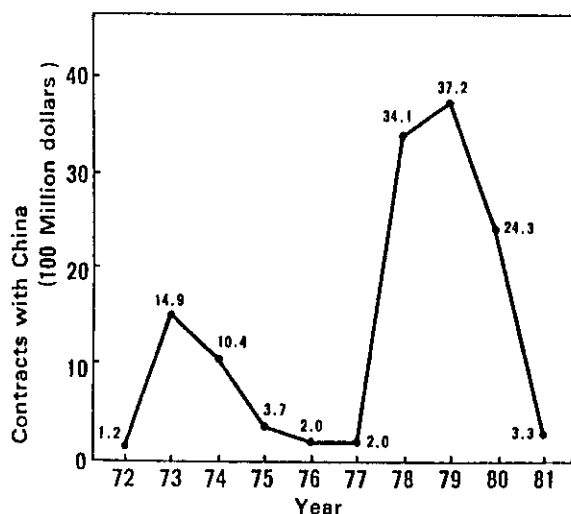


Selling Technology to PRC

Japanese engineering contractor company's experience relating to process plants for petroleum, gas, petrochemicals

BY SHOGO NOJIMA*

This paper reports our company's experience in the trade with China from the standpoint of an engineering contractor, particularly experienced in process plants in the areas of the refining, natural gas processing, and petrochemical industries.



Source: The Japan-China Association on Economy & Trade

AMOUNTS OF CONTRACTS MADE WITH CHINA FOR TECHNOLOGY AND PLANT (1972-1981)

Figure 1

Figure 1 shows the estimated amounts of the contracts that China made from 1972 to 1981 to import technologies and plants from abroad. It is estimated that in the decade since 1972, such contracts concluded by China amount to a total of \$13 billion. As the figure indicates, China purchased large quantities of technologies and plants in two major periods: 1973-74 and 1978-80. Even in the later 3-year period alone, the contracts nearly reach \$10 billion. In the last 2 to 3 years, however, because of political conflicts and a failure in economic development policies, the Chinese

*Senior Managing Director, Technical Services & Coordination Division, JGC Corporation, Tokyo; paper delivered at LES U.S.A./Canada-LES International Conference, San Francisco, CA, October, 1982.

government developed economic readjustment policies, under which the introduction of technologies and plants from abroad is controlled. For this reason, the contract amounts during this period remain very low.

Table 1 classifies the technologies and plants on which China made contracts. In the overall 10-year period, chemical plants rank first in contract amounts, which are followed, in a decreasing order, by iron and steel manufacturing plants, power generating plants, petroleum and natural gas plants, coal and nonferrous metal plants, transportation equipment, computer systems, and consumer-use electric equipment manufacturing plants. In the period in and after 1978, increases are shown in steel manufacturing plants, coal development plants, computer systems, television sets, and plants in the fiber and other light industries. On the other hand, the countries as sellers of these technologies and plants to China are given in Figure 2. As a total in the last decade, Japan accounts for 50.4% of the total contract amounts, with West Germany for 19.1%, France 8.4%, the United Kingdom 8.0%, and the United States 7.0%.

FEATURES OF TECHNOLOGY AND PLANT TRADE WITH CHINA

JGC's Project Experience

Table 2 indicates the projects that our company undertook, including subcontracting. In the last 9 years, we worked on 10 projects. The projects vary from refineries to plants for the production of basic petrochemicals raw materials for synthetic fiber and synthetic leather, and synthetic rubber.

The plant locations scatter over an extensive region: from Taching, known as an oil field at the northern end to Maoming, in Kuwangtung, close to the southernmost part of China. Of these projects we handled, five projects have already been completed and are in smooth operation by the Chinese hand.

The Scope of Work

In general, the following items are included:

1. Licensing of patents and know-how.
2. Basic design services.
3. Detailed engineering services excluding civil engineering work.
4. Procurement services for equipment and materials.
5. Supervisory services for construction work.
6. Operator training at a similar type of plant.
7. Supervisory services for startup and guarantee operation.

CONTRACTS MADE WITH CHINA FOR TECHNOLOGY AND PLANT (1972-1981)

Plant Type \ Year	1972~77 total	1978	1979	1980	1981	1978~81 total
Steel/Iron Manufacturing Plants	654.7	106.6	1,719.3	1,538.4	3.6	3,367.9
Pig iron	(29.9)	(55.0)	*(1,186.9)	(322.6)	(3.6)	(1,568.1)
Steel (including hydrogen)	(48.0)	(40.6)	*(217.4)	(28.6)	(-)	(286.6)
Rolling and treatment	(576.8)	(11.0)	*(315.9)	(1,187.2)	(-)	(1,513.2)
Electric Power Plants	333.4	192.1	207.5	292.0	—	691.6
Chemical Plants	1,598.1	1,764.0	1,208.2	196.0	84.6	3,252.9
Basic Petrochemicals (incl. synthetic fiber raw materials)	(815.6)	(1,025.6)	(655.7)	(157.0)	(-)	(1,838.3)
Fertilizers	(538.8)	(445.6)	(130.0)	(-)	(-)	(575.6)
Plastics/Synthetic rubber	(215.9)	(130.3)	(272.5)	(29.5)	(73.6)	(506.0)
Synthetic fiber	** (28.4)	(162.5)	(150.0)	(9.5)	(11.0)	(333.0)
Petroleum/Natural Gas Plants	451.3	311.5	137.0	16.6	75.9	541.0
Drilling/production	(415.9)	(281.5)	(6.0)	(-)	(72.7)	(360.2)
Refining/processing	(35.4)	(30.0)	(131.0)	(16.6)	(3.2)	(180.8)
Mining/Smelting Plants	125.6	426.1	221.0	32.7	8.0	687.8
Coal development	(125.6)	(301.1)	(57.0)	(27.5)	(-)	(385.6)
Non-ferrous metal smelting	(-)	(125.0)	(164.0)	(5.2)	(8.0)	(302.2)
Machinery Building	218.8	225.0	90.5	234.5	31.5	581.5
Transportation equipment		(25.0)	(87.5)	(230.4)	(7.7)	(350.6)
Computer/Electric/Electronic	23.3	341.4	45.5	32.6	70.8	490.3
Computer systems, etc.		(86.2)	(8.4)	(18.3)	(60.9)	(173.8)
Consumer-use electric/Elec- tronic equipment		(220.0)	(37.1)	(4.8)	(9.9)	(271.8)
Others	13.2	46.5	100.5	83.0	54.0	284.0
Total	3,418.4	3,413.2	3,729.5	2,425.8	328.4	9,897.0

* Estimated figure ** Partly includes basic petrochemicals..

Source: The Japan-China Association on Economy & Trade.

206

Table I

In most cases, the Chinese request the contractor's coverage of single responsibility, so the contractor needs to maintain close cooperation with process licensor.

Sales Approach

During the stage of sales approach, before offering a bid or submitting an estimate, it is absolutely necessary to make a full technical presentation, which is called "technological exchange", specifically in business with the Chinese. Actually, all of the projects we handled involved meetings for technological exchange.

The time from the start of sales approach plus technological exchange up to the submission of estimate varies considerably. On all of the projects in Table 2, except for item 3 alone, we submitted some forms of estimates to the Chinese when we commenced

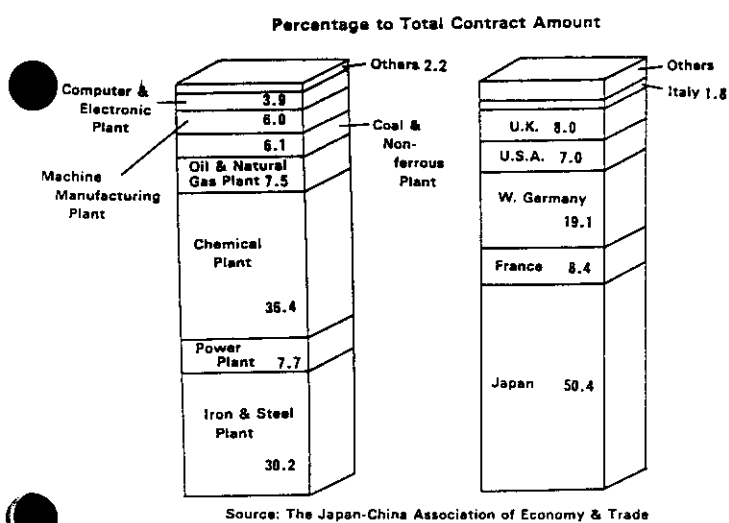
technological exchange. On item 3, it took 31 months from the first meeting to the submission of estimate proposal.

On every project, China's mission came to Japan to visit a corresponding type of plant. Such visits largely helped develop technological exchange and realize practical business meetings.

One Example of Project Negotiation

Examples of a middle-distillate hydrocracking unit are seen in items 9 and 10 of Table 2. Including meetings for technological exchange, our team visited China three times on these projects. The number of team members varied in respective trips. The maximum was 19 persons and, on the average, 6 to 8 persons.

Up to the conclusion of the contract, China expended 60 days for technological exchange and 45 days for



Source: The Japan-China Association of Economy & Trade

**BREAKDOWN OF CHINESE CONTRACTS (1972-1981)
BY CATEGORY OF TECHNOLOGY & PLANT
AND BY COUNTRY**

Figure 2

Mar. Discussions with licensor.
May Discussions on the basis of estimate with the Chinese.
July Acceptance of Chinese technical survey delegation.
Sept. Submission of estimate.
Oct.-Nov. Technical negotiations. (Kuangchou, China)
Dec. Contracting negotiations. (Beijing, China) Contract signing.

[After Contract Conclusion]

Jan. 1979 Design basis meeting. (China)
June-Oct. Acceptance of Design Liaison Teams. (U.S.:Japan)
Dec. Submission of basic design.
Jan. 1980 Basic design review meeting. (Japan).
Aug.-Dec. Acceptance of Inspection Teams. (3 groups) for main equipment and materials.
Oct. 1980- Shipment of plant equipment materials. (Japan; U.S.)
1981
Jan. Detailed design meeting. (China)
Jan. Supply of engineers for construction supervising (China)
Jan. Acceptance of computer personnel training team (Japan)
Sept.-Jan. Acceptance of operator Training Team (U.S.)

JGC'S EXPERIENCES IN THE PEOPLE'S REPUBLIC OF CHINA

PROJECT	LICENSOR	CAPACITY(MTA)	LOCA-TION	CON-TRACT	COMPLE-TION
1. P-Xylene Production Plant	Toray Industries, Inc.	17,200 as P-Xylene	Shanghai	1973	1977
2. BTX Extraction Plant	UOP, Inc.	74,000 as Feedstock	Shanghai	1973	1977
3. P-Xylene Production Complex	UOP, Inc.	64,000 as P-Xylene	Tianjin	1975	1980
4. Styrene Butadiene Rubber Plant	Japan Synthetic Rubber Co., Ltd.	80,000 as SBR	Jilin	1976	1982
5. Procurement of Equipment for Ethylene Plant	—	—	Jilin	1978	1980
6. Ethylene Complex	Stone & Webster Engineering Corp.	300,000 as Ethylene	Daqing	1978	1984
7. MDI (Diphenyl-methane di-isocyanate) Plant	Nippon Polyurethane Industry Co., Ltd.	10,000 as MDI	Yantai	1978	1983
8. Epichlorohydrin & Glycerine Plant	Asahi Glass Co., Ltd. etc.	15,000 each	Shengli	1978	*
9. Hydrocracking Plant	Union Oil Co. of Calif.	800,000	Nanjing	1978	1982
10. Hydrocracking Plant	"	"	Maoming	1978	*

* Chinese side suspended construction work.

Table II

negotiations—a total of 105 days. The period could be much shorter in the future.

Actual Project Development in China

This is a summary of actual project development in China taking the example of a hydrocracking plant project in Maoming, Kuangtung Province. Major events before and after contract conclusion are listed in sequence of date.

[Before Contract Conclusion]

Feb. 1978 Receipt of the Chinese' inquiry.

1982 Completion of facilities and equipment installation.
Start test run.
Guarantee Operation
Plant acceptance/takeover

THE GENERAL TERMS AND CONDITIONS OF CONTRACT

1. Price and Terms of Payment—The basis of the contract price was generally lump-sum, except for the supervisory work in items 5 and 7 of Table 2, which was on a man-day rate basis. It would be appropriate

to understand that the lump-sum price basis is inevitable in a country of planned economy. The currencies for payment include yuan, Japanese yen, and U.S. dollar. As terms of payment, both cash and deferred payments are employed.

In the deferred payment, the deferred payment portion normally covers 70% to 85% of the contract price, by 10 installments in 5 years, in general.

2. License Fees—License fees were clearly indicated separately. The payment of license fees is on a lump-sum basis: running royalty system is not adopted.

Normally, 30% to 50% of the fees is paid before the completion of guarantee operation, with the remaining 50% to 70% to be paid thereafter at one time or in two parts. The payment being substantial after guarantee operation is based on the Chinese' idea that it is not until the completion of guarantee operation that the transfer of the technologies or plants is definitely confirmed, which therefore should be the basis for the substantial part of the payment. It is necessary, however, to herein add that the payments from China are sure enough: the Chinese strictly keep what are stipulated in contracts.

3. Duration of secrecy provisions—The duration of nondisclosure provisions vary depending on contracts. In some contracts, it was 10 to 15 years, while there was no time limit in a certain case.

4. Plant duplicating rights—We hear that some con-

tract with the Chinese grants them a right to duplicate plant facilities. However, the contracts we made with them include little possibility for such rights.

OUTLOOK FOR TECHNOLOGY AND PLANT TRADE WITH CHINA

The trade with China will regain the vitality in view of the recent political stabilization and steady economic development.

The almost abnormal trade boom as in 1978-79 is not imaginable, but the underlying desire of the Chinese for advanced technologies would understandably remain unchanged.

Significant volumes of trade are expected in 1983-85. The trade, however, would feature the following differences from the trade so far:

1. Plant construction projects at new locations would decrease. Projects for the modernization of existing plants and incorporation of improved techniques will instead increase.

2. There would be increases not in the trade of complete plants but rather in the trade limited to license, know-how, basic design services, and main equipment supplies.

3. Technology and plant trade would involve increased requirements for capital investment, participation in management. Off-take of products (compensation trade), etc.