The great projects in heavy industry

Part 23
Ibero-American integration

EIR continues its exclusive translation of the Spanish-language book, *Ibero-American Integration: 100 Million New Jobs by the Year 2000!* The book, published in fall 1986 in Spanish, was written by an international team of experts for the Schiller Institute, elaborating Lyndon LaRouche's proposal to free the continent of economic dependency and spark a worldwide economic recovery, "Operation Juárez."

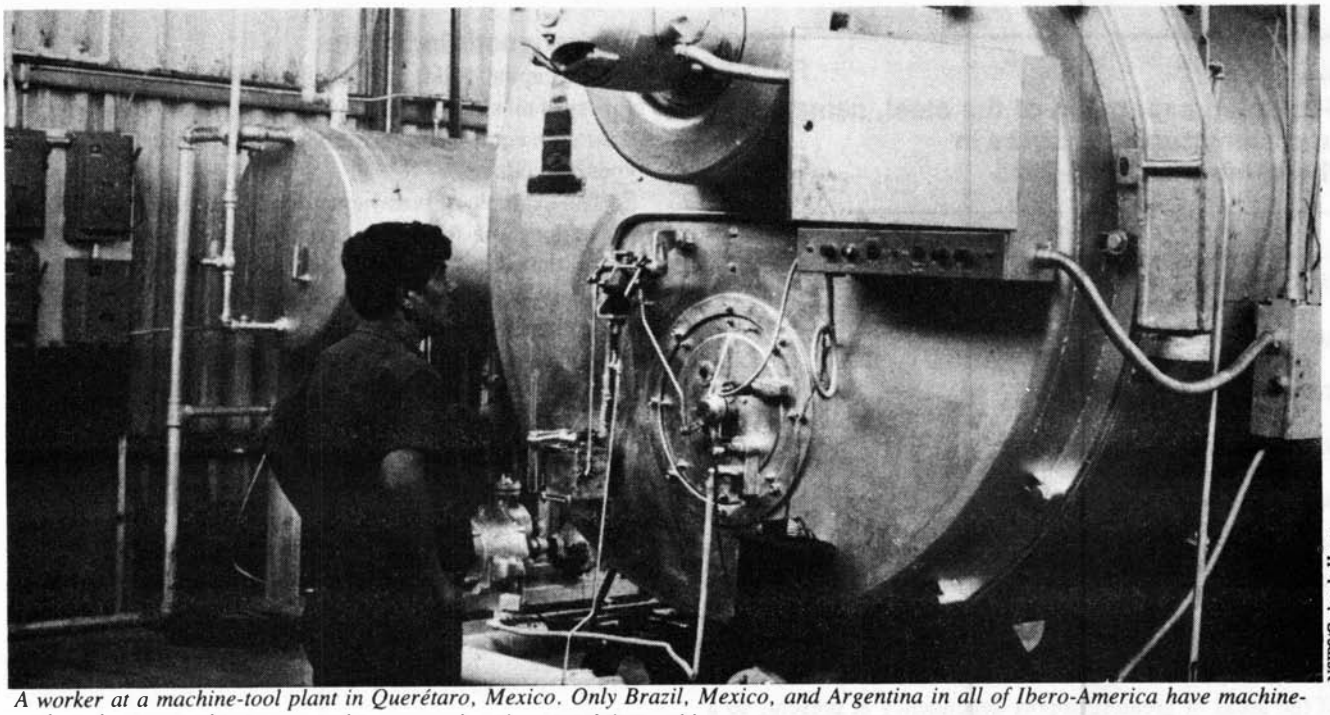
This week's installment continues Chapter 7, detailing the mining and industrial projects that will be required to fulfill that program. Only by converting the immense mineral wealth of Ibero-America into heavy industry, can the continent overcome its historical underdevelopment in this sector, which is indispensable for economic independence.

Numbering of the figures, tables, and maps follows that of the book.

Heavy industry is made up of the iron and steel industry, nonferrous metals production, basic petrochemicals, industrial non-organic chemicals, cement, and lumber and paper mill products. It turns the raw material of mines, oil wells, or forests into refined, semi-finished bulk products in preparation for their fabrication into the entire range of machinery and chemical products produced by the economy. Often called intermediate industries, heavy industries generally represent major investments in large-scale plants. Developing heavy industry is essential for Ibero-America to achieve the development goals outlined in this report.

The king of heavy industry is steel, and it is expected to remain so through 2015 and beyond. While ceramics and other materials are being developed to replace steel in many specialized applications, the bulk of the steel produced is consumed in construction, transportation equipment, and machinery, in uses where no substitute is in sight. Steel requirements for the year 2015 were estimated at 636 kilograms per capita, about the level of most OECD countries in the late 1970s. This will require 500 million tons production by 2015, and 150 million a year as early as 2000. Today, 35 million tons per year are produced.

This will require a tremendous investment in steel plants beginning immediately. But apart from the sheer construction of new steel plants is the question of technology. While producing basic carbon steel is a fairly straightforward process, the direct reduction method may be more advantageous for Ibero-America, as it uses natural gas rather than coke to reduce the iron ore. The direct reduction method has in fact already been pioneered in Mexico by the HYLSA company.



NSIPS/Carlos de Hoyos

A worker at a machine-tool plant in Querétaro, Mexico. Only Brazil, Mexico, and Argentina in all of Ibero-America have machine-tool production, and it is minuscule compared to the rest of the world.

In fact, the continent is relatively poor in coking coal, so that direct reduction is the way to go for all iron ore-producing regions that are near natural gas deposits. The Mutúm-Santa Cruz area of Bolivia is an excellent candidate, with large quantities of both; and Argentina, with lots of natural gas, would do well to go this route.

However, to avoid having to import huge quantities of coking coal by the year 2000 and beyond, the continent must pioneer the technology of plasma reduction of iron ore, which does not require coking coal. Small experimental plants already exist, and the continent must set up and fund, as a matter of strategic priority, experimental plasma reduction plants, such that by the year 2000 the technology is fully commercialized. This will also reduce significantly the cost of this phase of the steel-making operation, as the plasma furnaces replace costly blast furnaces.

Furthermore, Ibero-America will have to deal with the question of steel alloys, as there are very few applications of steel that do not also require some quantity of more specialized alloys. At present there are thousands of different alloys of steel involving a score of alloying agents, and more are being discovered every year. It will be necessary for Ibero-America to acquire the technology for a wide range of alloys, and to begin producing its own alloys as soon as feasible.

The estimated total cost over the next 30 years will be about $930 billion, if present cost parameters do not change dramatically. However, with the introduction of the above-mentioned new technologies and the mass production of rolling-mill machinery, it is likely that total costs can be significantly reduced.

Probably the biggest bottleneck of all, however, will be the shortage of skilled labor. A crash training program will need to be launched where workers will spend time in the steel mills already operating in Mexico, Brazil, and Argentina, and even in foreign steel mills as needed, to acquire the experience they will need to staff the number of steel plants that must be built in Ibero-America. The same holds true for the problem of skilled labor in all branches of heavy industry.

As for nonferrous metals refining, the average costs today for producing aluminum from bauxite are around $6,000 per ton (**Table 7-4**). However, in the area of nonferrous metals, the same developments of plasma technologies for refining iron ore apply. It is quite likely that by early in the next century, if not earlier, there will be a revolution in most of the ferrous and nonferrous metal industries brought about by early versions of the so-called "fusion torch," harnessing nuclear fusion energy to create very high temperatures for turning ores into ionized gases, making their separation easy.

Already, low-temperature plasma technologies are showing promise for near-term application in this area. In light of the importance that the metals industries will have in Ibero-America, it is imperative that the continent invest heavily in creating centers for research and development of these new methods. The potential is to cut not only refining costs, but energy requirements, especially electricity requirements, down to small fractions of their present size.

Many countries at present have some level of petrochemical industry. However, as with the other heavy industries, petrochemical production must grow at about 10% a year to keep up with the demand of the program presented here.

TABLE 7-4

Projected expansion of the steel, cement, and aluminum industries in Ibero-America 1985-2015

	Steel	Cement	Aluminum
New capacity (millions of tons)	467	630	18.7
Unit cost of investment (dollars per ton)	2,000	130	6,000
Total cost of new capacity (billions of dollars)	934	84.5	112
Annual investment in the year 2000 (billions of dollars)	24.4	2.3	2.5
Annual investment in the year 2015 (billions of dollars)	87.0	6.7	11.1

Chemicals, especially petrochemicals and fertilizers, is one of the areas of greatest import dependency at present, so a major emphasis must be put on acquiring the necessary technologies to be able to build chemical plants at the pace required. Mexico had made a good start in this direction in the early 1980s, but the International Monetary Fund (IMF) promptly put an end to that.

The continent will require, during the next 30 years, an enormous quantity of cement. The magnitude of infrastructure

struction, is such that more cement will be required per capita than for the industrialized countries. Ibero-America already produces about 80 million tons, but this must rise almost ninefold by 2015, and three-and-a-half times by 2000. Again, at first, the continent will need to import cement plants, until it can gear up domestic production of the required capital goods. However, in many countries there is a lot of excess capacity in cement-making plants at present due to the worldwide recession and general slowdown in construction. A cement plant located near the raw material and power source costs around $130 million, giving a total cost of nearly $85 billion over 30 years for our program.

In Table 7-4, one can see the investments that will be required over the next 30 years to expand the steel, cement, and aluminum industries.

Also important to develop will be the forestry-based industries. Ibero-America currently makes very little use of its forest resources, and most of that use is harmful, as discussed in Chapter 6. Large numbers of both lumber mills, for producing wood for railroad sleepers and for housing construction, and pulp and paper mills to produce paper for packing, newsprint, and paper uses, will have to be constructed. These forest-based industries must take into account the need for reforestation.

Capital-goods industries

The capital-goods industries are those that produce machinery of all kinds, transport equipment, electric and power-generation equipment, instruments, and a myriad of specific types of products.

The example of postwar Japan shows, again, how much can be done in a short time. Japan has developed, with only 15% of the population that Ibero-America will have in 2015, practically every capital-goods industry that will also be needed for Ibero-American development. While Japan ended the war with a significant trained industrial labor force, in numbers it was considerably smaller than the combined skilled industrial labor force available in Ibero-America today. What is required is a coordinated, continent-wide policy of upgrading the training of those already in the manufacturing workforce while bringing in new workers as fast as the jobs are created for them. **Table 7-5** shows the number of U.S. industrial workers in the core capital-goods industries, and the

TABLE 7-5

Composition of machine industry in the United States 1981

	Total employment (thousands)	Value of production (millions of dollars)
Total machinery and equipment	4,700	394,113
Machinery and equipment for agriculture and industry	933	85,904
agricultural machinery	127	12,460
construction machinery	155	16,760
industrial machinery and equipment	651	56,684
Machine tools and accessories	222	13,745
Transportation and communication equipment	1,871	209,058
transportation equipment	809	120,362
boats	185	10,021
aviation equipment	722	65,550
communication equipment	155	13,125
General equipment and accessories	1,674	85,406
electrical equipment	253	19,224
electronic and computer equipment	386	34,716
measurement and control	412	19,467
medical instruments and equipment	159	13,362
other equipment, components, and accessories	464	33,353

Source: U.S. Department of Commerce

projects, fo

annual value of the output of those sectors, which gives an idea of how few workers are required to produce an enormous output.

In Ibero-America, most countries are capable of manufacturing a certain range of capital goods at present, and Brazil is capable of producing a small quantity of relatively more sophisticated items. The first step to be taken is the rapid increase in production of the goods that already can be manufactured, including putting on additional shifts to make fuller use of existing capital installations. Such an expansion in breadth will be able to meet the expanded demand for an important range of capital goods, without having to resort to imports.

Second, just as was done in Japan in the 1950s, plans have to be made to systematically set up factories to manufacture more and more types of capital goods, beginning with those that are easiest to produce. The less sophisticated plants will be located in the less developed of the Ibero-American countries, that have little or no capital-goods industries today, while the more sophisticated ones will have to be located in Brazil, Mexico, and Argentina. Once begun, the process of adding new lines of equipment can quickly expand the capabilities of Ibero-American industry to satisfy close to the full needs of the development program.

While heavy industry must produce the rails, structural steel, and cement for the infrastructure projects, the capital-goods industry must supply the turbines, generators, transformers, and switch-gears for the electricity generation program. Large boilers and reactor vessels must be manufactured for the nuclear and thermal generating plants. Pressure vessels and high-quality tubing are needed for the petrochemical industry. The shipbuilding industry of the continent must be greatly expanded to meet the needs of creating an Ibero-American fleet to handle continental cargo.

A detailed program for capital goods can hardly be elaborated here, given the diversity of the industry, but the above general guidelines suffice to indicate the proper framework.

Machine tools

If capital goods are the heart of heavy industry, machine tools—the machines that make other machines—are the heart of the capital-goods sector.

Machine tools are the tools that are used to turn a block of steel into a machine. There are machines for cutting and machines for metal forming. Simple machine tools can be mass-produced for under $1,000, while the most sophisticated computerized ones can run into the hundreds of thousands of dollars. At present, only Brazil, Argentina, and Mexico have machine-tool industries of any significant size at all, and all are very small by world standards (see **Table 7-6**).

Machine tools, despite being central to the capital-goods industries, make up only a small proportion of total investment for plant and equipment of industry. In the United States, machine-tool consumption by industry accounts for about 1.5% of total expenditure for plant and equipment. For Ibero-America, this percentage will need to be much larger, especially at first as the program gets under way, but nonetheless it will be a relatively small component of total capital-goods investment.

TABLE 7-6
Production of machine tools, various countries 1983

	Total production (millions of $s)	Per capita production ($s per 1,000 inhabitants)
Argentina	31	1.1
Brazil	124	1.0
Mexico	21	0.3
South Korea	210	5.3
Italy	1,048	18.6
Japan	3,538	29.9
West Germany	3,194	51.8

Source: U.S. National Machine Tool Builders Association

The biggest bottleneck to developing this industry rapidly will not be acquiring the machine tools themselves, but training the labor force to use them. The machine-tool industry requires the highest average skill level of any capital-goods industry, and virtually all of the workers must be skilled, and some very highly skilled. Within 10 years, Ibero-America will need 80-100,000 skilled machinists. To create this number requires that thousands of workers begin training in the existing machine-tool plants in Ibero-America, and where feasible in the machine-tool plants of the United States, West Germany, and Japan.

Given the tremendous variation in types and complexity of machine tools, Ibero-America must follow a strategy of phasing into each successive level of sophistication. From the outset, Ibero-America should move to produce numerically controlled (NC) machine tools, which is a machine tool governed by computers. An NC machine tool is more advanced than one without NC control, but for that very reason it requires much less skill and experience on the part of the operator. NC machine tools automatically guide the moving parts of the machine tool, the blades, drills, lathes, or scrapers, reducing the operator's task to setting up the machine beforehand. Thus, by installing mainly this type of tool, the long training period for machinists can be greatly shortened. It will be necessary to train a much smaller number of people in the kind of computer programming required to create the programs, but that is more easily managed than training machinists.