Peru, Bolivia) to 10-15 pct (Chile, Mexico, Brasil).

#### B. South-East Asia and Far East

Most of the countries of this vast region possess small-size metallurgical enterprises built in the 50's. In a number of countries there are no iron and steel works (Kuwait, Saudi Arabia, Syria). All countries of this region (except India) meet only a small part of their home consumption by the own production of iron and steel.

Profiled bar sections account for a large part of imports. Flat products import is negligible. The largest importers of rolled products are Pakistan, the Phillipines, Thailand.

#### C. Middle East

The countries of the Middle East do not possess any considerable metallurgical enterprises either and consequently are to meet their metal requirements by import (except the UAR). Bars for building and for mining industries and steel tubes compose the bulk of imports. In recent years a trend to the increase of import of sheet is observed.

#### D. Africa

An unadequate level of industrial development of the countries of Africa specified an appropriate nature of their metal consumption. In these countries the rolled steel products are generally consumed for building requirements (up to 40 pct) and for packing needs. In recent years import of steel tubes and pipes for agriculture as well as of tubes for oil industry to produce and to transport oil and gas has also increased.

The major part of the rolled product requirements of the countries of Africa (except the UAR) is met by import, the absolute amounts of which for separate countries are negligible. The largest importers of rolled products are Algeria, Nigeria, Morocco.

As a result of establishment of iron and steel works in developing countries the pattern of rolled products consumed and imported can considerably changed in due time.

Presently bar sections and rods for building requirements account for a large part of rolled product production and consumption in developing countries. The consumption of flat products is not great. However, some progressive trends are outlined in this field, which can lead in the nearest years to a marked increase of flat rolled product consumption for building needs (welded steel constructions and roll-formed shapes), for welded tubes production and for other purposes. It may serve as a basis for installing plate and sheet mills of a small capacity in these countries.

Import of tubes for oil industry substantially increased due to the progress of oil and gas production in developing countries since the organization of its production in many of small countries is not expedient because of limited requirements.

THE PRODUCTION OF IRON AND STEEL IN DEVELOPING COUNTRIES<sup>x/</sup>

The concept of "developing countries" includes a considerable number of countries situated in different parts of the world, in the Latin America, in the Southeast Asia, in Africa, in the Far East and in the Middle East.

The extent of sustained and economic development of these countries is different. Along with the countries which have reached a high level of development (Argentina, Brazil, Mexico, Venezuela, Peru, Chile, India, etc.) there are a large number of countries having an inadequate development of productive forces, of which agriculture accounts for the main part in the national economy.

According to the classification of the United Nations Economic Commission for Europe the group of developing countries includes all countries of Latin America, those of Africa (except the South African Republic), most of the South-East Asia and the Far East (except Japan and Korea), and most of the Middle East.

Most of the developing countries, as an initial priority, promote metallurgical enterprises. However, in the case of these countries the iron and steel industry is in the early stage of development.

Among these countries are Algeria, Tunisia, Egypt, Kenya, Lebanon, Libya, Tunisia, Jordan, Ethiopia, Somalia, Sudan, a number of countries of Latin America, Cuba, Guatemala, Colombia; countries of the Far East and Asia: Burma, Malaysia, Thailand and others.

Another group includes countries having a higher level of development and possessing considerable natural resources and a relatively developed mining industry (Argentina, Brazil, Venezuela, Colombia, Peru, Mexico, Chile, the U.S.S.R., India).

The production of iron and steel in all of these countries is low, with a little exception, a considerable part of the iron and steel demand in these countries, however, as a result of absence of the iron and steel industry most of developing countries in Africa are to rely on import to meet their metal requirements.

Practically the same picture of iron and steel products in developing countries concentrates

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<sup>x/</sup> In compiling this paper reports of the UNECE Steel Committee for 1966-1967 were used.

in some of them, viz. in India, Brazil, Mexico, Argentina, Venezuela, Chile and in the UAR.

The steel output in all the developing countries of the world increased more than six times during the period of last 19-20 years.

Over this period in the world the highest average annual growth of iron and steel production took place in the countries of Latin America (13 pct), those of the South-East Asia and the Far East (12 pct) and those of the Middle East (12 pct).

A number of countries contributed to such an intensive growth of iron and steel production which has occurred in the developing countries after the end of World War II:

a) re-establishment of economic relations interrupted by the war;  
b) liberation of a number of countries from the colonial dependence which hindered the consolidation of the economy of these countries and contributed to the one-sided development of their economy and raw materials.

Prior to the year of World War II the economy of Asia, Africa and Latin America countries was developing at a relatively slow rate: the annual growth of gross national output was no more than 1 pct in the countries. For the first decade after the war it increased and amounted to almost 4 pct.

Having achieved political independence the developing countries made efforts also to obtain economic independence through industrialization of national economy on the basis of industrial processing of domestic raw materials. As a result of that the industry of these countries gained some progress, which is shown up by the considerable growth of the total output of industrial production.

The iron and steel industry is of particular concern in solving these common problems of the economy development of developing countries as a principal branch of industry creating conditions for an appearance of a number of industries to process raw materials as well as for extending the building of industrial enterprises and housing.

The available data show that 44 pct of the world resources of iron ore and 48 pct of natural gas are concentrated in developing countries, which is also of far-reaching importance to establish the iron and steel industry in spite of the inadequate prospecting information about these deposits.

In a number of developing countries the leading role in establishment of the iron and steel industry belonged to the state. Hence in a number of these countries the iron and steel works are a government property.

A considerable part of investments required to build the iron and steel works has been derived from foreign loans.

The USSR has played a prominent part in the establishment of iron and steel industry in developing countries. Some iron and steel works have been constructed or planned to be constructed with the financial and technical assistance of the USSR in India, Pakistan, Ceylon, the UAR, Algeria and in other developing countries.

As a result of establishing the iron and steel enterprises the share of total steel consumption met by imports in some countries is decreasing.

In the 1957-1967 period according to the data of the Steel Committee of the UNECE the share of total steel consumption met by import decreased by 44 pct in India, by 25 pct in the countries of Latin America and by 33 pct in the UAR.

In 1967 all the developing countries imported 11.0 million tons of rolled products.

It is expedient to consider the rolling shapes consumed in developing countries and the outlook of its import for the regions mentioned above.

#### A. Countries of Latin America

The production pattern of rolled products in the countries of Latin America is typical



to a number of other developing countries. In a total production of ferrous metals steel bars hold a prominent place, their share amounts to 38 pct.

Countries having a small output of metallurgical production (Colombia, Peru, Venezuela, Uruguay) produce almost exclusively steel bars and wire rod pipes, unlike flat products, the production of these tends to a great extent carried out on rolling mills of a limited output.

The share of steel flat products also tends to amount to 30 pct for the whole region considered. However, this average is not to be regarded since the plate and sheet production concentrates in the iron and steel industry of a few countries, viz. in Brazil, Mexico, Chile and in Argentina where the iron and steel industry has attained a high degree of development. In Brazil, the production is estimated to be higher than in any other country in the range of 55 pct (Chile), of 45 pct (Mexico) and of 30 pct (Argentina).

The steel bars and wire rod production amounts to 30 pct in Brazil, to 35 pct and 20 pct in Argentina, to 20 pct and 10 pct in Mexico, respectively.

Some amounts of railway rolled products (rails, spikes, bars, tie-plates and railway axle billets) are produced in the countries (Brazil, Peru, Venezuela).

The rolled products made in the countries of Latin America (Brazil, Argentina, Mexico, Chile) meet the demand of these countries by 70-80 pct. At the same time the domestic production of rolled products meet the demand of metal industry in Colombia and in Venezuela and only 20 - 25 pct of these in Peru and in Uruguay.

The figures of principal items of rolled products imported in recent years into the largest countries of Latin America are given below.

Country	Principal items of imported rolled products	Share of import in total consumption of rolled products, pct
Argentina	Rails for railways <sup>x/</sup> , plates and sheets <sup>x/</sup> , tinplate <sup>x/</sup> , pipes and tubes	25 - 30
Brazil	Pipes and tubes, tinplate, alloyed bar sections	15 - 25
Bolivia	Tubes for petroleum industry <sup>x/</sup> , plates and sheets, profile iron reinforced bars	100
Venezuela	Tubes for petroleum industry <sup>x/</sup> , sheets <sup>x/</sup> , tinplate, bars, reinforced bars	45 - 50
Peru	Plates and sheets <sup>x/</sup> , tinplate, pipes and tubes, railway rolled products, reinforced bars	75 - 80
Colombia	Sheets <sup>x/</sup> , tinplate, tubes for petroleum industry <sup>x/</sup>	50 - 55
Chile	-	10
Mexico	Railway rolled products, pipes and tubes	10 - 15

x/ The main items of imported rolled products.

The figures cited above show that due to the non-uniform production of iron and steel in developing countries of Latin America the degree of meeting the rolled products demand thanks to the domestic production and, consequently, the share of import are sharply varied.

If Mexico, Chile, Peru, Argentina and Brazil almost completely meet their rolled pro-

ducts demand and Venezuela and Colombia satisfying about half of its demand, most of the countries (Bolivia, Honduras, Costa Rica and others) practically completely depend on the import.

In Colombia, Peru, Venezuela where only steel bars are produced flat products (sheet, tinplate) and tubes for petroleum industry prevail in imports. The demand for tubular products is rather considerable in all developing countries of Latin America and exceeds the capacity of existing tube mills more than twice.

Nearly in all countries railway rolled products are imported in considerable amounts since their production is carried out in a limited number of countries (Brazil, Argentina) only.

Nearly all countries of Latin America import cast and bar rolled products, especially of steels and small sizes, and also some bars.

However, on account of small size data it can be concluded that import of bar rolled products essentially exceeds that of flat rolled products in all the developing countries, which is attributed to the insufficiently high level of steel and metal consumption in these countries. The metal import into Mexico and Brazil is minimal.

### 3. South-east Asia and Oceania

Most of the countries of this region possess small-size metallurgical enterprises. All their enterprises have limited capacity. The rolling mills do not work at the rated capacity for lack of steelmaking facilities and other reasons.

This in Pakistan there are 12 rolling mills with a total capacity of 200,000 - 250,000 tons<sup>x/</sup> per year producing mainly the bar rolled products; there are 100 small enterprises in the Philippines and near 50 works with a total capacity of 100,000 tons of bar products and tubes in Hong Kong.

In Burma, Indonesia, Ceylon, Thailand and in some other countries there are 1 - 2 small iron and steel works of a little capacity.

In Kuwait, Syria, Laos, Cambodia, Afghanistan, Saudi Arabia and in a number of other countries there are no iron and steel works.

All countries of the South-east Asia and of the Far East meet only a small part of their domestic consumption by their own production. Only India is an exception as it possesses integrated iron and steel works and exports a part of rolled products into other countries. In this case domestic production of ferrous metal meets about 80 per cent of the demand of the country.

As a result of that the demand in rolled products in the countries of the region considered is mainly met by import. In recent years the largest imports of rolled products were Pakistan and the Philippines. Bar rolled products account for a large part of imports. The rolling shapes imported into the largest countries are given below:

Country	Items
Burma	Bar <sup>x/</sup> and flat rolled products
India <sup>xx/</sup>	Plate and sheet <sup>x/</sup> , constructional alloyed steel, rod

<sup>x/</sup> The non-integrated iron and steel works has been built and put in operation in 1967 in Chittagong, East Pakistan. Its annual capacity is of 150,000 tons of combined mix of rolled products (bars and tubes) and may be expanded to the output of 200,000 tons per year.

<sup>xx/</sup> The main item of report.

<sup>xxx/</sup> The rolling shapes produced in the country are characterized by prevailing the profile iron (90-95 per cent), rail way rolled products (about 10 per cent). The share of sheet and plate does not exceed 30 per cent of the rolled products output.

Country	Items
Indonesia	Profile and bar iron <sup>x/</sup> , flat rolled products.
Malaysia	Profile iron, flat rolled products <sup>x/</sup>
Pakistan	Wire <sup>x/</sup> , flat rolled products.
Thailand	Bar <sup>x/</sup> and flat rolled products.
The Philippines	Flat rolled products <sup>x/</sup> , profile iron

x/ The main items of imports.

### C. Middle East

The countries of the Middle East like those of the South-East Asia and those of the Far East (except India) do not possess any considerable metallurgical enterprises and consequently are to meet their metal requirements by import mainly.

The only country which largely meets its metal needs by domestic production of iron and steel is the U.A.E. There are small enterprises in Lebanon and Jordan.

In the countries of the Middle East as well as in the most of developing countries rolled products are mainly used in building and in mining industries. The imports into these countries is specified by these two industries. Bar rolled products account 50 per cent and steel tubes for petroleum and gas industries (up to 10 per cent) compose the bulk of imports. In recent years a trend to the increase of sheet imports is observed.

A brief description of rolling shops, which are essential for the developing countries of the Middle East is given below.

Jordan. In 1957 a iron and steel plant with a 50,000 tons per year. Light-section rolling mill was put in operation. After reaching the rated capacity of this mill the demand of Jordan in reinforced bars for building will be met. The plate and sheet consumption is negligible in that country.

Iran. In total there are no production of rolled products in that country. In 1967 a plant for production of helical electric tubes is expected to be put in operation in Achaz. The principal items of imported rolled products are beams, large sectional shapes and rods. The percentage of steel bars in metal consumption of that country is 52 per cent, that of flats is 23 per cent and that of tubes is 25 per cent.

Iraq. There is no iron and steel industry. It is large flat products for building and sheet and plate in small amounts that are mainly imported.

Kuwait. The country does not possess metallurgical enterprises although attempts to build them have been made. The import of metal is varied in a great extent. The principal items of imported metal are profiles, reinforced bars and tubes for petroleum industry.

Lebanon. The country has three small enterprises mainly producing reinforced bars, which are able to provide for all the demands of the country. Hence sheet and tubes for petroleum industry are imported only.

Saudi Arabia. There is no iron and steel industry in the country. Bar rolled products (shapes) and tubes are imported.

The Syrian Arab Republic. There is no iron and steel industry. The principal items of metal imported into the country are shapes, flat rolled products (plate and sheet) and tubes and pipes.

The United Arab Republic. There are 10 iron and steel works in the country. Now the construction of a number of iron and steel works is planned as well as the extension of the He-

Iron and Steel Works with the assistance of the USSR. The bar rolled products is the main item (about 80 pct) of rolled products produced at the metallurgical enterprises of the UAR. The domestic production of iron and steel meets about two thirds of the country's metal demand. The principal items of ferrous metal import are flat rolled products, billets for rolling and railway rolled products.

#### Africa

The industrial backwardness of the developing countries of Africa has an unfavorable effect on the establishment of the heavy industry and on the development of the steel industry in particular. According to the annual reports of the African countries, production increases by 6-7 pct per year in connection with the industrial investments.

The appropriate nature of metal consumption for one of the commonest rolling shapes is due to the low level of the industrial development of the countries of Africa. In these countries the rolled products are consumed for building (up to 40 pct) and for making containers to pack agricultural products, both for export and for use in the country. The other principal consumers are the petroleum and gas industries, producing oil wells and casing tubes and pipes for oil and gas mines as well as the agriculture consuming steel for irrigation of droughty soils.

Presently in the developing countries of Africa there are not any considerable metallurgical enterprises. In Algeria, Tunisia and Morocco there are small plants. In Algeria and in a number of other countries (Ethiopia, Nigeria, Senegal) there are rolling mills and in a number of countries (Ghana, Nigeria) galvanneal mills have been built and now are in operation. In some countries (Kenya, Tanzania, Uganda, Nigeria) galvanized and electrolytic sheet and products from the imported sheet.

Almost all the rolled products in the countries of Africa are being under capacity. For the heavy industry, iron and steel enterprises of the developing countries of Africa are able to provide for only a small part of their rolled products demand. The rest of demand is met by import, the absolute value of rolled products imports being negligible and amounting to some tens thousand of tons per year only. The largest consumers are Algeria, Nigeria and Morocco.

The bar rolled products, both heavy-section and light-section covers the bulk of imports. In recent years the metal import for package making and for other needs has increased. In connection with putting in operation gas and oil fields in some countries steel tubes import has also increased. The share of these items of metal in import is about 10-40 pct. Import of railway rolled products is at a relatively high level.

A brief description of metal consumption of some of the largest developing countries in Africa is given below.

Algeria. For the time being a considerable part of metal demand of that country is met by import. Bar rolled products, reinforced bar and tubes for petroleum industry (drill pipes, gas and oil line pipes) are met approximately to three-fourths of the total of rolled products imported. Coilplate for machine industry and package making and wire and for building needs are imported in small amounts.

Ghana. As the wire rod and bar stock demand is met by domestic production, flat rolled products (plate and sheet) and pipes and tubes are mainly imported.

Kenya. All demand of that country is met by import (sheet, including galvanized, and medium and small bar stock, mainly).

Libya. Flat rolled products import is mainly connected with the petroleum industry development. The main item of metal import is steel tubing for petroleum industry (70-80 pct of all imports).

Morocco. There is a small domestic production of bar rolled products. The main items of import are shapes, coilplate for canning industry, plate and sheet.

Nigeria. That country has the largest population in Africa and its metal demand is increasing with each year. The home production of rolled products (reinforced bar) is negligible. The prevailing items of rolled products imported into the country are shapes, plate and sheet, tubes for petroleum industry and railway rolled products.

India. The iron and steel products of small (reinforced bar) and medium sections are mainly imported.

The principal metal consuming countries in the developing countries and the rolling shapes both produced in the country are presently imported were considered a very low. It is essential to characterize the outlook of metal consumption of some developing countries which have proceeded or are going to proceed in the nearest future to the construction of iron and steel works with the technical and financial assistance of ICI, U.S.

Presently the ICI is carrying out extensive programme of assistance for building metallurgical enterprises in developing countries. As a result of their construction the amount of metal consumption and the pattern of rolling products is being changed to a great extent.

A brief character of the production programme of iron and steel works which are designed, constructed or intended to be built by the USSR in some developing countries is given below.

The changes in metal consumption and import which will occur if these works are constructed are also considered.

### 1. The iron and steel works at Bhilai, India.

The first stage of the works is designed to produce heavy and medium bar rolled products having been built, a project of the extension to the annual output of 2.7 million tons of steel ingots was carried out in 1967. The production of rails is raised to 500 thousand tons, that of bar rolled products, to 100 thousand tons and the output of 100 mm section billets, to 300 thousand tons against the rated output of the first stage of 100 thousand tons. Additionally the wire rod production amounting to 100 thousand tons is to be established. In the course of works enlargement the total amount of finished rolled products is raised from 40 thousand tons as it was envisaged by the project of the first stage to 1.4 million tons, i.e. 1.4 times.

As a result of such considerable increase of production at the Bhilai iron and steel works India would gain a possibility not only to reduce import of iron but to export some grades of the latter (railway rails).

### 2. The iron and steel works at Bokaro, India.

The project of iron and steel works at Bokaro provides for the annual production of 4 million tons of steel (the first stage is 1.5 million tons) in 1971-72.

The works should produce heavy and medium rolled flat products with the width up to 2500 mm amounting to 1,500 thousand tons and also resulting 1,500 thousand tons of hot rolled and 1,700 thousand tons of cold rolled products (the latter include 600 thousand tons of galvanized and corrugated sheet).

The building of Bokaro iron and steel works is intended to eliminate the sharp deficit of India in flat products the import of which presently somewhat exceeds output of all rolled products import.

On the basis of available data the maximum requirements of India in flat rolled products are not only now but later on will exceed the planned amount of their production at Bokaro and other works. Iron and steel works, hence, the import of flat rolled products will be at a relatively high level.

### 3. The iron and steel works at Durgam, India.

Constructing a comprehensive works is planned in three stages. The annual output of the first and the second stages is 10 thousand tons of hot rolled products, the output of the third stage should reach 10 thousand tons per year. The enlargement of output to 100 thousand tons is provided for. The rolling shapes include small- and medium bar steel up to 50 mm section,

reinforcing steel, hoop (20 thousand tons) and wire rod (15 thousand tons). A wire making plant has also been planned with the output of wire and wire-rope in amount of 11.6 thousand tons per year.

After the works are able to give the rated output, the construction of this works is close to 80% only. It is necessary to continue the work. It should be mentioned, while rolled products import is planned, the import of all rolled products at present it will have a tendency to be constant.

4. The iron and steel works in Nigeria

In accordance with the plan, the construction of the iron and steel works in Nigeria is being worked out on the basis of a technical-economic survey of iron and steel works in the country. The survey is being carried out by the following stages:

5. The iron and steel works in Nigeria

The works are planned to produce the following products:

The products of the works are: 1. Rolled products: flat rolled products, including coils of sheet and strip, hoop, wire rod, wire, channels Nos. 5-50, beams, angles, etc. 2. Cast products: pig iron, cast iron, products. The products of these works are intended for use in the iron and steel products, except large castings.

As present, the works are planned to be built in two stages. The first stage is the construction of the first stage of the works, which will produce the following products:

6. The first stage of the works

A technical-economic survey of iron and steel works in Nigeria has been worked out; the annual output of the works is about 1.4 million tons, including 90 thousand tons of rolled products, 1.3 million tons of cast iron and 115 thousand tons of pig iron. The output of the works is intended for use in the iron and steel products, except large castings. The products of the works are: 1. Rolled products: flat rolled products, including coils of sheet and strip, hoop, wire rod, wire, channels Nos. 5-50, beams, angles, etc. 2. Cast products: pig iron, cast iron, products. The products of these works are intended for use in the iron and steel products, except large castings.

A question of combining the first stage of the works with the output of 1.15 million tons of pig iron of the first stage of the works and steel has been considered.

Although present, the works are planned to be built in two stages. The first stage is the construction of the first stage of the works, which will produce the following products:

After the first stage of the works is completed, the iron and steel products should be imported. It is necessary to continue the work. It should be mentioned, while rolled products import is planned, the import of all rolled products at present it will have a tendency to be constant.

In view of the fact that the output of the works is intended for use in the iron and steel products, except large castings, the works are planned to be built in two stages. The first stage is the construction of the first stage of the works, which will produce the following products:

7. The iron and steel works in Nigeria

Despite the fact that the works are planned to be built in two stages, the construction of the first stage of the works has been completed. The works will produce the following products: 1. Rolled products: flat rolled products, including coils of sheet and strip, hoop, wire rod, wire, channels Nos. 5-50, beams, angles, etc. 2. Cast products: pig iron, cast iron, products. The products of these works are intended for use in the iron and steel products, except large castings.

After the production of products of the works is completed, the iron and steel products should be imported. It is necessary to continue the work. It should be mentioned, while rolled products import is planned, the import of all rolled products at present it will have a tendency to be constant.

works to the output of about 3 million tons of steel. Proceeding from the character of metal consumption the rolling products should be apparently oriented to the manufacturing of bar-rolled products. In this case the development of Algeria is rolled products should be a general set of heavy iron items.

The consideration of the most important metal production levels in "developing countries" question allows us to find the following directions to be taken:

a) Iron and steel production in 1960 and the volume of various output products carried out in most of the developing countries is shown in Table 1. The Middle East, the South-East Asia, the Far East and Africa, are the main areas of steel production in the developing countries and to decreasing the output of metal.

The output of these countries is not sufficient to use with increasing volume metal consumption of the countries in the future.

The concentration of iron and steel production in the hands of the authorities of the state in many cases, is an important factor in the development of an exportable surplus of considerable size.

b) The development of metal production in developing countries is relative to each developing country which includes the following factors: the natural resources, the size of the works, a relatively small amount which is not very high, increase in, however, technical progress in metal production.

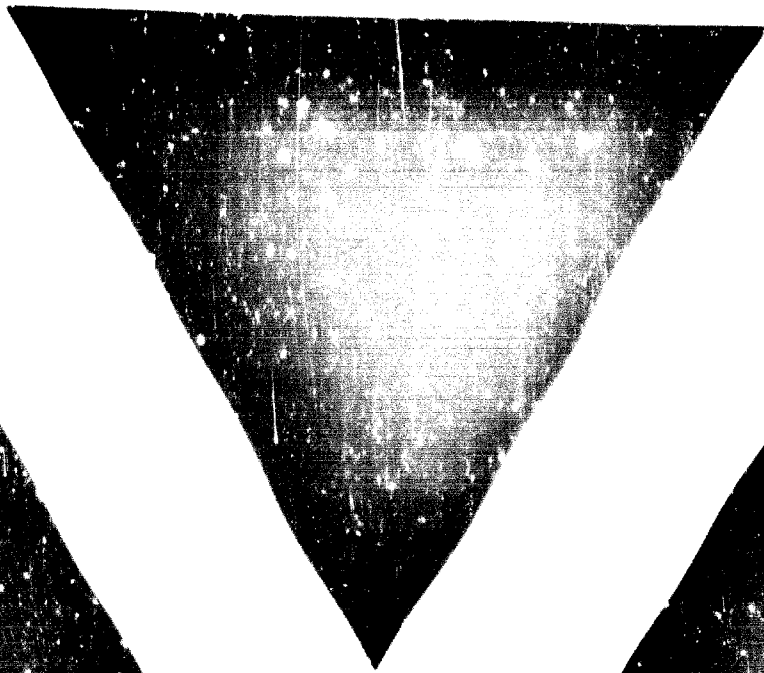
c) In the metal production of iron and steel, the production of small and medium bars and wire is a very important part of the output. The building of a low capacity of iron and steel works due to the relatively low output of cast and wire-rod rolling mills contributes to the development of the following types.

d) Recently an increase of finished products demand is observed. In reform sheet mills of a small productivity are planned to be built in a number of developing countries. These trends are taken into account in development since the increasing demand for sheet production allows the production of rolled-iron shapes, rolled bars, beams for various different products etc. which are used in the construction of civil and industrial buildings to be obtained as a result of making structural constructions lighter. Since the requirement of small developing countries for bars and sheet which are not produced in general set by import should be taken into account.

e) Lately a new and important direction of production of developing countries belongs to tubes for petroleum and gas extraction which is connected with the development of oil and gas extraction in these countries. In production of electric welded tubes of medium and large diameter for oil and gas extraction the complexity of organizing their production in the country and the low productivity of tube rolling and electric weld pipe mills have caused a need to import them from the country.

f) Some of rolled products, for instance, railway rails, large brass, pipe fittings, rolled steels are not produced in developing countries (except India, Brazil, Mexico, Venezuela) due to the limited requirements and high capacities of modern rail- and structural mills. These grades of rolled products are imported from developed countries.





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