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MEMORANDUM FOR THE DIRECTOR
INVESTIGATION

MEMORANDUM

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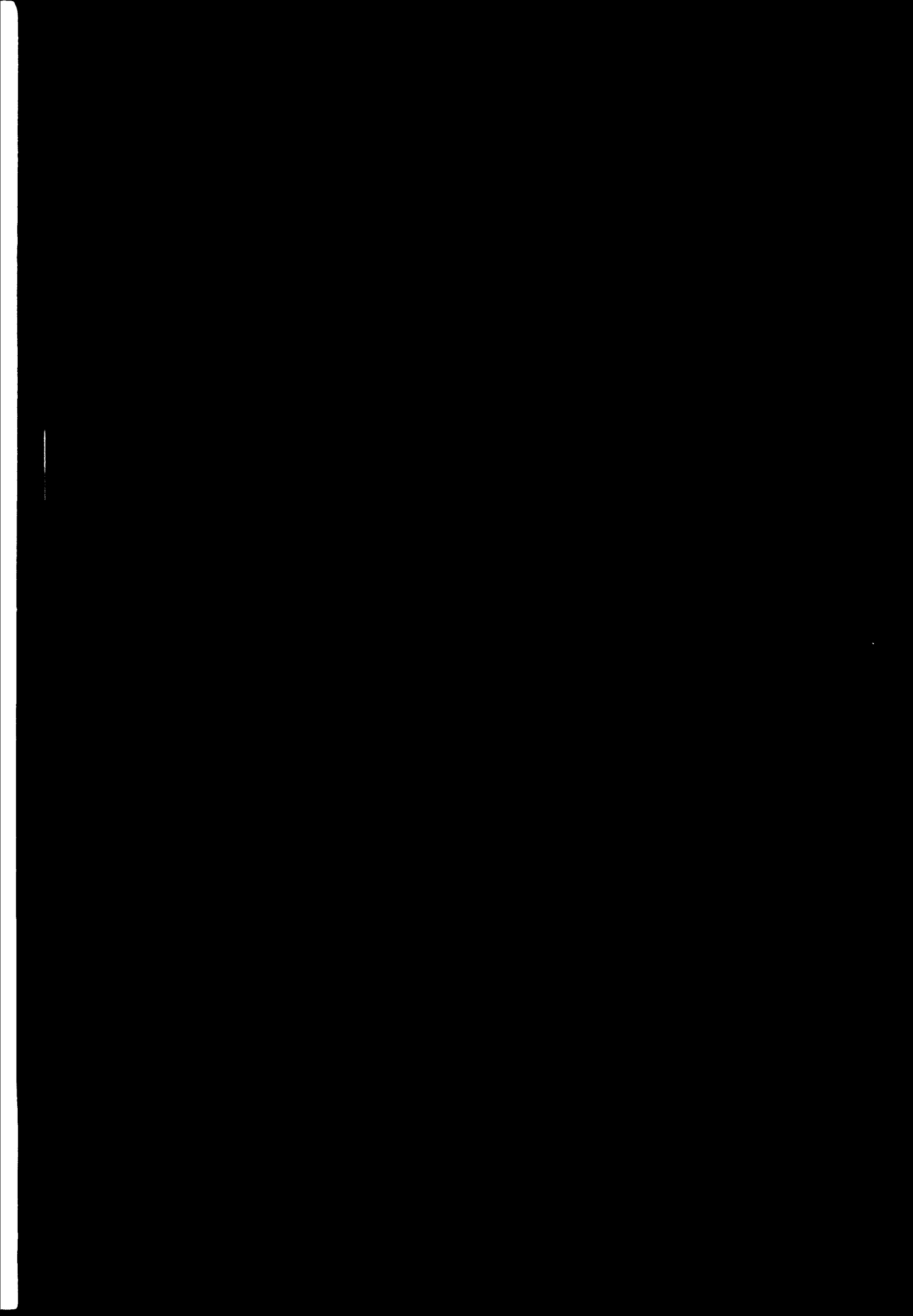


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SUMMARY

During his four weeks assignment to the MID printing industry consultant was asked to survey the public printing industry and to calculate the production capacities of the 19 public printing presses in Baghdad. To facilitate the evaluation of the industry's ability to meet the needs of the public printing sector, the different printed matter requirements were estimated for the years 1974, 1976 and 1980.

With reference to the surveys and estimates, the consultant was asked to recommend measures to ensure that the printing industry would also be able to fulfill both the quantitative and qualitative requirements in the near future.

The consultant made the following main recommendations:

1. It was obvious that both production quantity as well as quality suffered from the fact that most of the presses are relatively small and situated in buildings that are too small and hardly suitable for industrial use. Thus, it was recommended that the good and serviceable machinery from the 19 public printing shops be re-located in one plant, thus forming a centralized public printing factory.

The proposed printing factory's space requirements have been calculated and some recommendations relating to the configuration of the building complex have also been given to the authorities.

2. It is recommended that training of workers be started immediately with a view to improving the quality of the work and the maintenance of the existing machinery, and to prepare for the later switch to two-shift work and adequate industrial production planning in the proposed new factory.

3. Some technical improvements in the production methods were also recommended, such as improving colour separation, introducing photo-composing techniques and mechanical book-binding production lines.

4. It is also recommended that foreign experts in various printing fields be recruited to assist in the planning of the factory, the starting and implementing of training and the introduction of new techniques.

The printing industry consultant was also able to present the results of his studies and his recommendations at regular meetings to a Governmental committee and to discuss the various possible solutions with the authorities. As a result of the committee work, a plan will shortly be presented to the Government for the erection of a centralized printing factory as recommended by the consultant. The printing building project will cost approximately 1.5 million US (\$ 4.5 M).

After presenting his progress report, the consultant was asked to contribute to the initial factory planning stage and to give some additional recommendations relating to the training of workers. The Iraqi Government applied for an extension of the assignment so as to enable the consultant to continue his activities as mentioned above.

He made a note of the work carried out during the extension period and included it in this report as supplements.

INDEX OF THE PRINTING INDUSTRY IN IRAQ

1. Introduction:

1. The IPI (Iraqi Printing Industry) consists together with the State-owned factories restricted this printing industry only to the public printing process situated in Baghdad. The private sector of the printing industry in Iraq is supposed to be very small. It, which are not supposed to deal with printing orders from the public administration, if possible. There are some public printing processes situated elsewhere in Iraq, but the time for the assignment was considered too short to include them in the survey.

2. The newspapers and a major part of the magazine printing industry are controlled by the political parties of Iraq. The consultant was told that a fair modernization of the newspaper printing had recently been completed and that this sector should thus be omitted from this survey. However, the general printing production requirements exist for this industry to include a limited number of products such as the printing of newspapers and periodicals.

3. Industrial printing, which in this context refers mainly to the printing of packaging, is presently carried out by one modern printing establishment belonging to a technical-chemical company. This factory has also been improved recently and is able to deliver printing as required for packages of the salt factory and the tobacco industry. There are plans to expand the sector by including metal lettering in the production programs of the establishment. During this assignment process of time prohibited the investigation of the industrial printing sector.

2. COUNTERPARTS AND ACTIVITIES INVOLVED IN THE SURVEY

4. The printing industry consultant was assigned to the Industrial Department of the Ministry of Planning. The counterparts from the Ministry were headed by Mr. Salah Kachachi with Dr. Jaffer Abdul Ghani as the first counterpart and Mr. Hussein Abbas-Bashi as the personal counterpart of the consultant. Mr. Yasar A. Al-Sayid and Mr. Sabir Mohamed Al-Sayid of the Dar-al-Shar'iah Printing House contributed creditably by supplying details of their personal experience in the Iraqi printing industry to the consultant.

5. The results of the above mentioned survey were reported to the committee by the consultant to the Ministry of Industry to study the feasibility of reorganizing the public printing industry. The consultant's findings in this matter were the analysis of the recommendations and the preparation of a report and recommendations for improvement of the industry to the Ministry of Industry.

II. THE PRINCIPAL DUTIES OF THE CONSULTANT

6. It was agreed that the principal duties of the consultant during the consultant's assignment were the investigation of the available machinery in the public printing industry establishments, the evaluation of domestic printing requirements, the assessment of the present printing industry's ability to meet such requirements and the identification of recommendations for the eventual reconstruction of the industry. The quality standards were to be evaluated and, if possible, recommendations made for their improvement.

III. COLLECTING THE AVAILABLE DATA

Survey of the Factories

7. The Iraqi counterparts had prepared for the consultant's election by surveying the public printing process and investigating their machinery and factory conditions. The consultant paid some visits to the largest and best factories, studied the condition of their machines and discussed the problems of the printing establishments with the management.

8. During the visits, the consultant was able to confirm the conclusions the local reports had made about the condition of the machinery; he also studied the condition of the factory buildings and evaluated their suitability for industrial purposes. Most of the factories were found to be in rather poor condition and unsuitable for industrial use.

9. The machinery survey covered nineteen public printing shops, all situated in Baghdad. The most important items of machinery as well as a list of the printing establishments are included in Annex I of this report. Four of the presses included in this list do not exist yet; machinery for the factory has been ordered, but there are neither factory buildings nor workers ready to set the machines into operation.

10. It was agreed that this survey should not be concerned with the numerous obsolescent printing machines still existing in the printing shops. Thus, the machines included in this report and the capacity calculations only represent the new, relatively modern and serviceable machines.

Public Printing

16. For purposes of estimating public and governmental printing requirements, the same approach of estimation was followed as the Ministry of Education. The Ministry made available a list of published list of educational books including titles, number of pages and the projected number of students to be enrolled. The list included a book together with its price and a few were lead by their content to be used in printing needs in 1973.

When estimating other public and printing and general printing requirements for mainly state-run printing, the production statistics of the ten factories run by the Central State Printing House were used.

Estimating the Future

17. It is, of course, rather difficult to predict printed matter requirements for a rapidly progressing developing country, such as Iraq today. Nevertheless, the consultant developed estimates of the future educational material printing requirements in terms of books, assuming, firstly, that the number of students per student would not increase during the computation period (4 years), and secondly, that there is a direct linear relationship between the number of books and the number of students to be educated.

18. The figures relating to students and pupils were obtained from the statistics plans drafted by the Ministry of Planning.

19. In addition, therefore, the future stationery and other printing requirements were estimated using the Ministry of Planning's forecasts for the total population of Iraq and the projected growth in the national income for 1973 - 1980. Here, the projected stationery printing was assumed to be more or less 10% of the growth of the national income per capita in the first half of the computation period, but 20% in the second half.

Comparison of Book Requirements with UNESCO Figures

20. As a check procedure, the number of school books to be printed were compared with the figures quoted in the data on school book requirements in developing countries in 1980 published by UNESCO in the Publication No. 92 (1987) on book development in 1980 (2).

21. According to the Ministry of Education's list, book requirements in 1973 would total approximately 805 million standard prints; the corresponding number of standard prints in UNESCO's estimation being 128.5 million (see Annex 3). Thus, Iraqi book requirements are estimated to be 1.6 times greater than the average book requirements in the developing countries in 1980.

IV. CAPACITY ALLOCATIONS

18. The capacity calculations were mainly based on the production statistics of the Dur-Al British Printing Press and the special experience of the Press with a machine supplied by the manufacturer from the Al-Zakariyah. For the composing capacity, an illustration was prepared on one page with a certain number of characters to be composed was taken as an average, although the various type sizes and number of illustrations used in it certainly have a influence on the amount of time needed to produce a book page. Thus, the effective composing requirements are probably less than those estimated.

19. The printing press machinery in the factories surveyed is rather heterogeneous. Thus, a standard printing unit has been used in the calculation of all the capacity and printing requirements, this "standard print" measuring unit being an "average sized page" (see above), printed on one side only.

20. In addition to the composing and printing operations, only the folding machinery capacities were calculated owing to the fact that there would not have been sufficient time for a thorough investigation of the frequency of various types of illustrations needed for school books. It was, however, assumed that there would be enough reproduction and plate-making capacity to produce the illustrations needed, were the available equipment properly utilized properly.

21. As for the binding requirements, there is what would be great surplus capacity with the binding methods used today (mainly wire stitching). However, this is the result of the manufacturing process which the consultant would prefer to have technically reviewed (see paragraph 22).

22. The results of the capacity calculations are shown in Tables 1 and 2.

V. EXISTING CAPACITIES WITH REQUIREMENTS

23. A comparison of the existing capacities and the estimated printing production requirements shows a high degree of over capacity in all the process stages compared. This is, however, only true if the available machines can be utilized to the full degree that has been assumed in the calculations for the various capacities. It has been taken for granted that it would be possible to switch over to two-shift work; that production planning could be ideal and that the factory lay-out would not hamper production flow more than is normally tolerated. None of these assumptions, however, apply to operations in the industry today.

24. In summary, it may be stated that composing capacity will be enough for longer than the period covered in the survey, that one-colour printing capacity will probably satisfy requirements

utilization of the capacity with the sheet-fed folders will differ only slightly. However, were the folding capacity of the two new web-offset presses with their web-folders to be used fully, capacity would exceed the requirements estimated for 1970.

21. The 1970 requirements are estimated to increase at the same rate as one-colour printing. This is probably over-optimistic, as school books tend to be designed conservatively. On the other hand, the increase in requirements will usually be matched by a similar increase in one-colour printing, were the number of units to be kept constant.

22. The printing capacity would seem to be enough for two years' sheet-making as colour printing does not increase in relation to one-colour printing. Anyhow, in order to prepare for a change towards more colour in book design, it is recommended that the printing capacity be increased through the purchase of units for the two offset-presses in web-offset rather than sheet-fed process.

23. For the same reasons the industry should prepare itself for a growing demand in colour printing by improving its high-quality colour-reproduction capabilities. This means primarily introducing new methods for reproduction techniques, using automatic film processes and specially designed colour-separation equipment.

24. The capacity and time requirement comparisons are shown in the Annex.

THE GENERAL ASPECTS OF THE COLLECTED DATA AND EXPERIENCES

25. As a result of the production capacities for the different manufacturing stages would seem to be enough for any year to come, provided production can be maintained on industrial scale. At present the numerous pieces of obsolete printing machinery are spread throughout a number of small printing units. Thus management becomes a complicated operation, without any possibility of directing the whole production rationally or specializing. Consequently there is a considerable loss in efficiency resulting in higher production costs. In a small printing shop which is designed to handle every kind of printing job, there cannot be a good balance in production machinery, the result being that some of the production processes are overloaded while some under-utilized.

26. Most of the printing presses operate in buildings which are not constructed for industrial use. The buildings are too small for the existing machinery and liaison between the individual production stages is poor. The production flow is often obstructed by machines from the different production stages having to be placed where there is an empty space,

thus, confounding any hopes of an orderly flow of materials. There are also stores where the materials are transported mechanically but have to be carried a long way from one store to another. The net result is a waste of effort in terms of machinery and labour.

11. Owing to the cramped factory premises, the raw materials are stored mechanically in unsuitable sheds, far away from the production machines. This results in a large loss of raw material losses in the form of waste & damaged semi-finished products, thus raising printing costs.

12. New production techniques involving new machines should be introduced for want of space.

13. The situation could be improved somewhat, were the oldest printing machines to be discarded at once. The space thus gained would undoubtedly lead to a decrease in production rather than a decrease in production capacity. It has to be remembered that the production capacities calculated in Chapter IV did not take these old, obsolete machines into account.

VII. RECOMMENDATIONS FOR RESTRUCTURING THE INDUSTRY AND SOME TECHNICAL IMPROVEMENTS.

14. In order to improve the public printing industry in India it is recommended:

(a) that a new factory be built to house the presently widespread printing machinery in a suitable modern industrial building, thus establishing an efficient printing factory under one central management;

(b) that an efficient training scheme for the workers be started immediately to supply the industry with people able to maintain modern machines and manufacturing processes; and

(c) that certain technical improvements be effected in the manufacturing processes.

New factory for the public printing establishments

15. The printing industry consultant recommends that an adequate new printing factory be built to achieve an industrial production environment and utilize most modern industrial production methods, thus meeting all the requirements of public printing.

16. The new factory should contain all the industrially suitable machines collected from the 19 existing public printing shops. Only so-called small offset and duplicating facilities should be authorized, therefore, in the various Ministries and public companies, etc. Some very special fields of printing would perhaps have to be done as they are today, such as ticket-printing, photo-mechanicals for general surveying and map-printing, etc.

40. The new printing methods require as flexible as possible although it is preferable that production should be planned for two separate lines: one line utilizing for book production and the other for stationary and general printing.

41. The space requirements for the new plant are calculated for a new factory building. The plant, now a modern machine of the various types in the establishment under the roof (see Annex 12). The list of the printing and bindery machines the following formula was used:

$$F = \frac{A \cdot B \cdot C}{D} \cdot E$$
 (A - number of machines); F - total space required in m^2 , W - active area (m^2), L - area of the current sheet, and P - production in sheets per hour. For machines to which this formula could not be applied and for which no data were available, the DIN standard 14078 (German Standard Report) was used to check the factory space requirements calculated.

42. The net space requirements for the production departments and stores were then found to be 14,000 m^2 . Using an expansion factor of only 1.1 (about 10% reserve) to meet the requirements after 1977, the total area for the factory as recommended would be 15,400 m^2 .

43. In addition to these purely industrial areas, some other areas would have to be included into the total building: service departments (repair workshop, garages, restaurant, social areas like changing and wash-rooms etc., approx. 1,750 - 1,920 m^2), measurement facilities (approx. 2,000 m^2) and some mechanical areas (air conditioning, electrical power, etc.).

44. It is recommended that the following industrial departments be accommodated on one composite floor at ground level: metal working, letterpress and offset printing, bindery and raw materials and finished product stores as well as the machine repair workshop. The total floor area would be 15,000 m^2 . If the raw materials area, including the reception, is also placed in the composite part of the building, the total area requirement would be approximately 15,500 m^2 .

45. The proposed building above would occupy about 40% of the total site reserved for the central public printing plant (32,000 m^2). Thus, the site would probably be too small rather than too large.

46. It is, however, customary to locate factory buildings on sites that allow for future extensions of the factory building of up to 30% of its original size. This is done to ensure that the factory can be subsequently expanded to meet the industry's space requirements more than ten years later. In this particular case, a smaller expansion factor may be justified, firstly, because the reconstruction plan consists of numerous small production machine units, and secondly, because comparatively fast developing new printing production methods are involved

which tend to produce more products in less space with shorter production time and a smaller manpower requirement. Such developments include computerized composing and photo composition, web-offset printing machines and advanced, automatic book-binding production lines.

44. Modern industrial buildings are planned so that, wherever possible, at the ground floor level. In the printing industry in particular is best accomplished in a separate space rather than in a multistorey building, which in the long run tend to transport material (paper and semi-finished products) from one machine to the next. A comparatively linear production flow thus represents the ideal solution in most cases. The very important detail to remember is to plan as flexibly as possible owing to the developing printing industry's propensity to change both machinery and production processes.

45. The maintenance of flexibility in industrial buildings involves, *inter alia*, providing for floor loads of at least 2,000 kg/m². The production hall must not be less than 5 m, preferably 7 - 8 m, the distance between the supporting columns, the hall being no less than 20 m. Power lines to the machines should preferably run from overhead cables at ceiling level.

46. The high-quality requirements of printing and binding necessitate good lighting conditions in the composing, printing and bindery areas, no less than 750 lux. The fast-running presses and the exact register requirements of colour printing require that the paper used for printing is suitably conditioned.

47. The most suitable conditions for the paper store, printing and bindery hall are 23°C and 55% RH. These conditions should be maintained with as slight a variation as possible, such as + 3°C and + 5% relative humidity. If the humidity drops below this point feeding the sensitive, fast-running presses and bindery machines will prove difficult, causing stoppages in production, wastage and inaccuracy in folding and printing register. If the humidity and temperature rise above the limits mentioned, there is a risk of the drying mechanism being upset, resulting in poor quality printing, smudging and piling.

48. Annex 7 contains a very rough sketch of a possible factory lay-out in keeping with the calculated space requirements.

Training of workers

49. The consultant recommends that immediate measures be taken to start the training of workers in the printing industry.

50. The question can be tackled in different ways: in-plant training, training courses and regular training school. Of these possibilities, in-plant training and the training courses can be started soonest.

51. There is also an obvious need to train technicians in the printing industry. The trained technicians would upon completion of their training act as supervisors and foremen as well as teachers for worker training.

52. The questions of training are discussed in greater detail in a special report appended to this report as supplement I.

53. In the meanwhile, it is recommended that a sub-committee be formed to plan the training to suit the Iraqi industry's special needs and to recommend measures to be taken to solve the problems. Such a sub-committee would possibly apply for the advice of the ILO vocational training expert, Mr. Malik, presently on mission in Baghdad.

54. Finally, it has to be mentioned that the training is needed most acutely in order to supply the proposed new factory with workers to fill two shifts, to train workers in the new technologies proposed in this report, to train the workers in the industrial means of production according to effective production planning and to learn proper machine maintenance so as to be able to take better care of the machines used in the industry today.

Technical improvements

55. The role of colour illustrations is increasing in both book production and general printing. The colour separation possibilities of the 19 public printing shops are in toto still rather limited.

56. A modern workshop for colour separation and other colour work would easily improve present colour printing standards. Such a studio should rely on standardized, instrument-controlled processes, colour separation using either colour scanners or special colour separation enlarger-type cameras and direct screening methods, densitometric control and automatic film processors.

57. The need for mechanical book binding has been mentioned several times in this report. Such automatic bookbinding equipment, such as the Martini-Rotobinder or others, are capable of producing high-quality paperback school books faster and cheaper than any other manufacturing methods. It is also possible to combine adhesive binding with hard covers to produce books for the general public and libraries. It must again be pointed out that present standards, in particular binding, are inferior.

58. The printing industry consultant has prepared a more specific report on the machinery available for this sort of production, the recommended factory lay-out of such a production line and of the costs involved in introducing this new technology, which is appended to this report supplement VI.

59. Photocomposition is the text production method that will survive more than ten years. Combining electronic data processors and photocomposition will increase the composition output enormously, thus increasing capacities and reducing composition costs over a longer period.

60. Furthermore, photocomposition offers better production quality when compared with metal composition for offset printing. Additional process savings can be gained by using photocomposition to make offset plates. If offset plates are made from metal the next process step after setting must be printing the metal form on paper or foil. If printed paper, the proof has to be reproduced on film before it is ready for mounting and plate making. Thus, as photocomposed text on film is directly suitable for offset plate making, savings in both labour and materials are obvious.

61. Photocomposition in Arabic is still at the fledgling stage with only first-generation photocomposing machines with Arabic composition capabilities. However, it is obvious that most of the modern photocomposing machines, which are far more productive than the Monophoto, would lend themselves to Arabic. There is still some basic research to be done before the computer programmes and photocomposing equipments are ready to be controlled in the way specific to Arabic script. Thus, it is highly recommended that every effort be made to develop computer programmes and photocomposing machines to suit Arabic.

62. The application of photocomposing to film will also necessitate automatic film processing, if high-quality results are to be achieved.

VIII. POSSIBLE ADDITIONAL EXPERTISE REQUIREMENTS

63. Just as there are three different types of recommendations aimed at the improvement of the printing industry, there are three different suggestions for experts who could assist in the implementation of these recommendations.

Factory planning

64. One expert is urgently needed to assist in the first draft stage of designing the factory building. The expert would check the space requirement calculations made during this short assignment. He would also assist in planning land-use for the factory building, drafting internal traffic routes, and making draft factory lay-outs to ensure a correct flow of work and materials.

65. This expert mission should be exactly timed to coincide with the start of the drafting of the factory construction, once a definite decision has been made to build a printing factory as recommended in this report, the duration of the assignment being 4 to 6 weeks.

During the past year, as part of a contract with the assignment of the printing industry consultant was also able to consider and evaluate other possibilities of restructuring the industry, such as building two factories instead of one large factory. In addition, in evaluating the various sites for the factory, he also considered the building requirements peculiar to the printing industry, which have been sought. The consultant has identified the main problems and provided further detailed advice on them. The results of his work are included in Supplement II.

76. A general report on the factory, preferably 2 to 3 months before the construction work is completed, (1) reports will be needed in terms of the final detailed planning of the factory, including machinery and production flow.

77. For this stage of planning, a co-ordinating report would be needed for a duration of 2 to 3 months, his duties being to direct and supervise the overall planning project in addition to the actual planning of the printing departments.

78. The co-ordinating report would need two (2) specialists in different fields of printing techniques to assist in the planning of the departments and their operational and production flows.

79. One of these specialists should be an expert in photo and metal composing, as well as in reproduction techniques, including reproduction photography, colour separation and off-set plate making. The duration of his assignment being 4 to 6 weeks.

80. The other specialist should be an expert in colour binding techniques, as well as in paper storage and material handling. His main duties, therefore, would be in assisting in the planning of the bindery, paper and finished products storage, packing and transportation within the factory and without. His assignment would also last 4 to 6 weeks.

81. These experts could be either individual UNICEF (UNEP) experts or a team of experts contracted from a printing industry planning establishment through UNICEF or through direct contract with the Iraqi Government. Such consulting and planning units may be found in the Federal Republic of Germany, the German Democratic Republic, Finland, Sweden and Switzerland, for example.

82. Should the planning experts deem it necessary, the same experts or another team of experts could also be assigned during the implementation of the new factory and the new production technologies, as well as on a follow-up of the planning project proper.

Training of workers and technicians

83. As already mentioned, the printing industry urgently needs

training scheme for a period of 10 to 15 years to meet the needs of non-manual work, ... quality work and to train the ... of the valuable industrial machinery

15. The training programme ... supplement the ... behind the training scheme

16. Again, ... the ... foreign training reports are regularly ... training programme and to implement such training as ... training, training courses and, possibly, ... regular printing school, ... progress report.

17. Immediate benefit to the training issue could be gained by starting a series of courses using local printing reports as teachers in their own special fields of printing. ... training should be planned immediately, and implemented in the public printing process through the training committees of these establishments. ... that the industrial establishments are responsible for the training of their own workers and that in every establishment there should be a five-man committee dealing with training issues.

18. A regular printing school represents the only long-term solution to training problems and provides an effective means of enhancing productivity and production quality.

12. FELLOWSHIP

19. It is recommended that some fellowships be made available to local printing industry officials ... the possibility to study abroad the certain techniques mentioned above, or to train them to take over the responsibility of training workers and technicians in the industry.

Intern sponsored students

20. One fellowship would be needed for one person to study modern photo and computerized composing techniques in advanced printing establishments and research institutes abroad. In particular he would have to learn the techniques and language of computer programming so as to be able to design independently computer programmes suitable for composing. It is recommended that he try to specialize in composing Arabic during a fellowship of one to two years.

21. Placement for this fellow could possibly be arranged at the Technical University of Helsinki, Finland, which has a good outstanding research group for the application of computer techniques to the fields of printing.

Research and Training

13. The Fellowship shall be made available for an 18-month period in the field of modern book binding processes and machines. The grant should be in a machine factory for such equipment, or, alternatively, in the production environment of a modern book binding establishment. The Fellow should have a background in the subjects mentioned in this report as being most likely to be important for the improvement of industry techniques.

14. Details of the Fellowship are available on request.

Industry Liaison

15. To all three Fellowships should be granted to keep printing reports to be treated as teachers in the printing industry.

16. Two of these Fellowships should specialise in photomechanics, such as offset colour reproduction, the use of colour cameras and offset platemaking.

17. The second Fellow should study various printing and binding techniques and paper handling.

18. The third Fellow should specialise in machine maintenance and repair, including preventive maintenance and spare-parts management.

19. The duration of these three Fellowships should be at least one year.

20. Draft project sets should be for all the above mentioned projects and job descriptions for the reports are attached as Supplements IV and V.

References

- 1) Reports on General Action Plans for Teaching in Bangladesh, Ministry of Education, Education and Social Planning Office, 1971-1972.
- 2) UNESCO Ed/Conf/77.2711.20 A: Book Development in Asia, Reports and Papers on these Communications, No. 25, 1967, 70 p.

THE PUBLIC PRINTING ESTABLISHMENT IN CANADA AND THE 18 DEPARTMENTS

FUNCTION GROUPING	ITEM	TOTAL NUMBER
Reproduction	Copies, small	0
	Copies, large	0
	Colour frames	11
	Colour airless	11
	Plate writing frame	11
	Engraving machine	1
Imaging	Imaging camera	1
	Imaging software	0
	Imaging camera	1
	Imaging software	1
	Imaging machine	1
Electronic printing	Electronic process (Electro-plate)	1
	Electronic process	0
	approx. 10 x 10 cm	0
	approx. 10 x 10 cm	11
	approx. 10 x 10 cm	1
Offset printing	Electronic process	1
	approx. 10 x 10 cm	11
	approx. 10 x 10 cm	1
	approx. 10 x 10 cm	1
	Electronic process	1
	approx. 10 x 10 cm, perforated	1
	approx. 10 x 10 cm	1
	approx. 10 x 10 cm	1
	Electronic process	0
	approx. 10 x 10 cm	0
Electronic process	1	
approx. 10 x 10, 1 unit each	1	
Other	Colour printing machine	11
	Colour printing machine	0
	Colour frame	11
	Colouring machine	0
	Colouring machine	0
	Colouring machine	0
	Colouring machine	0
	Colouring machine	11
	Colouring machine	11
	Colouring machine	0

THE 18 PUBLIC PRINTING ESTABLISHMENT GROUPS IN THE COUNTRY

- | | |
|--------------------------------|---------------------------------|
| 1. Central Services | 11. Ontario |
| 2. New Brunswick | 12. Central Scientific |
| 3. Ministry of Education, Ont. | 13. St-Paul |
| 4. Ministry of Education, Que. | 14. Ontario College |
| 5. Ministry of Education, Ont. | 15. Ontario Support and Service |
| 6. Ministry of Education, Ont. | 16. Provincial Services |
| 7. Ministry of Education, Ont. | 17. Ontario |
| 8. Ontario Press | 18. Federal Laboratory |
| 9. Ontario Press | 19. Ministry of Education, Que. |
| 10. Ontario Press | 20. Printing Plant |

B. 1988 REPORTING REQUIREMENTS (1988)

	Ministry of Education	Capital University	Other Public Activities	Total
Approximate number of:				
- books	175	25	100	300
- newspapers	100	100	100	300
- periodicals	7,000	200	1,000	8,200
Total Approximate:				
- pages (assuming capacity requirements)	25,000	3,000	24,000	52,000
- standard price, all (printing capacity requirements)				
one volume	100.0	0.2	2.0	102.2
two volumes	70.0	.	.	70.0
four volumes	20.0	.	.	20.0
six volumes	2.0	.	.	2.0
- sheets, all (including ¹⁾ capacity requirements)	100	0.4	1.0	101.4
- sheets, all (and binder requirements)	10.0	0.00	0.10	10.10

B. GENERAL PRINTING CAPACITY REQUIREMENTS per year (1988)

Estimated number of standard price, all items **100**

Estimated amount of reporting work corresponding to a number of standard pages (assuming needs) **20,000**

¹⁾ It is assumed that the stationary printing will be total, that the number of sheets covers the book production only.

C. 1. 1967-68	1971	1976	1980
Total number of:			
• pupils in primary schools	137,000	110,000	970,000
• pupils in intermediate schools	70,000	80,000	300,000
• pupils in secondary schools	910,000	800,000	710,000
• total all grades	1,000,000	970,000	1,000,000
• teachers in above schools	60,000	70,000	80,000
• students in technical training	10,000	12,000	10,000
• teachers in technical schools	1,000	1,000	1,000
• students in universities	20,000	25,000	30,000
National income per capita, \$	115,000	140,000	160,000
Population of Iraq, millions	10.0	11.0	12.0

C. 2. 1967-68	1971	1976	1980
Total number of:			
• standard prints for text production, millions			
• standard prints for stationary printing production, millions (non-educational)			
• pages to be composed for text production			
• composing units for stationary printing in standard text pages			
• sheets to be fed, millions ⁽¹⁾			
• total standard prints, millions			
• total composed pages			
• total books in millions			
• standard prints for text production	10	100	200
• standard prints for stationary printing production, millions (non-educational)	100	100	200
• pages to be composed for text production	10,000	60,000 ⁽²⁾	60,000 ⁽²⁾
• composing units for stationary printing in standard text pages	10,000	60,000	60,000
• sheets to be fed, millions ⁽¹⁾	100	100	200
• total standard prints, millions	100	200	400
• total composed pages	60,000	120,000	120,000
• total books in millions	10.0	10.0	20.0

⁽¹⁾ It is to be noted that the composing for text production does not necessarily increase with total number of students (or books).
⁽²⁾ It is on the safe side, allowances are made for this when estimating the quantities required to produce the educational printing.
⁽³⁾ Text production only

NUMBER OF STANDARD PRINTS FOR SCHOOL PAPER REQUIRED IS (SEE APPENDIX TO SUMMARY)

	Persons employed	Standard prints per person ^{a)}	Total number of standard prints to all items
PRINTS IN VARIOUS SCHOOLS			
- primary	1 120 000	10	120.0
- intermediate and secondary	100 000	10	100.0
- teachers in above schools	60 000	1000	60.0
PRINTS IN:			
- vocational training schools	10 000	100	1.0
- vocational teachers	1 000	1000	1.0
- teachers training and other higher education, colleges and universities	10 000	100	1.0
- teachers of higher education	1 000	1000	1.0
TOTAL NUMBER OF STANDARD PRINTS			282.0

^{a)} THESE ESTIMATES ARE BASED ON 4000 TO 4010 IN EACH UNIT OF 10 PAGES, WHICH IS EQUAL TO THE STANDARD SETTING AS USED IN THIS REPORT.

TOTAL YEARLY COMPOSING, PRINTING AND FOLDING CAPACITIES OF THE UNITED NATIONS PUBLIC PRINTING ESTABLISHMENTS IN MADRID

1. COMPOSING CAPACITY

Composing capacity in standard sheet pages (20 cm, 20 point arabic)

1.1 Linotypes			
3 composing units, 4 keyboards	20 000	20 000	
1.2 Monotype			
3 casters, 7 keyboards		27 000	
1.3 Linotype and intertype			
20 composing machines		124 000	<u>TOTAL 221 000</u>

2. PRINTING CAPACITY

Printing capacity in millions of standard pages (20x20 cm, 6 pages)

2.1 Offset printing process

two-colour (2 web presses, 1 70 x 100 cm 11 20 x 70 cm)	64.9
two-colour (2 presses 70 x 100 cm, 2 70 x 100 cm and 1 20 x 70 cm)	1.0
four-colour (2 70 x 100 cm)	22.6
total colour capacity in two-colour prints	68.5

2.1 Intertype printing process, all one-colour

4 70 x 100 cm cylinder process	6.0
27 20 x 70 cm cylinder process	27.0
1 20 x 20 cm cylinder process	2.0
24 20 x 20 cm planar process	7.0

2.2 Total one-colour

offset process	64.9
intertype process	42.5
	<u>TOTAL 107.4</u>

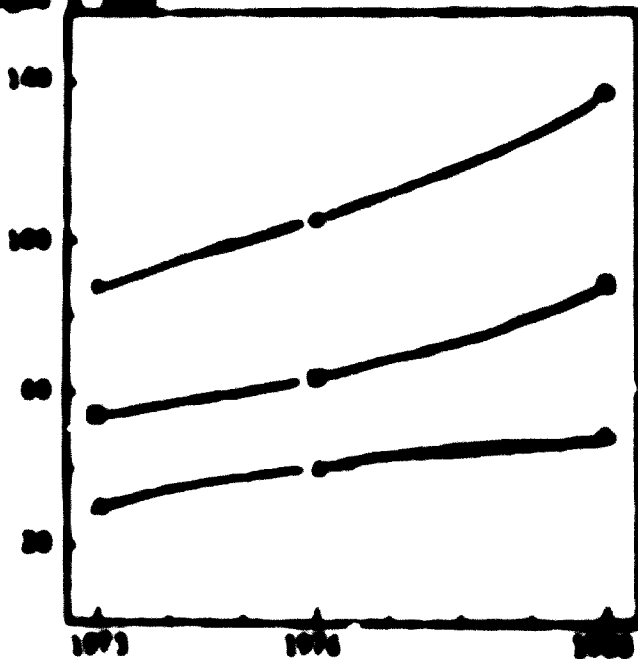
3. FOLDING CAPACITY

Folding capacity in sheets (20 x 70 cm) in millions

3.1 10 sheet-fed folders	2.7
3.2 2 web-offset presses with folders	1.0
	<u>TOTAL 3.7</u>

COMPARISON OF PRODUCTION REQUIREMENTS AND CAPACITIES.

Supposed standard
range = 1000

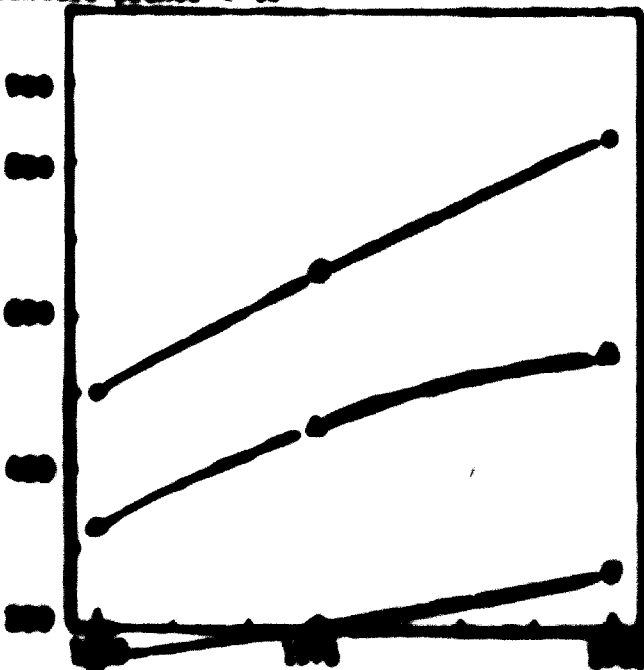


CRUISE CAPACITY IN STANDARD
UNITS

1973	201 000	275 0
1976		280 0
1980		287 0

- total production
- tank production
- ▲ stationary production

Standard units = 10⁶



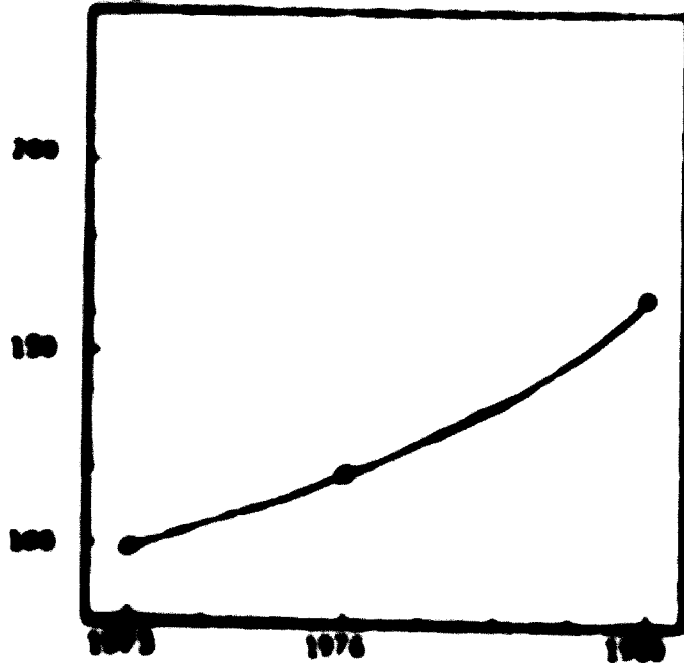
CRUISE CAPACITY IN STANDARD
UNITS = 10⁶

1973	500	177 0
1976		180 0
1980		185 0

- total production
- tank production
- ▲ stationary production

REPORTING OF PRODUCTION AND THROUGH AND CAPACITY

Standard top-colour
prints = 10^6

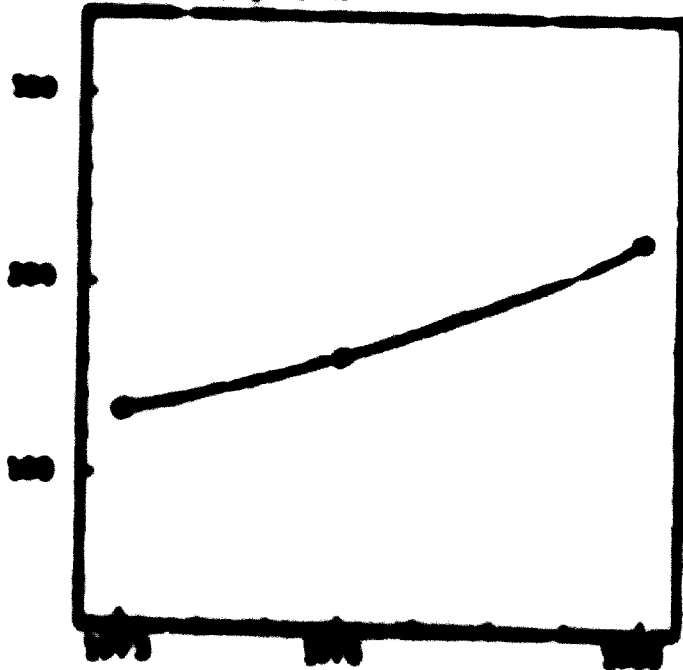


COLOUR PRINTING CAPACITY IN
TOP-COLOUR STANDARD PRINTS x 10⁶

1973	100	100
1976	163.2	126
1980		99

• total book production

Sheets to be folded = 10^6



FOLDING CAPACITY (in sheets x 10⁶)

Sheet folders only	147
Sub offsets with folders	100
Total folding capacity	200

Folding used for
book production

1973	100	140
1976		107
1980		100

• total book production

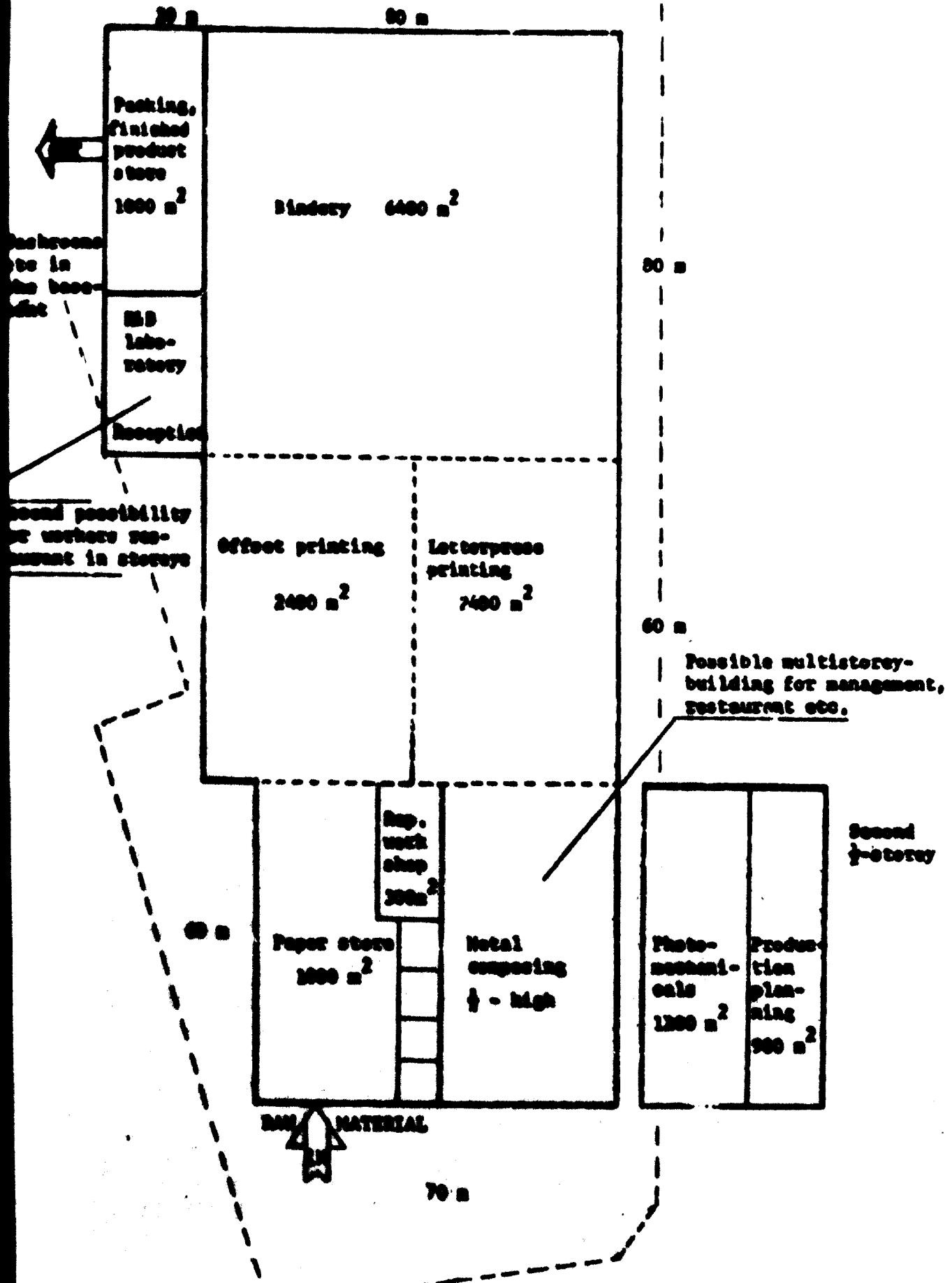
ANNEX 6

ESTIMATED SPACE REQUIREMENTS FOR THE PRINTING MACHINERY COLLECTED FROM THE NINETEEN PUBLIC PRINTING ESTABLISHMENTS IN BAGHDAD

	IN (GROUND) FLOOR		IN STOREYS OR IN THE BASEMENT	
	Net space	space w. 10% ext.	NET	10% EXT.
1. PHOTOMECHANICAL DEPARTMENTS Reproduction photography, colour separation, photoengraving, photocomposing, montage, offset platemaking			1120	1230
2. COMPOSING DEPARTMENTS (METAL) 2.1 Monotype, Linotype and Intertype 2.2 Handcomposing, pre-press make-ready, metal melting etc.	740 1120	840 1230		
3. PRINTING DEPARTMENTS 3.1 Offsetprinting (2 web-, 21 one-colour, 5 two-colour and 2 four-colour presses) 3.2 Letterpress printing (2 web-, 60 sheet fed one-colour presses)	2330 2200	2590 2450		
4. BINDERY PRODUCTION LINES 4.1 Book production line for 40 000 books produced in two shifts 4.2 Stationery production line: cutting, gathering, stitching etc.	4000 1000	4400 1100		
5. STORAGES 5.1 Raw material storage for 2 months 5.2 Packing, delivery and storage for ready product for one week	1100 960	1210 1060		
6. SERVICE DEPARTMENTS 6.1 Repair workshop 6.2 Restaurant and other social spaces (washrooms, showers, dressing rooms)	250	300	1500	1650
7. MANAGEMENT Office facilities for 250...300 persons, conference rooms, class rooms, research & development and quality control laboratory, reception, guards etc	500	500	1500	2300
8. SECONDARY TECHNICAL SPACES 8.1 Air conditioning, electrical supply, garages etc	not estimated not estimated			
TOTAL SPACE REQUIREMENTS	14220	15400	4120	5000

ANNEX 7

DRAFT SKETCH OF POSSIBLE FACTORY LAY-OUT



SUPPLEMENT I

A TENTATIVE WORKER TRAINING SCHEME

Number of workers and training needs

1. The number of workers employed in the printing industry are not to be found without a thorough survey covering both the public and private sectors of the industry. However, an estimation has been made of the public sector using the information that was available and an estimate based on the number of machinery existing in those establishments.

2. Also, a preliminary estimate of the number of workers needed in the proposed new central printing office has been made.

	<u>Number of workers in the new factory</u>	<u>Number of workers em- ployed in industry</u>
Photomechanicals	157	120
Composing	261	200
Letterpress printing	234	180
Offset printing	271	200
Bindery	736	600
Paper storage and transport	24	25
Maintenance and repair	150	120
Packing and delivery	50	30
Guard, servants, cleaners etc	100	150
Total	approx. 2,000	1,625
Management	300	350

3. Thus, about 300 - 350 workers have to be employed and receive stepwise professional training when the new factory gradually enters two-shift production stage.

4. In addition to the above, it is estimated that probably one half of the existing workers would have to be trained or retrained to meet the demands of modern industrial production methods and higher quality requirements.

5. In summary, at least 150 - 200 workers should be involved each year in various training programmes. Furthermore, this means that when all the workers have completed the first round of re-training, a new refresher cycle will start updating the skills taught some 8 to 10 years previously and providing new training in production techniques that have since been developed.

Training methods and needs

6. It is recommended that training of the semi-skilled workers be started immediately as an in-plant exercise, giving the trainees an opportunity to acquire machine operation skills,

upgrading standard skills to ensure the highest possible quality and familiarizing the workers with up-to-date working techniques. This training should be given by skilled workers and teachers under their personal supervision and on an individual basis in a production environment, but free of pressure arising from urgent printing orders.

7. This training should also be backed up by theoretical instruction given in simple terms. These lessons should emphasize the reasons behind the application of strictly standardized working methods and the need for concise production planning. The trainees should also be told of the importance of producing good quality work, and clearly shown how to achieve such an aim.

A survey of the number of workers and their training needs

8. It is proposed that a survey be carried out to obtain reliable figures on the number of workers and background information for the planning of regular training programmes (in-plant training, training courses and training school). A draft survey form is shown below.

9. The survey shall comprise the workers employed in the public and private printing industry, analysing and classifying the individual skills to determine training needs.

10. The survey may be carried out by the Industrial Department of the Ministry of Planning or any other suitable authority using experienced counterparts from the industry to assist in the analysis. A supporting committee may be authorized to direct the survey, draw conclusions as well as draft training proposals.

Training of foremen and printing technicians

11. There is also an urgent need to train the various departments' foremen in modern industrial and economic approaches. They should be helped to adapt to new technical and management methods and at least some of them should receive background training in supervision techniques and labour relations.

12. There is an urgent need for technically trained people in the industry who could improve modern production methods and machine maintenance and repair methods as well as train technical teachers to run training courses. This could be solved by including training departments for printing technicians in industrial schools and colleges. Preferably the training of printing technicians should be closely linked with general engineering training as many general technical subjects are closely related with or identical to their training.

TRADE PROGRAMMES

13. Draft curricula for training courses are shown below, the distinctive features of the programmes being:

- a) Training of foremen - on a part-time basis in evening classes providing foremen and supervisors with new information and education on modern production and labour management. The course may be followed as a full training package deal or suitable sections thereof specializing in different sectors of the industry according to the students' personal position in the industry.
- b) Training of printing technicians - this programme corresponds to the syllabus of a regular technical college with an engineering department to train printing technicians. The original Finnish plan has been modified somewhat to suit Iraqi conditions and new developments in manufacturing processes in the printing industry.
- c) Workers' training courses - these courses aim to give employees in the industry background training and impart some theoretical knowledge so as to improve their skills and ability to adapt to learning on-the-job and profiting from the experience they have accumulated or will accumulate at work. The courses are not designed to make skilled operatives of new employees, but to provide trainees with a chance to perform normal comparatively simple jobs on their own. After some 2 - 3 years in the industry they would need additional training in order to be classified as fully skilled operatives. Training programmes in offset printing, offset plate-making and montage, reproduction photography and bindery are included in the scheme. These trades would need most training, although special equipment-oriented courses can also be designed for letterpress printers and photo-composers in particular.

Planning the training

14. After the proposed survey has been executed, the training should carefully be planned as indicated on previous pages. Draft project data sheets and job descriptions have also been included together with planning details and the proposals for foreign experts and fellowships for local vocational training teachers.

The present state of training in the printing industry

15. Legislation pertaining to the training of workers and applicable to every industrial plant delegates training responsibilities to a five-man committee in each establishment. Hitherto, the consultant has been unable to confirm whether any sort of regular training programme exists, but he was told that there were most probably no such programmes as yet.

16. In the training section of the Digital Industry school, there are training courses for printing workers. No course material was available, only the information that there was no machinery or equipment available for training purposes. As the teachers of the school are not professional printers, the industry does not approve of the results. This notwithstanding, some 20 workers are trained yearly, but they are all too few.

FORM FOR SURVEYING UNEMPLOYED TRAINING NEEDS

FOCUS	PROFESSIONAL		NON-PROFESSIONAL		SEMI-PROFESSIONAL		UNEMPLOYED
	1	2	1	2	1	2	
4. OFFSET PRINTING 4.0 Foremen and supervisors 4.1 Proof printers 4.2 Small-offset printers 4.3 One-colour printers 4.4 Colour printers 4.5 Web offset printers 4.6 4.7 4.8 4.9 Others							
5. BINDING AND FINISHING 5.0 Foremen and supervisors 5.1 Paper millstone cutters 5.2 Three-knife cutters 5.3 Folding machine operat. 5.4 Gathering machine oper. 5.5 Sewing machine operators 5.6 Stitching machine operat. 5.7 Book assemb. mach.oper. 5.8 Hand hand binders 5.9 Others							
6. PAPER STOCK AND TRANSPORT²⁾ 6.0 Foremen and supervisors 6.1 Store keepers and carriers 6.2 Fork lift drivers 6.3 Truck drivers 6.4 Storage workers 6.5 6.6 Picking workers 6.7 6.8 6.9 Others							
7. MAINTENANCE AND REPAIR 7.0 Foremen and supervisors 7.1 Machine workers 7.2 General repair 7.3 General maintenance 7.4 Electrotechnicians 7.5 7.6 7.7 7.8 7.9 Others							

²⁾ Heavy transport infrastructure of the various departments are included in the number of workers in their resp. Dept.

A. FOLD FOR EMPLOYING THE SERVICES OF SENIORS AND YOUNG TRAINING MEN

1. Trained professional workers, no special work for training
2. Professionals working with machines but without any previous planned training, not through experience or otherwise needing further training

CLASSIFICATION	Professional workers		Semi-professional work.		Unskilled workers		Unskilled nonworkers	
1. PHOTOGRAPHY 1.0 Technicians and supervisors 1.1 photographers, studios 1.2 cinematographers 1.3 photographic workers 1.4 printing workers 1.5 retouching lithographers 1.6 retouching photographers 1.7 1.8 1.9 other								
2. PRINTING 2.0 Technicians and supervisors 2.1 linotype compositors 2.2 linotype keyboard op. 2.3 letter and linotype op. 2.4 photoengravers, types 2.5 photoengraving keyboard op. 2.6 photoengravers 2.7 metal setting and handl. 2.8 2.9 other								
3. LITHOGRAPHY 3.0 Technicians and supervisors 3.1 color proof printers 3.2 hand color press op. 3.3 large color press printers 3.4 litho press printers 3.5 litho press printers 3.6 color printers 3.7 3.8 3.9 other								

The course is meant for ... of ... students ...
 Part of the ... is to ...
 ...

1.11 Mathematics	20 h	1.11.1.1 INDUSTRIAL MATHEMATICS Primary and secondary schools Vocational training or college or possibly working in industrial sector. 2 - 4 years experience in the industry, of which 2 years as ...
1.12 English	20 h	
1.13 English as a foreign language	20 h	

1.11.1.2 **Work supervision techniques with refer-
 ence to a sector community and modern
 industrial production industry**

2.11 Statistics	20 h	3.21 Electro-techniques	20 h	3.21 Production techniques	20 h
3.12 Industrial coordination I	20 h	3.22 Printing techniques	20 h	3.22 Safety and accident prevention techniques	20 h
3.13 Industrial economics I	20 h	3.23 Computers and use of e. in computing	20 h	3.23 Cost estimation techn.	20 h
3.14 Industrial econ. II	20 h	3.24 Technical English	20 h	3.24 Pricing techniques	20 h

4.11 Work and security environment	20 h
4.12 Instructional techniques	20 h
4.13 Learning techniques	20 h
4.14 Personnel management I	20 h
4.15 Personnel management II	20 h

**FURTHER POSSIBLE STUDIES IN OTHER SUB-
 JECTS OR STUDIES IN DEPTH IN SPECIALIZED
 FIELDS, DEPENDING ON PRIOR REQUIREMENTS
 IN INDUSTRY**

The student may choose suitable courses, combinations of the above mentioned subject gradings, or take the whole course program; meet suitable size of study group about 12 - 15 students.

• **Implementation of the ...
 studies ...**

The candidate should have at least secondary school education and one year practice in the printing industry.

GENERAL SUBJECTS

Mathematics	200 h
Physics and auxiliary sciences	200 h
Engineering design and descriptive geometry	200 h
Business and industry regulations legislation	50 h
Industrial economy and statistics	100 h
Industrial safety and health (environment rules)	50 h
Shop supervision and teaching techniques	100 h
First language and commercial correspondence	150 h
Second language and commercial correspondence	200 h
Third language (preferably German), optional	200 h

GENERAL ENGINEERING SUBJECTS

Mechanics	120 h
Electrotechnics	120 h
Mechanical technology	80 h
Strength of engineering	200 h
Control gear drives, machines and equipment, pumps, pipes, transport, air conditioning, ventilation, instruments and measuring techniques	120 h
Factory planning and layout	60 h
Laboratory practicals, physics	60 h
Laboratory practicals, electrotechnics	60 h
Laboratory practicals, mechanical engineering	60 h
Laboratory practicals, mechanical engineering	120 h

PRINTING INDUSTRY SPECIAL SUBJECTS

Planning and design of printed matter	60 h
Printing of printing	20 h
Industrial heat-treating and coating techniques	60 h
Reproduction techniques	100 h
Composing techniques, computers	100 h
Plate making (offset, letterpress)	20 h
Letterpress printing techniques	15 h
Offsetprinting techniques	75 h
Other printing methods and techniques	15 h
Book binding and other finishing techniques	20 h
Printing industry machines and techniques	20 h
Statistics of the printing industry	60 h
Electrotechniques of the printing industry machines	60 h
Laboratory practicals in reproduction	70 h
Laboratory pr. in the machines and equip.	100 h
Laboratory practicals, printing	60 h
Laboratory practicals, binding	20 h
Laboratory practicals, computers and composing	20 h

TOTAL 1,400 h

*) Modification of the Finnish code).

A TEN-WEEK IMPROVEMENT COURSE FOR LETTER PRINTING^{*)}

The course is supposed to be used as a training course for skilled letterpress printers to upgrade the skills of offset printers and printers assistants.

PROFESSIONAL WORK IN BUSINESS OR IN THE PRINTING (7 weeks)

Offset printing, two-color and four-color	200 h
Offset plate making	20 h
Other preliminary and binding operations	20 h

THEORETICAL STUDIES (1 week)

Printing theory and techniques	60 h
Reproduction and binding techniques	10 h
Mathematics	10 h
Physics	10 h
Chemistry	10 h

The aim of the course is to enable the student, upon completion of the course, to perform common offset printing jobs on a regular production printing press. His skill should be suitably tested.



A TWELVE-WEEK COURSE IN OFFSET PLATEMAKING AND SHORTAGE

The course offers training in shortage and offset plate making to letterpress metal compositors, as well as assistant and semi-skilled plate makers.

PROFESSIONAL WORK IN THE BUSINESS OR PRINTING OF PLATE (9 weeks)

Shortage	160 h
Plate making	72 h
Plate making with stop and repeat machines	72 h
Proof printing	24 h
Reproduction photography	24 h

THEORETICAL STUDIES (3 weeks)

Shortage techniques	30 h
Plate-making theory and techniques	24 h
Stop and repeat machines	18 h
Proof printing	6 h
Other preliminary and subsequent operations	12 h
Mathematics	16 h
Physics	12 h
Chemistry	12 h

^{*)} Swedish school 1971

After the course, the student should be able to perform independently every normal printing or plate making activity. His skills should be suitably tested.

Operational safety and environmental control should be dealt with during the lessons on the various subjects.

A FIVE-SEMESTER COURSE IN REPRODUCTION PHOTOGRAPHY

The course is aimed at reproduction workers with at least one year's experience in any printing profession or six months' experience as a reproduction assistant.

PROFESSIONAL WORK IN THE WORKSHOP OR PRODUCTION PLANT (9 weeks)

Line photography	10 h	
Screening in camera and contact, (Half-tone photography—colour)	80 h	
Line colour separation	24 h	
Continuous tone photography	20 h	
Contact copying	20 h	
Continuous tone colour separation	70 h	
Direct screening colour separation	40 h	
Colour scanners	30 h	
Hand developing	10 h	
Automatic film processors	10 h	
Exposure	10 h	
Preparing of photographic solutions	10 h	
Lithographic retouching, ink setting	10 h	
Offset plate making	6 h	
Layout of illustrated printed matter	4 h	140 h

THEORETICAL STUDIES (3 weeks)

Photographic materials and developers	10 h	
Developing theory and practice	8 h	
Photographic theory	24 h	
Colour and colour-separation theory	40 h	
Exposure	8 h	
Layout of illustrated printed matter	4 h	
Mathematics	8 h	
Physics and Chemistry	18 h	182 h

After the course, the students should be able to perform independently every normal reproduction photography operation, these skills in one-colour and four-colour work being suitably tested.

A TWELVE-WEEK COURSE IN BINDERY OPERATION

The course is aimed at bindery workers with at least one year's experience in any other printing sector or six months' experience in a bindery.

**PROFESSIONAL WORK IN THE WORKSHOP OR PRODUCTION PLANT
(9 weeks)**

Paper handling and transportation	16 h
Paper cutting	24 h
Folding machine operations	60 h
Gathering machine operations	48 h
Stitching and sewing	32 h
Case making in machines, book assembly	24 h
Manual bookbinding	16 h
Perfect bookbinding machines	80 h
Offset printing	20 h
Miscellaneous bindery operations	40 h

THEORETICAL STUDIES (3 weeks)

Paper storage and handling, transport devices	24 h
Paper cutting	16 h
Folding	16 h
Gathering	24 h
Bookbinding and book design	20 h
Sewing, stitching and miscellaneous	10 h
Mathematics	10 h

After the course, the student should be able to operate bindery machines, his skills being suitably tested.

SUPPLEMENT II

PLANNING OF THE CENTRAL GOVERNMENT PRINTING OFFICE

SUMMARY

1. This supplement compares two ways of overcoming the inadequate factory building conditions in the public printing sector in Baghdad and proposes their restructure, giving some idea of suitable factory sites and their utilisation for industrial building purposes and providing some general advice on the construction of printing factories and details of the special requirements of the various departments. Some examples of simple factory planning systems are also quoted.

2. During his assignment, the consultant was asked to produce the above information. An actual lay-out of the production flow proved impossible since careful study of the situation showed that the proposed factory site was unsuitable for construction purposes. In the brief time available, the authorities were unable to find a suitable alternative site.

Comparing the original recommendation of one factory with a proposal for two smaller factories

3. The consultant was asked to compare the initial restructuring proposal with some other possibilities. In his progress report and, later in the draft final report, dated 10 February 1973, the consultant recommended that a large printing factory be built and all the public printing establishments be accommodated therein thus forming a central Governmental Printing Office.

4. Two other possibilities were: the erection of two smaller factory buildings, either housing two similar printing presses (both producing books and stationery printing) or one factory for book production and the second factory for stationery production. As a means of reducing immediate investments, the question was raised whether, for example, book production would be feasible in the new smaller building, whilst one of the existing plants could be used for stationery printing purposes.

5. It was considered that there were many disadvantages to having all public printing done in two similar factories, as no real restructuring would have been established and the advantages to be gained from specialisation would not have been exploited. These main disadvantages would have outweighed the costs invested in factory buildings. Consequently the main comparison was limited to the advantages of a central printing office as against two specialized printing presses, the results of which were presented in a memorandum to the planning committee (see pages 6 - 9 of this supplement).

6. It was shown that the building of two factories would have

resulted in a considerably more expensive solution than the original recommendation, further to causing other disadvantages. It was also clearly shown that none of the existing buildings were suitable for the production of any of the two product groups. It would also have cost too much to restore one of the existing plants up to the standard required for a fair production environment.

7. Thus, the committee was convinced of the correctness of the recommended solution, and agreed to recommend to the Ministry of Industry that only one large printing factory be built.

Suitable factory sites

8. The factory site originally selected for the printing establishments was found to be inconvenient; this notwithstanding, a factory building lay-out as shown in the final report might be situated there. Owing to the comparatively small total area and the unsuitable form, there would have been scarcely any possibility of extending the building at a later date. Furthermore, external transport on this site would have been difficult. Thus, the site was considered to be unsuitable for further needs, and could not justifiably be used to that extent (52% of the total area for building, whereas the master plan proposed a maximum of 55%).

9. Thus, the authorities have started to look for an area, better suited to the needs of the printing factory. It was agreed that a suitable site should be large enough to permit the later extension of the proposed factory (30 - 50 %) the length/width ratio being not less than 1:2. The consultant feels that the factory might well be situated in the outer areas of Baghdad, possibly on one of the main streets.

10. In view of the fact that no definite decision has been reached with regard to new factory sites, it was considered most useful if some general outlines of printing factory buildings were discussed and utilized as soon as a suitable piece of land was found.

General features of a printing factory building

11. The heavy industrial processes should be located on the ground floor: meta' composing, letterpress and offset printing bindery and stores.

12. The printing machines, in particular, necessitate the floors having a load-bearing capacity of 2,000 kp/m². However, as there will be no definite limits between the various departments and overall flexibility is most important, it is recommended that the ground floor have the same load-bearing capacity throughout.

13. The most common floor surface for the heavy industrial sector is still smooth concrete flooring which can withstand very heavy point-loads exerted by the small metal wheels of customary trolleys. At least three layers of epoxy two-component, oil-proof paint are

used as finishing to prevent dusting. The special requirements of certain departments' floors are mentioned below.

14. To ensure a high degree of production machinery flexibility, the customary span between columns is approximately 20 m. Headroom must not be less than 5 m; however in corners and on the walls it is possible to have the air-conditioning ducts at a lower height.

15. The walls and windows should be insulated externally to ensure the maintenance of constant air-conditions in the printing shop and bindery, as well as in the paper stores. Printing equipment is not sand-proof, thus to avoid excessive wear all outer doors and windows should be kept permanently closed and no unfiltered air should be fed into the shop. The dust content of untreated air ruins not only the sensitive high-speed machines with their low-tolerance bearings and the electronic equipment, but also printing quality in the very first production step, i.e. photo-mechanics.

16. The roof of the building is in dire need of heavy isolation to stop the scorching sun from upsetting air conditions inside. If skylights or other windows are used, no direct sunlight should be allowed to penetrate into the production departments, in particular the printing and the photomechanical sections. Instead, sufficient artificial lighting must be planned, i.e. at least 750 lux at the working level in the composing, bindery and printing departments. In the photomechanical department only the montage and retouching need be lighted so brightly. In the departments, where colour work is done, i.e. photomechanicals and printing, it is recommended that a special colour-corrected fluorescent mercury vapour tube with a colour temperature of 5,000°K be used. If this is not available a colour corrected tube of 4,000°K may be used with a colour correction index of at least 96.

17. The air conditioning system should be planned and installed in such a way as to ensure a tolerance of no more than $\pm 5\%$ RH and $\pm 2^\circ\text{C}$ has to be tolerated. If the most suitable conditions of 55% relative humidity and 23°C temperature cannot be maintained without major additional costs, other nominal conditions may be chosen between 20 - 28°C, 45 - 65% RH including the tolerances from the nominal values. The ultimate conditions of 20°C and 45% RH and 28°C and 65% RH should never be overstepped.

Special requirements of the various production departments in the building

18. Photomechanics: hot and cold water, both ordinary and acid-proof drainage, air-conditioning, dust filtering, vinyl floors, light movable partitions, special rooms for photo-engraving etching with acid-proof finishing, ventilation and explosion-proof illumination (hydrogen gases are generated in the etching process and there are photopolymer platenaking processes, where alcoholic fumes may enter the air). Photocomposing is included in photomechanics.

19. Metal machine composing: dirt-proof floors and walls, special provisions to be made for the heat generated by the metal melting pots of the composing machines which also generate poisonous lead fumes. The fumes have to be evacuated by having each machine connected to the ventilation system.

20. Printing departments: in addition to the general remarks, the noise of the machines may cause trouble and efficient ventilation is required for the solvents used for ink unit cleaning and printing inks that might pollute the air. Wiring should ensure maximum flexibility when installing machines; this is best done by using cables at ceiling level, the nearest outlets being 3 - 4 m in one direction (7 - 8 m between the cables) and 5 - 8 m in the other. Water should be available for offset dampening roller cleaning and dampening water supply.

21. Bindery: in addition to the general remarks, here too the noise might cause trouble. The machines are mostly smaller than in the printing departments, thus, there is an even greater need for power outlets.

22. Stores: these have to be planned for mechanical handling methods, including, inter alia, high fork-lifts. Paper and products are stored in 5 m high racks using pallets and standard cages. There should be a platform for loading and unloading directly delivery vans and trucks, as well as a special arrangement for loading and unloading standard containers indoors. The latter should be used as soon as they are available, for long-distance transport of products in bulk, raw materials from the paper mill in Bashrah and the paper imports of valuable sheet paper.

Some planning examples

23. This supplement also contains some examples of very simple systematic planning methods for land-use and the inter-relationships of the various production departments, thus determining the most appropriate form for the proposed factory.

24. Planning starts with the drawing on the site plan of a network representing planning modules as well as the column span, usually 20 by 20 m or 10 by 10 m in larger-scale drawings. In the example shown no site boundaries are drawn; they thus represent an unrestricted planning stage.

25. If the space requirements are now indicated in the modules, the number of modules can be easily included in the sketch, thus determining the form of, and links between, the departments. At this stage, the traffic routes are kept to a minimum by carefully planning the process steps in the right order.

26. A planning network is also used to ensure that if separate annex-buildings are planned, they can be easily incorporated later into the same principal construction structure of the span. The direction of extension on the site as well as external traffic will also be determined.

27. The examples given are:

- (1) An I-form material flow (direct flow) with management rooms in annex and with a side flow of printing forms and plates;
- (2) A U-form material flow with minimum site requirements and very good flow of printing forms and plates;
- (3) An L-flow of material and very good I-flow and connexions for the printing forms and plates, the management in an annex and fair usage of land area;
- (4) Proposal for a printing factory made by local architects, using many separate buildings and requiring a larger site than the others. It is also felt, that this sort of construction may be even more expensive than the compact ones.

28. One unique advantage of the second example should be mentioned: the possibility of making "ad-hoc" or instant extensions to production space, if suddenly required. This expansion can be achieved by using the stores for the bindery and offset printing shop and the production planning office for photomechanicals. These very departments are most likely to be enlarged first, and stores are the easiest of all departments to arrange elsewhere on a provisional basis.

COMPARISON OF THE SPACE REQUIREMENTS OF ONE FACTORY (see page 10)
SEPARATE FACTORIES

1. All the machines of the public printing presses in one central Government Printing Office, book and stationery production
2. Machinery of the Ministry of Education Press and Baghdad University Press in one separate book production factory, books only
3. Rest of the machines of the public presses (except above) in one stationery printing factory, no book production.

(Tables A, B, C cover the net space requirements, only)

DEPARTMENT	1. CENTRAL PRINTING OFFICE	2. BOOK FACTORY	3. STATIONERY PRINTING OFFICE
1. Photomechanicals	1000	700	300
2. Composing:			
machine composing	660	330	600
hand composing	1120	300	1065
3. Printing:			
letterpress printing	2200	400	1770
offset printing	2330	1100	1200
4. Bindery	3000	4000	1200
5. Raw material store	1100	600	600
6. Packing and delivery store	900	600	300
A. Industry departments total	14590	8310	7915
7. Management	2000	1000	1200
8. Social spaces (restaur., washr)	1500	1200	1200
9. Secondary (workshop, air-cond)	600	600	600
B. Paragraphs	4100	2900	3100
C. TOTAL FLOOR AREA, net	18690	11210	10665
D. Extension inside factory 10%			
Industrial areas (A)	1869	911	1067
Other spaces (B)	431	289	245
E. TOTAL FACTORY FLOOR AREA	20559	12201	11732
Grand total of two factories	24662		
F. SPACE DIFFERENCE (m²)	3903		

Conclusions from the comparison of space needs

29.

1. None of the public printing presses have a factory building large enough to accommodate any of the above mentioned two-factory proposals.
2. Nevertheless, it is possible to build two factories instead of one central factory. The machinery may be divided into two groups: one for the book factory (Ministry of Education), the second for stationery printing. A book factory of this kind, in addition to the existing and ordered machines, would need some machines (colour printing and possibly book binding machines) from other printing shops to meet the capacity requirements.
3. It is rather clear that building two factories instead of one central factory is considerably more expensive as the following additional cost factors are involved:
 - buildings costs for roughly 3,500 m² including double planning and designing costs;
 - additional equipment and machinery costs such as laboratory, repair workshop with their expensive machinery and instruments, air-conditioning etc.;
 - additional transport organisation, including car and vehicles;
 - additional management costs in officials, office utensils, etc. for financial book-keeping, filing, production management and planning etc.
 - additional costs in training workers in two different plants with different teachers;
 - additional costs in double security wards, etc.
4. In a smaller factory hall it is more difficult to achieve good space flexibility and to make changes in production processes should these prove necessary at a later date.
5. A smaller factory and its production are admittedly easier to control, but in a large central factory it is easier to maintain an even production load and to level out the occasional inevitable peak-load situations. In two separate production units, some extra production capacity must be available in both to tackle such peak load situations. Furthermore, peak-loads most probably terminate at different times in each of the two factories.

Surplus capacity is not so necessary in a one-unit factory where the production lines may be in a position to balance out each others load troubles.
6. Even in the case of two different factories it would probably be necessary to create a central office to handle the orders and

to direct the "one plant" factory. We can hardly expect the customers to be so knowledgeable in printing matters that they could go directly to the right specialist factory in all the cases.

This extra unit would also take care of the problems arising from balancing at the levels of the separate factories. However, just for this and planning purposes, the central production planning unit would have to have exact information on daily work conditions and the progress of each different printing order in the production process. This would be necessary, if one wished to avoid inconveniences and delays in deliveries, etc. However, such close contact with the two factories, possibly situated far away from each other or from the central planning office, would be almost impossible to maintain.

2. The technical development of the factories, i.e. keeping up-to-date with the trends, would be better, were the factory centralized in one place. If both production lines were in the same factory building, both could be developed equally. The material and quality control laboratory would possibly fail in its task were it to be included in only one of the factories. Were the laboratory to be split in two different places, duplication of instruments and workers is inevitable.

3. In the above, it was assumed that the separate book factory would be built mainly using the machinery of Ministry of Education, which, indeed would also be the factory's principal client. A situation where the owner of the factory is also the most important client could be disadvantageous as other customers would have every good reason to fear that their orders would be rated second if work had to be done during a peak production period. This could cause them to return to the private sector.

Comparison between a factory in the immediate centre of city and in the suburban site

30.

1. In all the developed countries, the central parts of the cities and towns are being "cleared" of industry. Industry itself also seeks to move out of city cores, as such moves bring many advantages.

2. In earlier times, the printing industry was traditionally located in the very centre of cities because it was a traditional handicraft "art" and closely linked with private customers, instead of being considered an industry.

3. As printing has gradually changed to a modern large-scale industry, factories and factory sites have become unbalanced - the sites are too small for large factories, frequently increasing space requirements.

4. Thus, all the recently constructed factory buildings are built elsewhere: some in the suburbs, and some in rural areas.

5. The main reasons are the following:

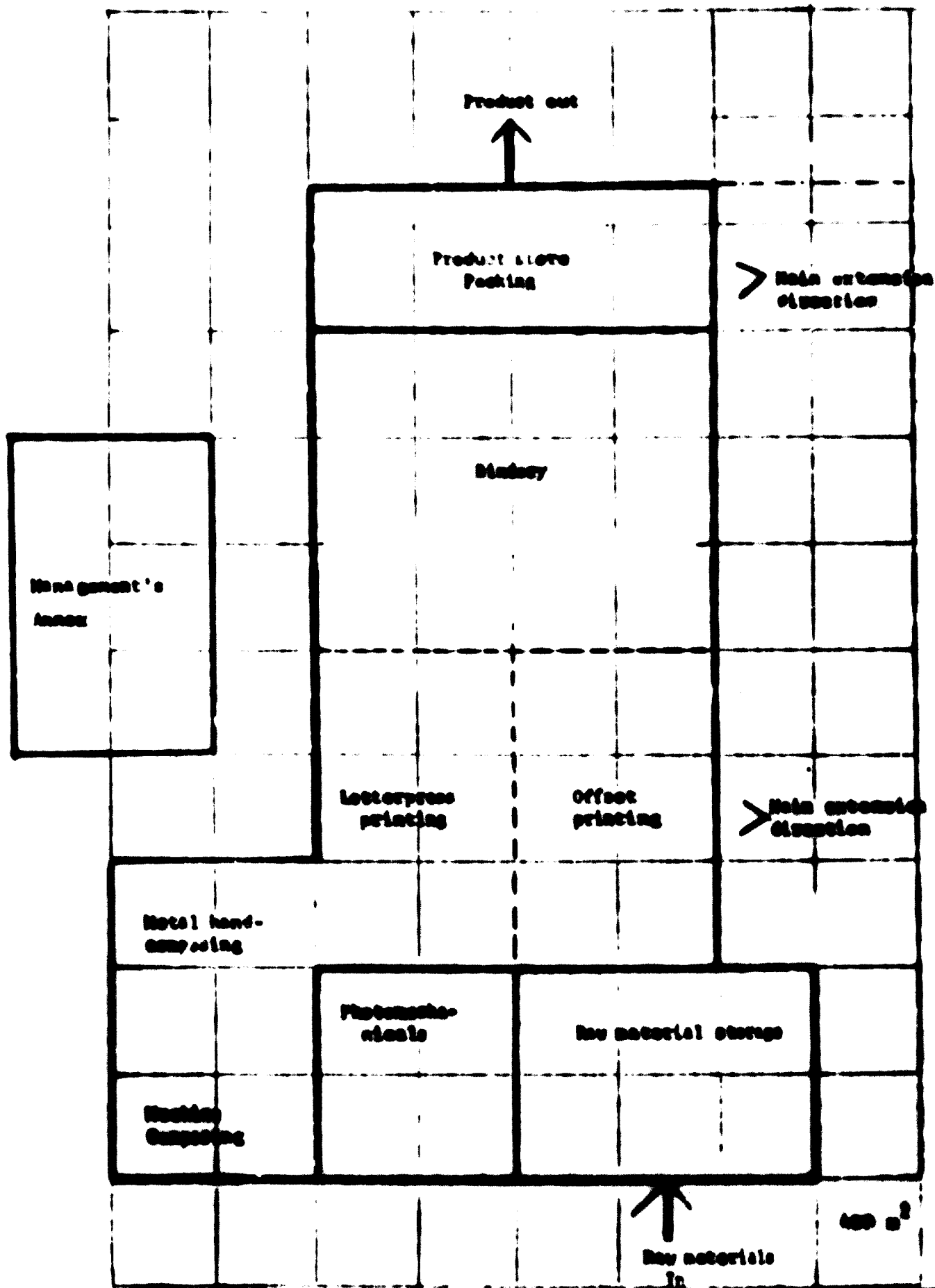
- large site needed for modern one-story buildings with easy horizontal, internal transportation, and less expensive land;
- large site needed for the possible future extension;
- transport in and out has to be convenient so as to maintain easy supplies and rapid deliveries; this entails more space and a good situation with respect to roads and/or railways;
- parking places for customers and factory personnel;
- no problems with the environment, the "green belt" may be maintained outside the factory and the inside well planned for good production conditions, pleasant environment and good, humane conditions of work.

6. There are, of course, some disadvantages in building a factory on the outskirts of the town. The main inconveniences may be as follows:

- Longer delivery times for the customers;
- Sometimes a town office is needed for the customers' convenience;
- Sometimes, a delivery store in the town is needed for rapid "out-of-stock" deliveries;
- Transportation of workers and employees is in general more cumbersome and usually has to be provided by the factory;
- Possible needs for housing, accommodation for executives and workers near the factory, if not available already;
- More social and cultural space is needed for better comfort and more appealing environment.

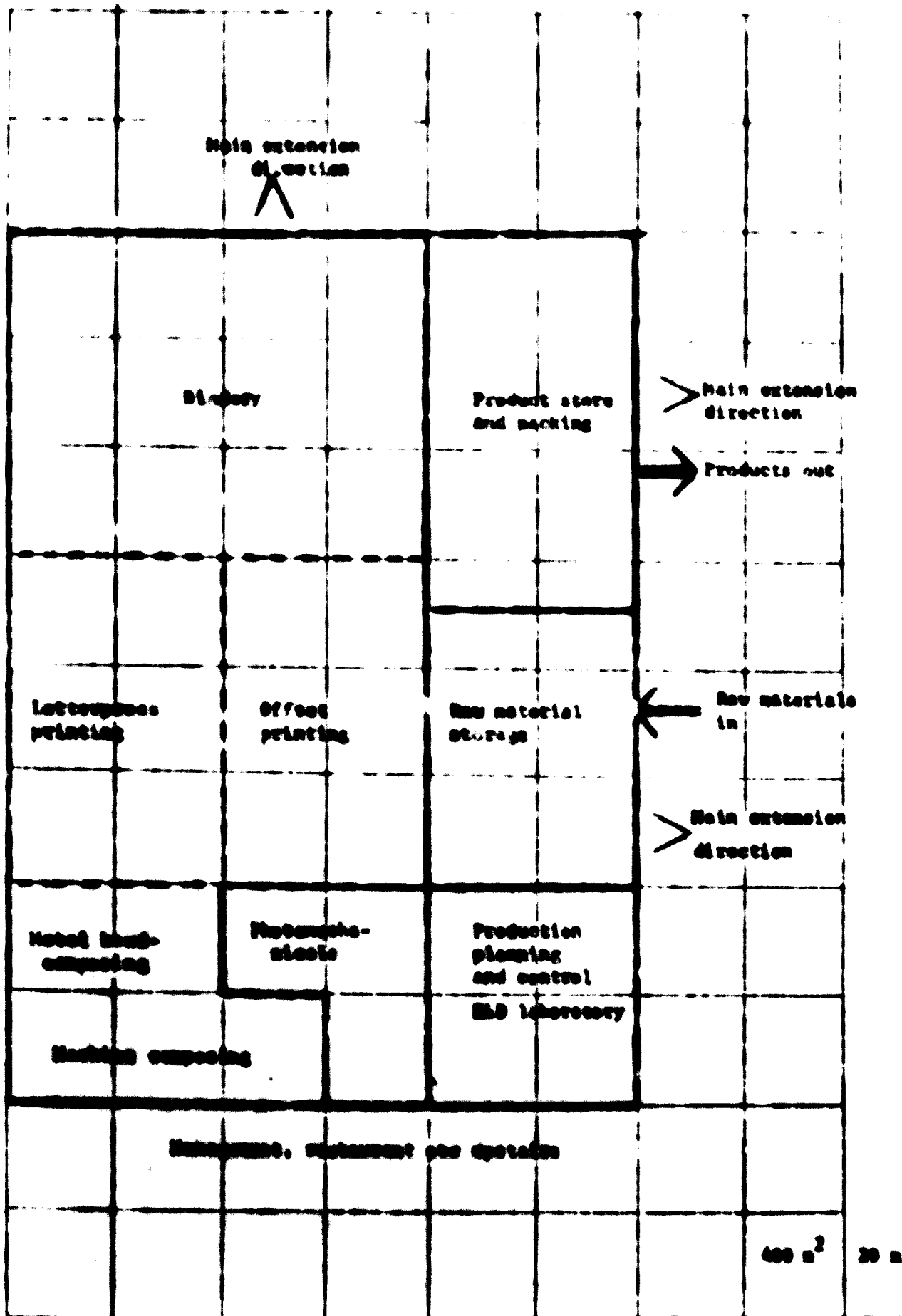
FACTORY PLANNING: EXAMPLE 1

SUPPLEMENT 11

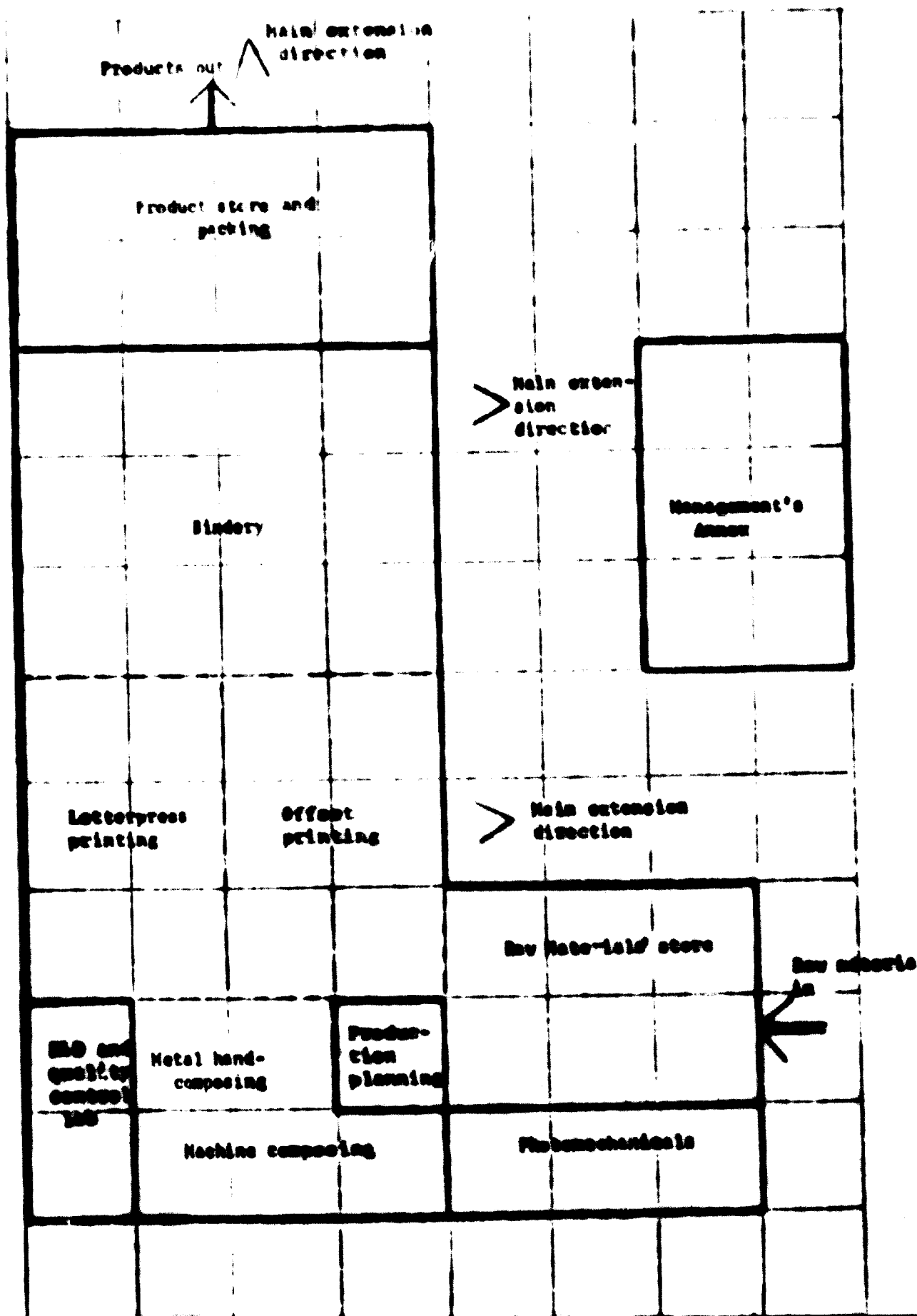


FACTORY PLANNING EXAMPLE 1

PLANT 11



SUPPLY ROUTE



Lockers

FACTORY PLANNING
EXAMPLE 4



Administration

Raw material
store

Photo-
mechanicals

--->
Exten-
sion
direc-
tion

Metal stamping

Letterpress
printing

Offset
printing

Exten-
sion
direc-
tion
--->

Canteen

Bindery

Exten-
sion
direc-
tion

Product's store

--->



60

SUPPLEMENT III

WORKERS' TRAINING

Draft Project Data Sheet

1. Reference Data:

Country: Republic of Iraq

Project Title: Training workers for the printing industry

Executing Agency: UNIDO (ILO)

Project Number: - UNDP Ref.:
- UNIDO Ref.:
- ILO Ref.:

Origin and date of request:

Purpose of Project: To plan and implement training of workers and/or retraining of workers already employed in the industry to improve the printing industry to meet the growing demands of productivity and production quality, and to make them competent to maintain modern methods and machines.

2. Background Information:

The Iraqi Government has decided to build a centralized Government Printing Office to meet both educational book printing as well as other public printing requirements. Today there is an urgent need to improve the skills of workers so as to achieve better standards of quality and productivity. There is enough machinery, but the lack of trained professionals and technicians prevent the full utilization of the high quality and valuable machinery.

The total number of workers needed is approximately 3,000 - 3,500, of which 2,000 - 2,500 will be working in the projected plant. At least 200 workers in various trades should be trained yearly at various levels.

3. Description of the Project: The project entails the planning and immediate implementation of training schemes in some of the existing printing establishments as in-plant training and training courses, to be later continued in the new factory as an advanced in-plant training school.

Furthermore, the means of achieving competent training for a staff of printing technicians, supervisors, teachers and foremen should be studied.

**DRAFT PROJECT DATA SHEET
TRAINING PROJECT**

4. Project budget:

<u>Components</u>	<u>Duration</u>		<u>Costs</u>
Survey of the number of workers employed in the industry, their professional skills and need for training	4,5 months	ID	4,500,000
Machinery, equipment, materials and facilities for the in-plant training of workers		ID	65,000,000
<u>Foreign experts</u>			
- Planning of the in-plant training and the first training courses (one expert)	3 months	US \$	7,500,000
- Implementing the training and training of counterparts, further studies (three experts)	3x2 years	US \$	150,000,000
- Fellowships for training of local teachers abroad (three fellowships)	3x1 years	US \$	19,200,000
<u>Agency Overhead Costs:</u>			

5. Request Approved:

For UNIDO (ILO)

For UNDP

Date:

Date:

SUPPLEMENT III

EXPERTS' JOB DESCRIPTIONS

TRAINING PROJECT

Request from the Government of the Republic of Iraq

Draft Job Description (1)

- Post Title: In-plant training expert for printing industry
- Duration: 3 months
- Date required: As soon as possible
- Duty Station: Baghdad
- Purpose of project: To estimate the need for training and to plan in-plant training and training courses to improve the skill of semi-skilled workers so as to cope with the growing demands of productivity and production quality.
- Duties: The in-plant training expert will be assigned to the Industrial Department of the Ministry of Planning and he will be expected to:
- 1) control the survey executed by the Ministry for calculating the training needs and labour skills;
 - 2) recommend factories and machinery to be used for training and assist in choosing local training teachers;
 - 3) propose programmes for in-plant training of photocomposing, reproduction techniques, offset and letterpress printing, bindery operations and machine maintenance and repair;
 - 4) brief local counterparts in teaching methods for the proposed training programmes, including headings and sub-headings of the lessons;
 - 5) propose priorities in implementing the training courses and make time schedules for some years in advance;
 - 6) outline the duties and programmes of foreign training teachers possibly needed for implementing the training programmes.

Qualifications: Printing technicians with good experience in planning of training and implementing training in the various fields of printing.

Language: English, Knowledge of Arabic and ability to communicate in German would be assets.

Background Information: See Draft Project Data Sheet (page 1)

SUPPLEMENT III

EXPERTS' JOB DESCRIPTIONS

TRAINING PROJECT

Request from the Government of the Republic of Iraq

Draft Job Description (2)

Post Title(s): In-plant training specialists (three)

Duration: Two years

Date required: As soon as possible (after the mission of the expert no. 1)

Duty Station: Baghdad

Purpose of project: To plan and implement modern full-scale in-plant training in some of the largest public printing establishments to improve the skills of semi-skilled workers and train new labour to cope with the growing demands of productivity and production quality made upon the printing industry workers.

Duties: The in-plant training experts will be assigned to the public printing industry under the authority of the Ministry of Industry and they will be expected in co-operation to do:

- 1) Revise the training programmes designed by the authorities according to a preliminary expert's planning recommendations;
- 2) implement in-plant training of workers of the printing industry;
- 3) train counterpart teachers of local printing staff;
- 4) propose a long-range plan to solve the problems of training high-quality skilled workers for the industry according to training needs and recruitment of new labour;
- 5) propose ways of organising training of printing technicians, foremen, supervisors, management and teachers for the printing industry at college and university levels, if needed.

Qualifications:

- 1) One training teacher specialized in reproduction techniques, including colour separation and plate-making processes, as well as photo- and possibly computerized composing methods;
- 2) one training teacher specialized in letterpress and offset printing, as well as modern mechanical bindery techniques, paper storage and stock-keeping;
- 3) one training teacher specialized in maintenance and repair of all kinds of modern printing industry equipment.

If a joint team of teachers is assigned to the project, the subjects may be divided differently to suit the special skills of the individual team members.

Language:

English. Knowledge of Arabic and ability to communicate in German would be assets.

Background Information: See Draft Project Data Sheet (page 1)

**SUPPLEMENTARY
FACTSHEET PLANNING**

Draft Project Data Sheet

1. **Reference Data:**

Country: Republic of Iraq

Project Title: PLANNING OF A CENTRALIZED GOVERNMENT PRINTING OFFICE IN BAGHDAD

Responsible Agency: UNIDO (SIS)

Project Number: - UNDP Ref.:
- UNIDO Ref.:

Origin and date of request:

Purpose of project: To plan in detail the factory lay-out and production flow of the Centralized Government Printing Office.

2. **Background Information:** The Iraqi Government has decided, following the recommendations of a UNIDO survey, to improve the public printing in Iraq by building a central printing factory and merging some fifteen existing public printing shops. The plant comprises a modern, mainly one-storey factory building with the heavy-duty departments on the ground floor level. The total planned floor area will be about 20 - 25,000 m² with vacancies for some 2,000 - 2,500 workers and employees.

3. **Description of the Project:** The project is designed to assist the local construction planning agency in the drafting and detailed planning of the printing factory, supplying the necessary expertise and adjusting the plans to the special needs of the printing industry.

The second stage of the project will be the co-ordination of the actual detailed planning and lay-out of the various production departments according to up-to-date production methods as well as work and material flows using the existing high-quality machinery.

Furthermore, assistance will also be required in the planning of technical improvements in reproduction and colour separation methods, photo and possibly computerized composing and mechanical (perfect) book binding.

4. Project Budget:

<u>Item/Activity</u>	<u>Duration</u>	<u>Unit</u>	<u>Cost</u>
Factory design (project)	6 months	ED	20,000,000
Construction of the actual factory building	24 months	ED	1,000,000,000
Value of the machinery used in the factory (existing)		ED	1,000,000,000
Annual cost of material and labor		ED	272,000,000
<u>Foreign experts and fellowships</u>			
- Factory draft planning (one expert)	6 weeks	US \$	2,700,--
- Detailed lay-out and production flow planning (three experts)	9-12 months	US \$	20,000,--
- Implementing of the factory's production and the technical improvements (three experts)	9-12 months	US \$	20,000,--
<u>Agency Overhead Costs:</u>			

5. Request Approved:

For UNIDO	For UNDP
Date:	Date:

MEMORANDUM

Request from the Government of the Republic of Iraq

Facility Description (1)

Kind of Work: Printing industry factory planning expert

Duration: Six weeks

Date Required: As soon as possible (urgently)

Entry Status: Required

Contents of Project: To plan draft for factory lay-out and production flow of the Centralized Government Printing Office.

Notes: The factory planning expert will be assigned to the Ministry of Planning and he will be expected to:

- 1) Check the space requirement calculations of the factory building project;
- 2) Assist the local building design authorities, during the draft planning stage, to maintain suitable utilization of the factory site, with particular respect to possible future extensions and the directions thereof as well as external transport;
- 3) Assist in making preliminary lay-outs for the various departments to ensure convenient indoor transport, circulation and communication between the process departments, as well as uninterrupted work and production flow;
- 4) Supply the planning agency with detailed information according to the machine layouts of power, water, air, air-conditioning and other requirements and supply in the various departments;
- 5) Provide the planning agency with all the special information related to the printing industry's requirements in terms of factory floors, walls, windows, lighting, special drainage, storage and parking equipment etc. so that planning can proceed to the final design stage and actual construction of the building.

The planning should be executed in such a way that it will be possible to build a factory building for maximum flexibility and productivity of the printing process, without causing unjustified building costs.

Qualifications:

Printing expert with good experience in factory planning and design as well as knowledge of modern printing processes and requirements.

Language:

English. Knowledge of Arabic and ability to communicate in German would be assets.

Background Information: See Draft Project Data Sheet (page 1)

ANNEXURE IV

Request from the Government of the Republic of Iraq

Draft Job Description (2)

Post Title: Printing industry factory planning expert(s).

Duration:

- A. Six months with possibility of extension up to nine months;
- B. and C. Four weeks with possibility of extension up to six weeks

Date Required: To be specified (4 to 6 months before the actual construction and factory building are completed.)

City Station: Baghdad

Purpose of Project: To plan in detail the factory lay-out and production flow of the Centralized Government Printing Office, as well as the transfer of the public printing establishments to the new building.

Duties: The planning expert(s) will be assigned to the Ministry of Planning and he (they) will be expected to:

- A.
 - 1) Co-ordinate the total detailed planning process executed by himself (themselves) and the local counterparts and foreign specialists;
 - 2) To plan in detail the printing departments and some other departments, including the machines, equipments and furniture and their link-up to power, water, and other utilities;
 - 3) To assist the local construction company in solving any questions of detail which may arise during his (their) assignment relating to the finishing of the actual building;
 - 4) To execute the overall planning of the transfer of the factories to the new plant with the aid of foreign specialists and local counterparts;
 - 5) To direct the transfer and installation of machines, if still on mission during this stage.

- E.
- 1) To assist the co-ordinating planning expert and in particular plan the photo-mechanical and composing departments of the new factory building with details specific for these processes;
 - 2) To assist in the planning of the transfer of the printing factories and the installation of the above departments' machines, etc.
- C.
- 1) To assist the planning co-ordinator and in particular plan the bindery production departments of the new factory building with details specific to the bindery processes;
 - 2) To assist and make plans for the new factory building's paper, raw material and product storage areas. The internal traffic design planning would also be included into the expert's duties;
 - 3) To assist in planning and the transfer of the bindery machinery, the transport equipment and the stores, together with their contents, to the new building.

All the experts would be expected to propose additional experts or any other means necessary to secure the smooth implementation of the processes and production in the new factory building.

Qualifications:

A. The co-ordinating planning expert will be a printing expert with wide experience in planning printing industry factories and their layouts as well as in production management.

B. The expert should have special experience in reproduction techniques, plate-making and composing as well as in the planning of these processes.

C. The expert should be a specialist in modern binding techniques, especially in mechanical book binding. He should also be familiar with paper and other raw material storage systems as well as transport devices and methods in the printing industry.

Language:

English. Knowledge of Arabic and ability to communicate in German would be assets.

Background Information: See Draft Project Data Sheet (page 1)

SUPPLEMENT I

Fellowships

Draft Project Data Sheet

1. Reference Data:

COUNTRY:

Republic of Iraq

Project Title:

Assistance to the Centralized Government
Printing Office of Iraq

Executing Agency:

UNIDO

Project Number:

- UNDP Ref.:
- UNIDO Ref.:

**Origin and date of
Project:**

Purpose of Project:

To grant three printing technicians from the Centralized Government Printing Office of Iraq the opportunity to receive training in new techniques in the fields of photo-mechanics (colour separation, colour scanners and offset-plate making), printing and binding techniques (including paper handling), and machine maintenance and repair.

2. Background Information: (See background information of Project Data Sheet in Supplement 11)

3. Description of the Project: Three fellowships will be granted to technical personnel of the above plant who have been identified as potential teachers for training schemes to be set up at the plant. Upon their return from abroad, the fellows shall act as assistants to the foreign experts assigned to this project prior to taking up their duties as full-time teachers to the industry. It is thus essential to select experienced candidates (skilled workers with foreman or supervisor experience), who have a good command of English and the ability to understand German, for training in the following fields:

- (1) photomechanics;
- (2) printing and binding techniques;
- (3) printing machine maintenance and repair.

4. Project components:

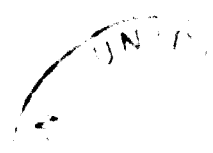
<u>Components</u>	<u>Duration</u>	<u>Cost</u>
Fellowship in photomechanics	1 year	6,400
Fellowship in printing and binding techniques	1 year	6,400
Fellowship in printing machine maintenance and repair	1 year	6,400
Total		<u>19,200</u>

5. Request Approved:

For UNIDO
Date:

For UNDP
Date:

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FINAL REPORT

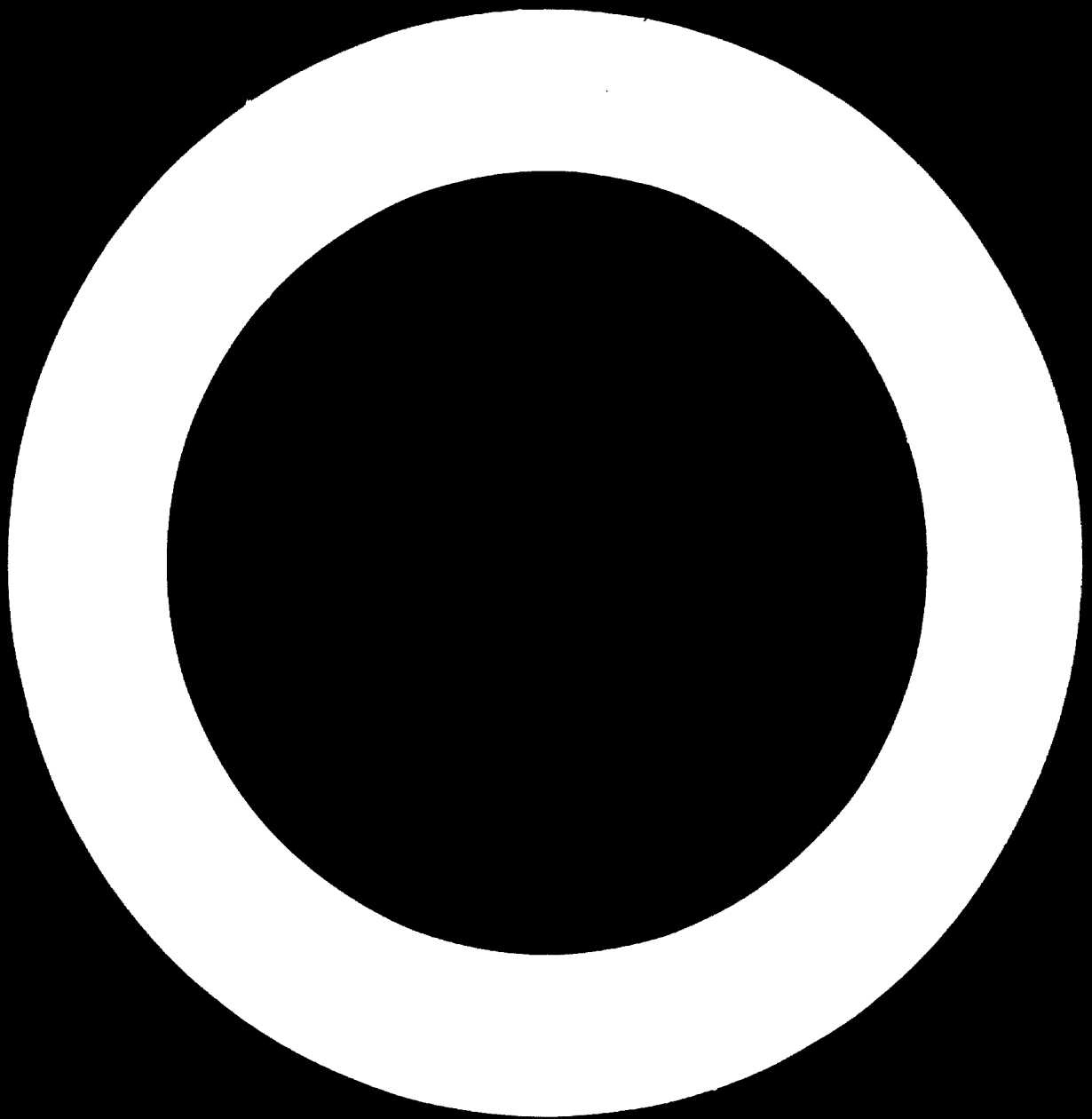
SURVEY OF THE PUBLIC PRINTING INDUSTRY IN IRAQ^{1/}

by

Georges L. ...
UNIDO Expert

Addendum

^{1/} 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. This document has been reproduced without formal editing.



MECHANICAL BOOK BINDING - PRODUCTION LINES

This is a supplement to the printing industry consultant's draft final report and was written in Helsinki after the actual assignment.

The purpose of this report is to shortly describe the so-called perfect binding technology and materials, list the possible available machinery for the production lines, give some hints of the investments involved and, furthermore, discuss details to be realized when planning a suitable production plant.

1. DESCRIPTION OF THE PRODUCTS AND THE EXPECTED PRODUCTION REQUIREMENTS

To be able to plan a correct manufacturing process and to choose the right machinery, a thorough investigation of the production and the products has to be done. This means that the layout of the design of the books has to be settled, and the number of books to be produced as well as the lengths of the runs has to be known. This information should be used for the technical requirements of the plant and for the capacity requirements as well.

The features of the book products which affect the choice of process, methods and machinery are:

- the dimensions of the books: height, length and thickness, and the paper qualities used
- the preceding manufacturing processes and their results i.e. folding, perforating, sewing, cutting etc.
- the type of book cover (hard-soft), use of gauze reinforcing the book spine, etc.

In this report these details are taken from the writer's investigation of the public Iraqi printing needs as far as possible and completed with some subjective estimations made by the author. The data may be summarized as follows:

<u>Book dimensions:</u>	School books	Other books	
- most common	17,5x25	17,5x25	cm/cm
- largest size	25 x35	25 x35	cm/cm
<u>Book thickness:</u>			
- most common	15	18	mm
- smallest	7	10	mm
- largest	45	45	mm
<u>Length of run:</u>			
- most common (mean)	75000	500	books
- shortest	5000	200	books
- longest	250000	10000	books

<u>Number of signatures per book:</u>	School books	Other books	
- most common (mean)	8	10	
- largest books	48	48	
<u>Total number of</u>			
- book titles per year	175	150	
- books per year (1973)	12,5 mill.	150000	
<u>Ratio of all:</u>			
- Sewn books	10	20	per cent
- Gauzed books	20	40	per cent
- books with covers	95	70	per cent
- books with covers	5	30	per cent

The paper used for 80...90 % of the whole book production is 60...90 g/m², uncoated letterpress or offset printing paper, which is rather suitable for mechanical book binding processes. Only a very few exceptions are made by including some signatures of coated or other different paper grades in some of the books produced. The mechanical, automated process is planned to start using folded signatures.

2. THE MECHANICAL BOOK BINDING PROCESS

On page 3, the mechanical book binding process is shown as a flow diagram listing the various processes or manufacturing steps, starting from the printed sheets or book signatures.

In short, the process may be described as follows:

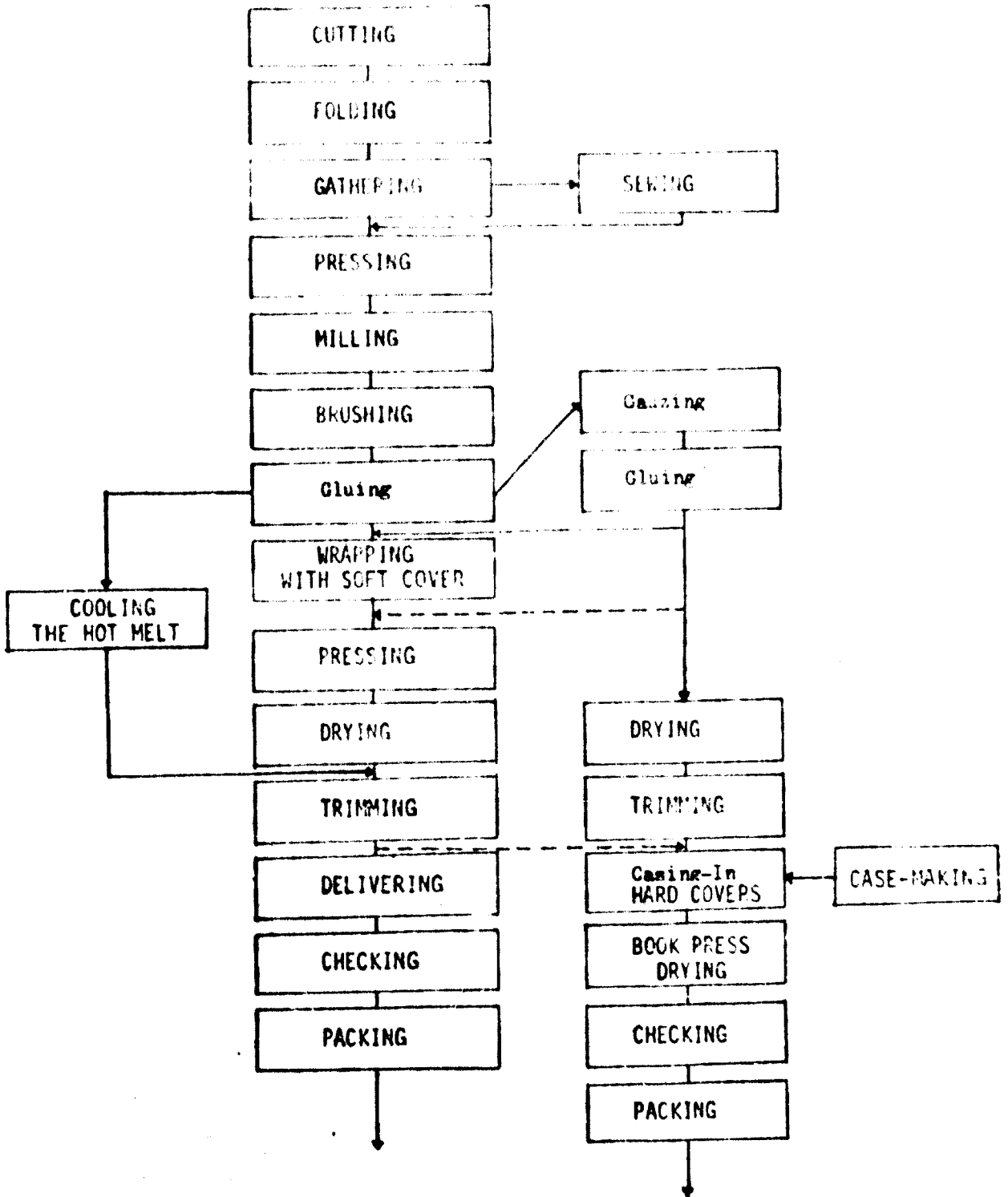
The printed sheets are cut down into suitable sizes (most commonly when making 16 pages, signatures corresponding to two standard sheets are used in the printing requirement calculations) for example 50x70 cm. The sheets are then folded in separate folders and gathered to make complete book blocks. In most of the book binding lines, the gathering of the signatures is done in automatic gathering machine units which are connected directly to the following binding unit.

If the book is produced as an entirely adhesive bound book, the following step is to clamp the book block between the delivery clamps of the machine which will feed the book block into the cutting/milling station. In this station the book spine is milled down and roughened to separate all the different 2-page sheets from each other in the signatures and the total book. In this way the sheets are exposed for the next step which is the application of glue to the book back and thus gluing all the freed sheets together to form a firm book block. To ensure a perfect joint, the book back has to be brushed clean from all paper fibre and loose lint before applying the adhesive.

After the gluing the back - which may be done once or twice - the paper cover is pressed against the fresh adhesive on the book spine, pressed once more firmly and formed. The ready book is then either delivered to be stacked in piles for final drying or passed through a drying or cooling section to enable the glue to set and

form a firm joint. When the book spine is adequately firm, the top and bottom as well as the front edge are trimmed and the final ready product delivered.

MECHANICAL BOOK BINDING PROCESS



...the book block is placed in perfect
position without the need of a trimmer.



In such cases, where additional strength of the book is required it is possible to glue gauze to reinforce the book back and to glue the setting of the cover into the book back. The gauze also strengthens the cover against wear. If the book back is gauzed the adhesive binding process may continue as above but may also be interrupted for hand binding or casing in haru covers by hand. In this case, the book blocks may be taken off the machine after gluing the gauze to be separately dried, trimmed and cased in hard covers. Some mechanical book binding machines are also able to produce hard covers, automatically bound books.

In some cases, if the books are required to be easily opened as hand made books it is possible to combine the processes by sewing the book block with the adhesive binding and casing in the unit. In this method, the milling of the book back has to be done while sewing the sewing threads, which is possible in most of the perfect binding machines.

When planning an automatic book binding process, there are several possibilities to mechanize the work. The simplest version is to feed by hand the readily gathered book block into the adhesive binder which roughens the back, glues and applies the paper cover into the book. All the other production steps are, in that case, done manually later on (see the illustration above).

Later, the perfect binder may be completed with a gathering machine, gauzing station, trimmer, stacker, etc.

Most of the modern perfect binding production lines are, however, complete processing machines starting from 12...24...48 gathering machines and ending in stackers or even shrink plastic wrappers thus delivering ready books in delivery packages.

The combination of the machine for each user has to be planned depending of the production requirements, the design of the

products and machinery available in the bookbinding plant.

3. ADHESIVES USED FOR MECHANICAL BOOK BINDING

The most common types of adhesives for mechanical bookbinding are PVA emulsion, which is set and dry rather slowly, the glue film is produced by a plaster water emulsion, which is absorbed by the paper with the passage of time. The setting of the paper affects the setting of the glue and the rate of setting is relatively slow. The glue drying may be accelerated by using devices, such as infrared or hot air drying, in some cases the drying conditions may be rather hot, such as 100°C are used.

Thus, when hot-melt machines and lines are used for bookbinding, the requirements for the hot-melt adhesive are different from those of PVA. This sort of adhesive is produced by the use of thermoplastics, which are melted in the binding machine and are then applied in melted condition on the book back. After the cover is pressed against the spine, the latter is cooled. The cover cools, the adhesive film rapidly and the glue sets immediately. The cooling may be accelerated further by using another type of cooling system. The use of hot-melt adhesives for bookbinding is immediately in the machine ready for turning, therefore will be no further need to let the ready books dry in the drying process after the machine finishing. Thus, the books may be stacked and packed directly with machines or units connected with the book-binding equipment.

The main difficulties when using hot-melt is that the rapid setting of the glue might give too little time for the glue to penetrate into the paper fibres in the book. This is especially difficult if heavily coated papers are used; when using uncoated or light weight coated paper grades, no such difficulties occur. It is also known that the hot-melt glue to be still developed to be resistant in ultimate cold conditions, in conditions -10°C and below, where the thermoplastics tend to be brittle.

Under Iraqi conditions neither of the disadvantages will arise because most of the production is done on uncoated papers and the temperatures are rather too high than too cold.

However, there are two different methods which are supposed to take advantage of both types of adhesives. In the so-called two-shot method the adhesive is applied to the book back in two stages: the first gluing uses emulsion-type cold adhesive as a primer and this is followed by a hot-melt glue to attach the cover.

The Ehlermann hot-melt-tip technique uses a PVA emulsion glue to achieve a good and firm book back. To make the process fast and immediately ready for cutting and trimming a section of the book back, top and bottom, is bound using hot-melt.

4. THE PERFECT BINDING MACHINES AND PRODUCTION LINES

The following are well-known manufacturers of adhesive book binding machinery:

<u>FABRIKNAME</u>	<u>FABRIK</u>	<u>ADDRESS</u>
BIELOMATIC	Biel (Died) Maschinenfabrik	7422 Neuffen W. Germany
BUFALO	Königsfelden Maschinenfabrik	8307 Jagelswangen Zürich Switzerland
EHELMANN	Bühlertal Maschinen- und Stofffabrik	309 Verden/Aller Postfach 149 Switzerland
FLATBACH	Flatbarch (1964) Ltd	124 Westbridge Road Battersea, London SW11 U. K.
KOLBUS	Rahden Maschinen- fabrik Anton Kolbus	4993 Rahden/Westf. Postfach 220 W. Germany
MARTINI ^{x)}	Martini Maschinenfabrik AG	8500 Frauenfeld/ Kt. Thurgau Switzerland
MÜLLER	Graphische Maschinenfabrik Hans Müller AG (Müller-Martini AG)	Unt Brühlstrasse 4800 Zofingen Switzerland

^{x)} Not long ago the Müller bought the Martini's factories and trade marks and combined the products of the two factories under the new trade name MÜLLER-MARTINI.

In the following discussion the machines are divided into two different categories.

1. Rather simple and not too expensive adhesive binding machines where the book blocks are mostly hand-fed into the machine and the products are either untrimmed perfect bound books or glued and/or gauzebook blocks to be used as a half products for separate casing-in.
2. More complete bindery lines either coupled with gathering machines or with a possibility of coupling later. Significantly these machines have a large production capacity and are built for later extension with various additional processing steps.

Most of the information given in this report is collected from the references listed at the end of the report. The tables on the pages 7...8 and 11...12 are copied from the 1969 Specification Manual of the magazine 'British Printer.'

4.1 Simple perfect binding machines

BIELOMATIC binding machines are especially built for stationery work, but may also be used for perfect binding of paper-back books.

MODEL	BIELOMATIC P 332 (For fixed parts with over-extended covers)	BUFFALO BA 18	BUFFALO-RONDORIX	QUICK II MODEL 110 SN	DATA BINDER MODEL 110 SN	BIOTAMAT 334
1	Book size thickness	max in/cm max in/cm 12 7/8 x 12 7/8 1/2	18 7/8 x 18 1/2 (with extended) 3/8 inch 47.5	22 x 13 20	25 x 15.5 10	25 x 15.5 10
2	Speed-copies per minute	36 blocks	Hand	20	20	20
3	Transport	Conveyor chain	Auto	Auto conveyor	Hand and conveyor	Conveyor chain
4	Adhesive: types handled application	Cold glue Rollers	Cold quick setting Double roller system	PVA Hand	PVA Hand	PVA Hand
5	Defers	Electrically heated plates	None	None	None	None
6	Lining cloth	None	None	No	Yes	Yes
7	Cover feed	Stack	None	Hand	None	None
8	Floor space	ft in/cm ft in/cm 27 sq ft 82 sq	12 1/2 2 1/2 97 64	12 12	12 12	12 12
9	Weight (net)	cwt/lb 30 1500	4 1/2 373	-	20 2000	20 2000
10	Power	hp/kw 6 4.5	5 3.73	1	4.5 3.4	4.5 3.4
11	Manufacturer	Ilms Riel	W. Gantenber	Ilms Riel	Ilms Riel	Ilms Riel

MODEL	FLEXIBACK E.10	FLEXIBACK S.10	MINORINDER	POLY BINDER G	STUBS WITH MICROFILM
1 Book size thickness	15 x 15 38 x 38 5	15 x 15 38 x 38 5	15 x 15 38 x 38 5	15 x 15 38 x 38 5	15 x 15 38 x 38 5
2 Speed: copies per minute	60	60	40	40	40
3 Transport	Conveyor belt	Conveyor belt	Clamps	Clamp	Clamp
4 Adhesive: types handled	Polyvinyl cold emulsion	Polyvinyl cold emulsion	None	None	None
5 Driers	Sprays	Clas sprays	None	None	None
6 Lining cloth	Machine heater and fusing station	Machine heater and fusing station	None	None	None
7 Cover feed	Expandable calico, book cloth, paper, gauze	Book cloth, gauze, paper, expandable calico	None	None	None
8 Floor space	21'0" 6'0"	22'0" 6'0"	21'0" 6'0"	21'0" 6'0"	21'0" 6'0"
9 Weight (empty)	640 183	640 183	395 210	395 210	395 210
10 Power	55 hp/kw	55 hp/kw	3300	3300	3300
11 Manufacturer	The Book Machinery Co (1964) Ltd	The Book Machinery Co (1964) Ltd	Marini AG	Grapha Item Müller AG	The Subs Engineering Development Co Ltd

The P 432 machine is not suitable for glue but the special hot electrical heating plates permit use of an edge trimmer in the line. A special advantage of this construction is the possibility to use several cuts to separate the books, if the book blocks include more than one book. A collator may be coupled for automatic feeding.

There are a range of BILMO machines starting from hand-operated to automatic binders. Buffalo 14 models include machines where the milling of the book back is not possible and therefore it has to be fed with pre-cut blocks or books in single sheet form. The Rondofix machine combines a compact, space saving unit with relatively large production capacity although the feeding of the cover has to be done manually.

EHLERMAN binding machines are produced in a large range of types although the smallest are reserved for book block gluing. The more sophisticated machines are the so-called Luchow machines and all Ehlermann machines use the so-called Luchow forming method to achieve an exceptionally firm joint and an adhesion of the products. Most machines may be coupled with collators and trimmers. The model Ehlermann Junior which is not included in the table on page 7 is the newest version of compact perfect binding suitable for small runs and variable production. This machine may be completed with gathering machine and trimmer to make a book production line, maximum book size 300x400 mm, the range and price optional and the cover feeding automatic. Capacity is said to be about 30 books per minute and both emulsion type as well as hot-melt adhesives can be used.

The FLEXPACK binders can produce only book blocks for separate casing in or, if satisfactory, quarter-bindings. Also sewn books may be glued. There is a Polygraph machine "662 W" which is probably the East German equivalent.

KOLBUS Thouvenin which is not shown in the table is a robust compact binder which can be used for several purposes such as gluing the book blocks, gluing sewn book blocks, applying glue to book backs and perfect binding books. It is an equivalent to the Ehlermann Junior machine, compact and has a fair capacity suitable for many kind of book binding productions. Maximum book size 400x600 mm, capacity 30...70 books per minute.

MARTINI is one of the most outstanding manufacturers of perfect binding equipment. Although a specialist in large, complicated and convertible bindery lines, the model Econobinder is designed for general use and production of small and medium size of runs. It is no doubt one of the most reliable type of machines in this group of half-automatic perfect binders being capable of producing 14-40 books per minute, although the feeding of the book blocks is done manually.

The Pony 5 of MULLER-MARTINI-range is probably one of the most widely sold versatile perfect binders in the class of semi-automatic binders. It is fed with book blocks by hand, both PVA and hot-melt may be chosen. The capacity is fair, about 30 books per minute with two operators: one feeding the blocks, the other controlling the

fees that covers and taking care of the delivered books. There is no possibility to give the glue but the machine is capable of producing rather resistant laminated books, magazines, pocket books, school books, etc. A laminating machine may be connected with the feed-in of the books in the Pony 5.

The most popular, especially the Martini and Autobinda machines have been used for the production of perfect binding into small printers workshops and offices. In the large Sulby range, there are various types of perfect binders, from very simple, hand-operated machines to fully automated bindery lines. The most interesting machines in this group are economic, half-automatic binders like the Auto-martina for small runs with hand feeding of both books and covers. Also the model 17, where the feeding is done by hand, but using up to three operators, the capacity of the binding may be increased. There are more automatic machines available, such as the model Compact and Sulby binder 88.

Most of the machines above mentioned may be well used for various lengths of runs under production conditions, where the products vary rather often. In most of the perfect binding requirements, a simple paper cover is enough, and thus no lining of the back is necessarily needed. If the products tend to be dominantly thick - many hundred pages thick - the lining of the book has to be with a paper or equivalent is required.

Thus,
if the machine for use under Iraqi conditions is to be selected from this group of machines, the following would be suitable for the average jobs: Ehlermann Junior, Martini Econobinder, Muller-Martini Pony 5, Kolbus Thouverin, Sulby 88 which the latter requires more hand work than the others.

To be able to produce hard books as well for some of the school books and many of them for other public requirements, the choice should rather be the Ehlermann Thouverin, the Martini Econobinder and the Ehlermann Junior in order of preference.

Nevertheless, the total production of books and the average length of run of the average book is estimated to be such that no doubt one perfect binding line of large capacity would be required in any case. Although the perfect binding machines mentioned above would be able to produce numerous books yearly: Kolbus Thouverin about 7,0 million books and the Ehlermann Junior and the Muller-Martini P5 and Econobinder about 4,2 million books yearly according to the calculation principles used in the writers report of the Iraqi book capacity calculations, even larger capacities would be preferable. It would, though, be wise to start the technology with one or two compact binders before introducing the automatic perfect binding lines. Later, these machines would serve as back-up systems for the major production line and also absorb the smaller runs which which would not be very suitable for production in the large capacity bindery line.

4.2 Automatic perfect binding production lines

The most sophisticated perfect binding machinery differs from the equipment mentioned in paragraph 4.1 basically as follows:

MODEL	max before thickens	min before most in/cm	PANFLEX MODEL 300 US	MARTINI COMET PERFECT LINDING LINE	AUTO BINDER	BEA	ROTORBINDER RBS	ILT BINDER*
1	13h x 12h	2	35 x 31 3	16 x 11 1	16 x 11 16.2%	16 x 11 16.2%	16 x 11 16.2%	16 x 11 16.2%
2	Speed-capion per minute		85	200	100	120	20.4%	100
3	Transport		Clamp chain	Clamps	Clamps	Clamps	Clamps	Clamps
4	Adhesive: types handled		Hot animal glue, p v a, hot melt	P v a, hot animal glue, hot melt	P v a, hot animal glue, hot melt	P v a, hot animal glue, hot melt	P v a, hot animal glue, hot melt	Hot Melt
	application		Rollers and side wheels	Rollers and side wheels	Rollers and side wheels	Rollers and side wheels	Rollers and side wheels	Rollers and side wheels
5	Driers		Infrared	Heating elements or high frequency	Heating elements or high frequency	Infrared	Infrared	Not required
6	Lining cloth		Yes	Mull, paper or bath	Mull, paper or bath	Mull, paper or bath	Yes	None
7	Cover feed		Continuous with creasing and gluing	Spans high pile	Spans high pile	Spans high pile	Yes	Continuous Roll
8	Flour space	ft before ft in/cm	844 216	1029 240	1029 240	1029 240	1029 240	411 100
9	Weight (nett)	cwt/kg	9(NH)	305 (with 12 loss gatherer)	196.5	216.5	60	3.34
10	Power	hp/kw	12	36.2	22	22	22	22
11	Manufacturer		Hans Ebermann AG	Martini AG	Martini AG	Martini AG	Beaumont Paper Mills AG	Beaumont Paper Mills AG

MODEL	SHERIDAN RACK-DRIVE 45 or 57 CLAMP	SHERIDAN HIGH SPEED RINDER (with heavy clamp)	SULBY SS MODEL III	SULBY SS MODEL IV	SULBY PINDMASTER
1	Box size thickness 16 x 12 2 1/2	40.6 x 30.5 7	16 1/2 x 11 1 1/2	15 x 10 1/2 1 1/2	15 x 10 1/2 1 1/2
2	Speed-copies per minute 200 (1 up)	200	17 x 10 1/2 1 1/2	18 x 26.6 4.4	18 x 26.6 4.4
3	Transport Clamp chain	Mixing clamps	70	100 coupled to rubber	40 fpm
4	Adhesive: types handled application All types Insulated rollers and scrapers	Hot melt (one step) Metered roll, and hot melt	Clamps Hot melt Rollers	Clamps Hot melt Rollers	Roll conveyors Hot melt Rollers
5	Dices Quartz hamps, dielectric optional	Not required	None	None	Yes
6	Lining cloth From recd. auto cut-off and application	N/A	-	-	From reel
7	Cover feed Continuous feeding, flat lubricated and tacky	Continuous flat	Section, meeting if required	Section, meeting if required	None
8	Press area 59 1/2" 8 1/2"	35 7/8" 10 1 1/2"	15 1/2" 5 3/4"	19 3/4" 5 3/4"	14 1/2" 3 1/2"
9	Weight (net) cut/kg	125	44%	49%	26%
10	Power hp/tw	15	9	10	9
11	Manufacturer The Sheridan Co	The Sheridan Co	The Sulby Engineering Development Co Ltd	The Sulby Engineering Development Co Ltd	The Sulby Engineering Development Co Ltd

- they are almost always built along popular principles, enabling one to construct temporary machines to suit either very specific or more convertible production requirements.
- besides the primary function of gluing books, they may be equipped with gathering machines, three-knife trimmers and counter-stackers, if necessary.
- their production capacity is very high ranging from 5000 to 12 000 copies per hour.

The tables on pages 10 to 12 show the most commonly used and readily available perfect binding machines according to the magazine British Printer.

The Ehlermann FANFLEX 350 machine is built in four different modifications ranging from hand-fed machine to automatic lines. All the machines may be supplied for the hot-melt-tap method of gluing the book back. To suit all possible paper types, the newest version of Fanflex machines may be delivered for three-shot gluing and with a infrared drying section between the glue application stations. The machine may be combined with Ehlermann Model 222/PS gathering machine for automatic in-feed. The automatic version is said to be able to produce about 3000 books per hour.

The MARTINI perfect binders are constructed in a large range of machines: AUTOBINDER AY, AZ, AM, AK, AUTOBINDER BBA and the most productive machine COMET perfect binding line.

The AY is hand-fed by two operators and built for later extension with the MÜLLER 201 S gathering machine, the AZ is also hand-fed by two operators and the AK readily equipped to be extended with a Müller 201 S gathering machine up to 33 stations. The AK machine is ready to be completed with either Müller, Martini or Sheridan gathering machines, and the machine is also able to handle sewn book blocks. It is also possible to install a hot-melt station or a drying carousel, if emulsion type cold adhesives are used. A Martini trimmer Model TY 40, Magnacraft-Martini counter-stacker and central control panel are optional.

The Martini COMET perfect binding line is a fully automatic unit linking the perfect binding machine with gathering machine, trimmer, and counter-stacker. Although it is said to be primarily constructed to produce magazines and periodicals with very high output capacity, books of up to 25 mm thickness can also be made. Where even thicker books have to be produced the model BBA offers a possibility to bind up to 60 mm thick books with a maximum speed of 7500 copies per hour. This machine is constructed for the primer-hot-melt or two-shot gluing and may be equipped with either infra-red or high frequency driers, but will probably be replaced by the Normbinder.

The MÜLLER perfect binding lines incorporate two possibilities: ROTORBINDER RB5, which is widely used for book production, and the new JET BINDER, which is specially constructed for magazine production. - Also the PONY 5 - machine may be built to form a complete perfect binding line, although for a lower production capacity.

The model ROTORTRIMMER KB5 is able to handle all types of adhesives. It may be delivered as a hand-fed version, as well as coupled with the 201 gatherer. A drying section and a trimmer enable one to construct a complete production line. The books may be delivered either on a conveyor belt, into a tray or into a drier to enable the use of a trimmer.

The high speed JET BINDER is a combination of the following units: gatherer type 210, hot-melt adhesive binding automat type 209, vertically rotating drying section, rotary trimmer type DSS-L, packet delivery and counting machine type 207. The line is producing magazines with a very high capacity but may be used to produce perfect bound, paper back books up to a thickness of 25 mm.

After the merger of the Martini and Müller ranges of machines, the new Müller-Martini series for book production will be the following: the hand-fed Baby-Pony instead of the Pony 3, the Pony 5, the Rotorbinder KB5 and a new modular type perfect binding automat, the Normbinder. The Normbinder is able to produce all the required various bindery steps with any type of adhesive, gauzing if required, etc. The binder may be combined with gathering machines, trimmers, stackers etc. There are three machines with different maximum speeds available: NB-1 4000 c/h, NB-2 6000 c/h and the NB-3 10 000 copies/hour. If school books of the Iraqi specifications are bound in this machine, it is possible to produce two books in one operation because of the exceptional max. spine length of 31 cm. After the binding, the books are cut apart in a cutting unit connected with the binding line resulting in a maximum capacity of 20,000 books/h.

The SHERIDAN machines are widely used in the USA and they provide a range of optional functions to be fitted into the basic machine to form a book binding automat for every possible product requirement. This unit may be equipped, for instance, with a five-knife continuously working trimmer thus being able to produce two books at a time.

The Sheridan perfect binder can, for example, be set on line with very special book production machines, called CAMERON BELT PRESS. These installations present one of the two real book production units available. Starting from a new paper roll, the Cameron belt press prints (up to 850 pages at once), folds and delivers book blocks into the Sheridan perfect binder coupled on line with the press. This combination of automatic machines is able to produce books at a speed of about 5000 books per hour. (The Müller-Martini Rotorbinder is used respectively in the Swedish equivalent book printing press, the Book-a-matic.)

Many Sheridan perfect binding lines are used for the production of telephony directories, which are commonly considered to be extraordinarily difficult as products and because of the huge numbers of copies to be manufactured in a relatively short period.

The SULBY machines are often known as machines constructed for small printers with small jobs. Nevertheless the Model 88/III and IV may be extended with gathering machines for larger production capacities up to 4500 books per hour. The Bindmaster mentioned on page 12 is primarily meant to produce glued and gauzed book blocks

for later casing in hard covers.

4.3 Perfect binding lines for Iraqi production requirements

The product and production specifications on page 1 and the information on the Iraqi conditions collected by the author of this report lead to the following conclusions:

- the suitable perfect binding line has to be able to produce a rather wide range of book designs from thin booklets up to very thick volumes
- the chosen line should be extensible: the perfect binder could be ordered at the beginning as a hand-fed binder and later extended with gathering machine and three-knife trimmer
- the manufacturer of the perfect binding unit should be able to supply the Iraqi binders with technical know-how of the method and to give good training to the machine runners and bindery workers.

Thus, the following would be recommended: the Müller-Martini and the Sheridan. The machines suitable for Iraqi conditions and able to produce the required production are: Martini Auto-binder, Martini PBA, Müller-Martini Rotorbinder and Normbinder and Sheridan Rack-drive.

The manufacturers of the perfect binding lines might be able to make such alterations to the construction of the basic binding machines, that some of the readily available gathering machines of the public Iraqi printing industry might be coupled in line with the binder chosen.

The large production line should also be completed with a compact perfect binder, preferably by the same manufacturer, to serve as a training machine, a production machine for smaller runs and exceptional products, and as back-up to be used if the main line ceases production for any reason.

5. THE INVESTMENT INVOLVED WITH THE PERFECT BINDING

Depending on which capacity the intended perfect binding production unit is planned for and on the degree of automation, the investment for the production machinery would vary greatly. Some examples of the prices of perfect binding equipment are given below:

Müller Martini

Baby Pony, hand fed perfect binder, production about 1000 c/h	US \$ 13 500
Pony-5, hand fed perfect binder, production capacity about 2000 c/h	US \$ 20 000
Rotor-Binder RB-5, hand fed perfect binder, may be coupled with gathering machine and trimmer, production capacity about 5000 c/h	US \$ 42 500

Normbinder, hand fed perfect binder automatic, may be coupled to form total perfect binding lines,

NB-1 and NB-2, 6000 c/h

US \$ 80 000

NB-3, 10 000 c/h

US \$ 100 000

All the above mentioned prices are for the basic perfect binding unit. The Baby-Pony is not extensible, the Pony 5 may be coupled with a gathering machine, all the other may be extended with a range of various additional production units, such as gathering machines, trimmers, stackers etc.

To give an idea of the extending costs it should be mentioned that the price of one unit (3 station) of gathering machines would be about US \$ 4000, and the price of the Müller Martini trimmer type 240 about US \$ 45,000. If the Iraqi bindery installation consisted of one Pony 5, one Normbinder NB 2-line with 24 station gathering line and type 201 trimmer only, the investment would be about US \$ 200,000. All the prices are FOB prices.

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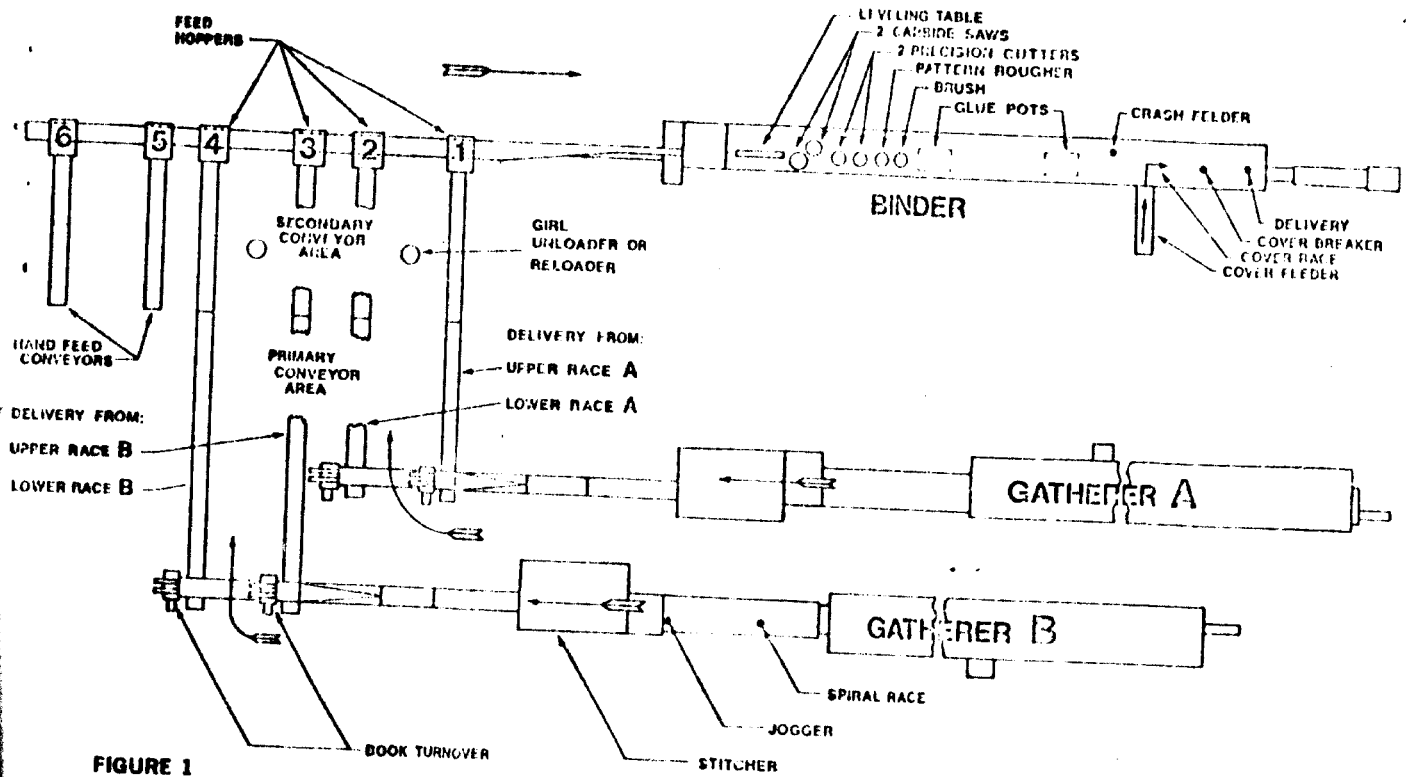
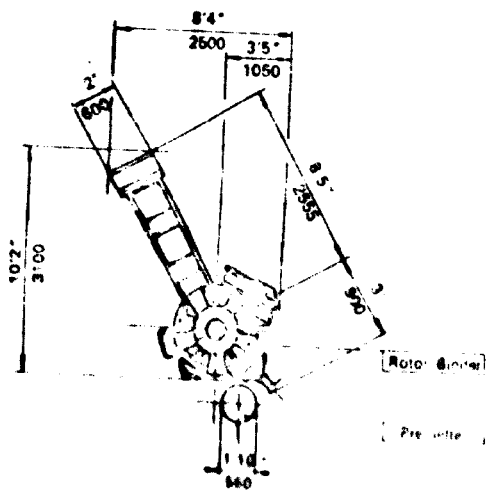
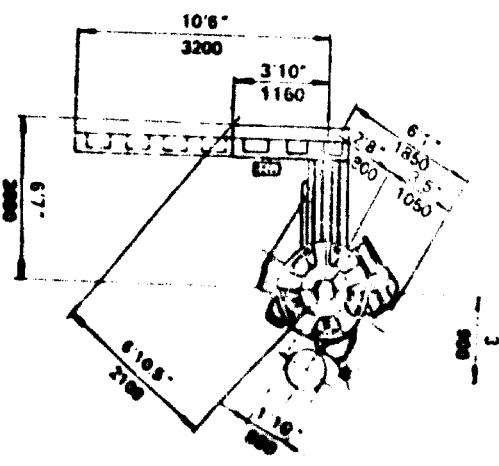


FIGURE 1

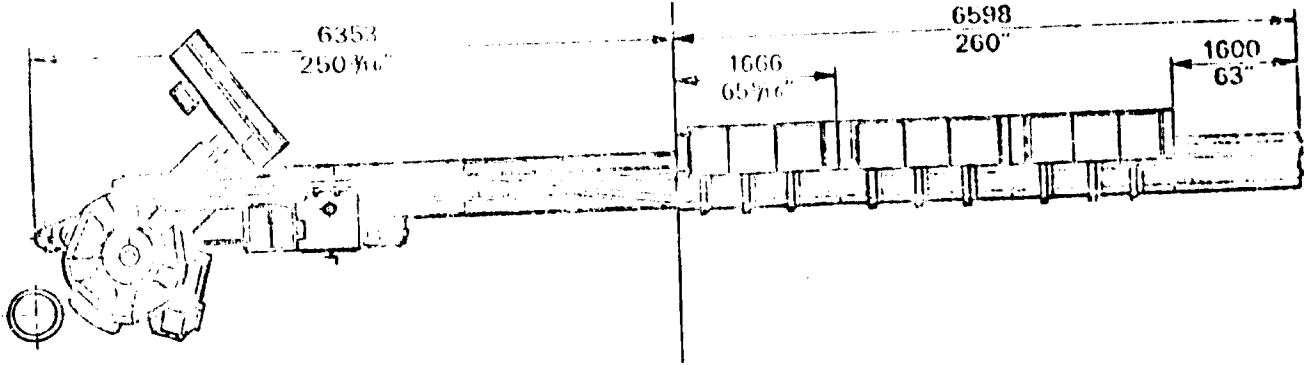
This diagram of the bindery floor plan shows the two 32-pocket gatherers, each of which produces half book sections of the catalogs; the conveyor and hopper system which holds a surplus of books as it feeds them to the binder gathering chain; and the main adhesive binder. Conveyors and hoppers 5 and 6 provide accommodation for a third gathering line.



Pony 5 with packet delivery

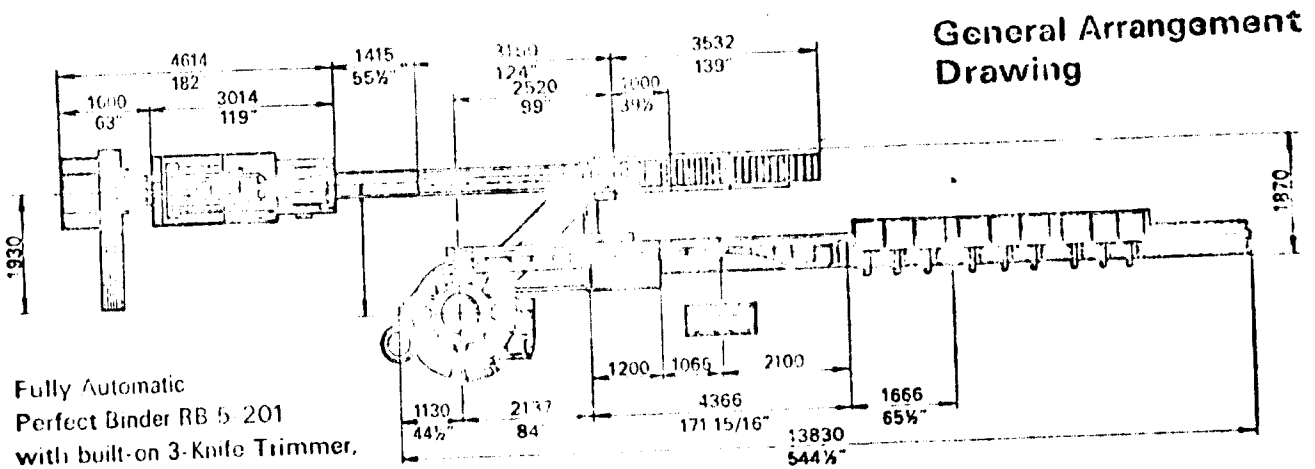
General Arrangement Diagrams

Pony 5 with chain



General Arrangement Diagram

Pony 5 with Gathering Machine 201 and packet delivery

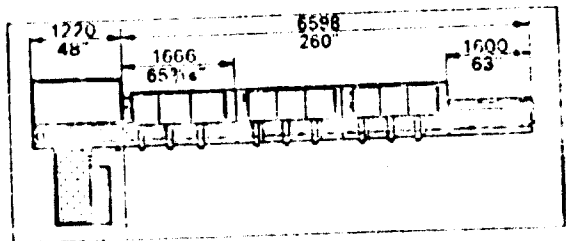


General Arrangement Drawing

Fully Automatic Perfect Binder RB 5 201 with built-on 3-Knife Trimmer, Model 240.

201-228

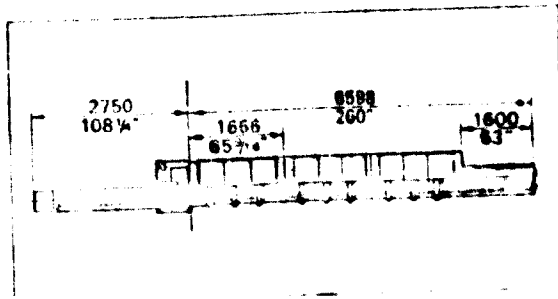
The 228 delivery permits the books to be delivered in horizontally staggered piles, thus enabling effortless stacking of gathered products. An automatic ejector carries the products onto the air table.



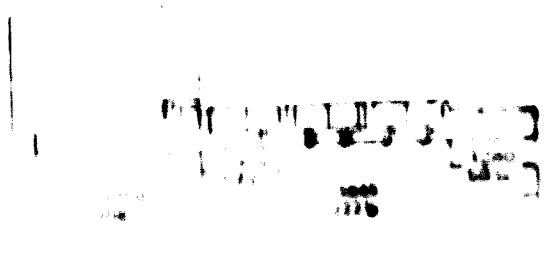
Trimmer 201 sections with different deliveries

201-Kombi

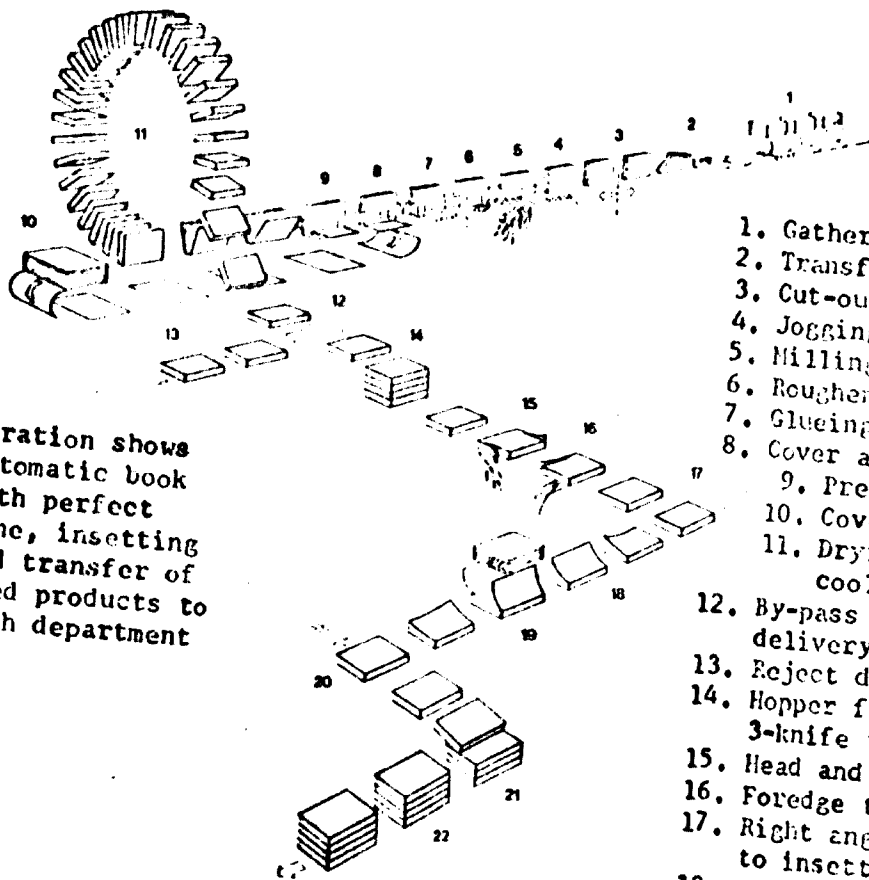
With this delivery the books arrive on a conveyor table singly or stungled. Suitable for all types of gathering operations.



201-K



Jet-Binder, insetting machine 227 linked to flowline

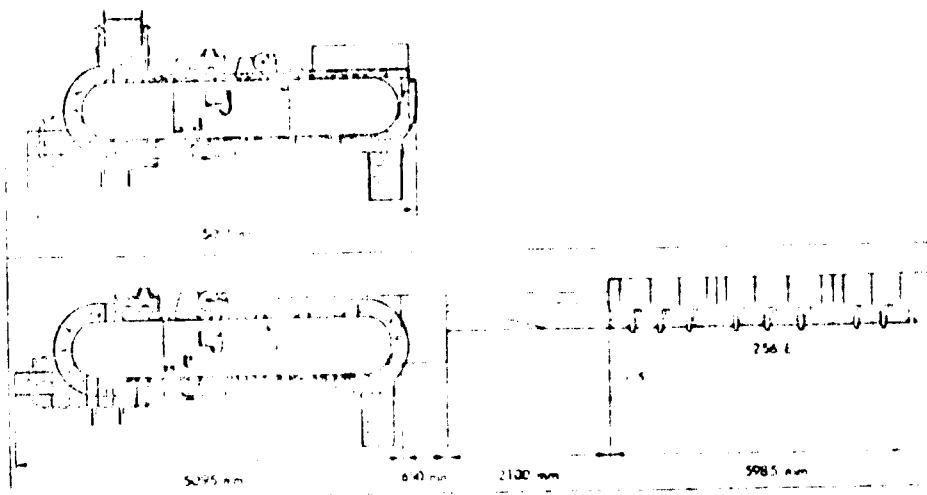


The illustration shows a fully automatic book bindery with perfect binding line, insetting machine and transfer of the finished products to the despatch department

1. Gathering
2. Transfer and turning
3. Cut-out unit
4. Jogging
5. Milling
6. Roughening
7. Glueing
8. Cover application
9. Pressing
10. Cover feed
11. Drying and cooling wheel
12. By-pass to reject delivery
13. Reject delivery
14. Hopper feeder to 3-knife trimmer
15. Head and tail trimmer
16. Fore-edge trimming
17. Right angle deviation to insetting machine
18. Opening station, insetting machine
19. Insert
20. Right-angle deviation to delivery
21. Stacking
22. Delivery of counted stacks

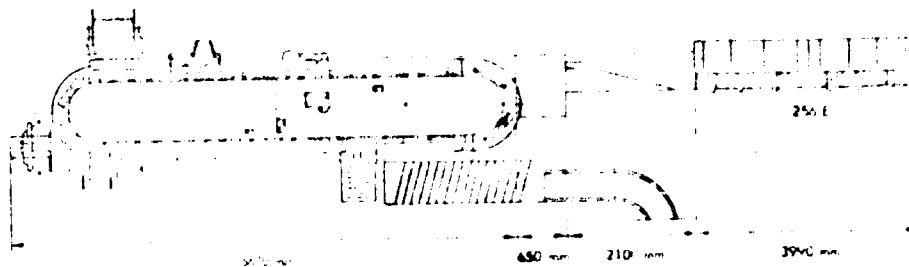
MULLER MARTINI NOCHBINDER

Basic, hand fed perfect binding unit ready for later extensions

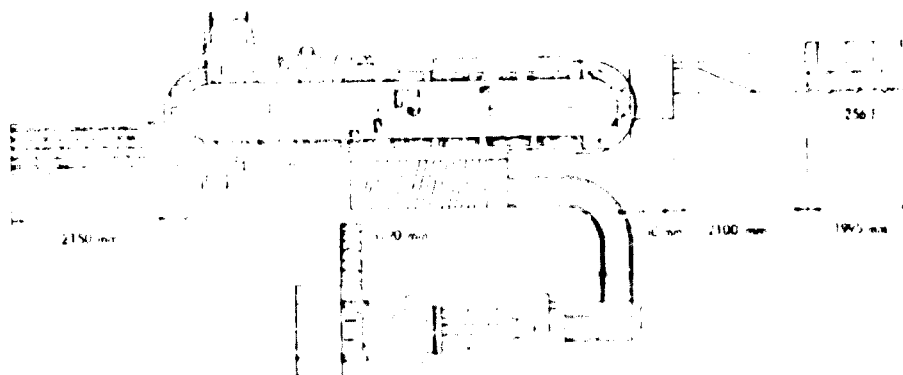


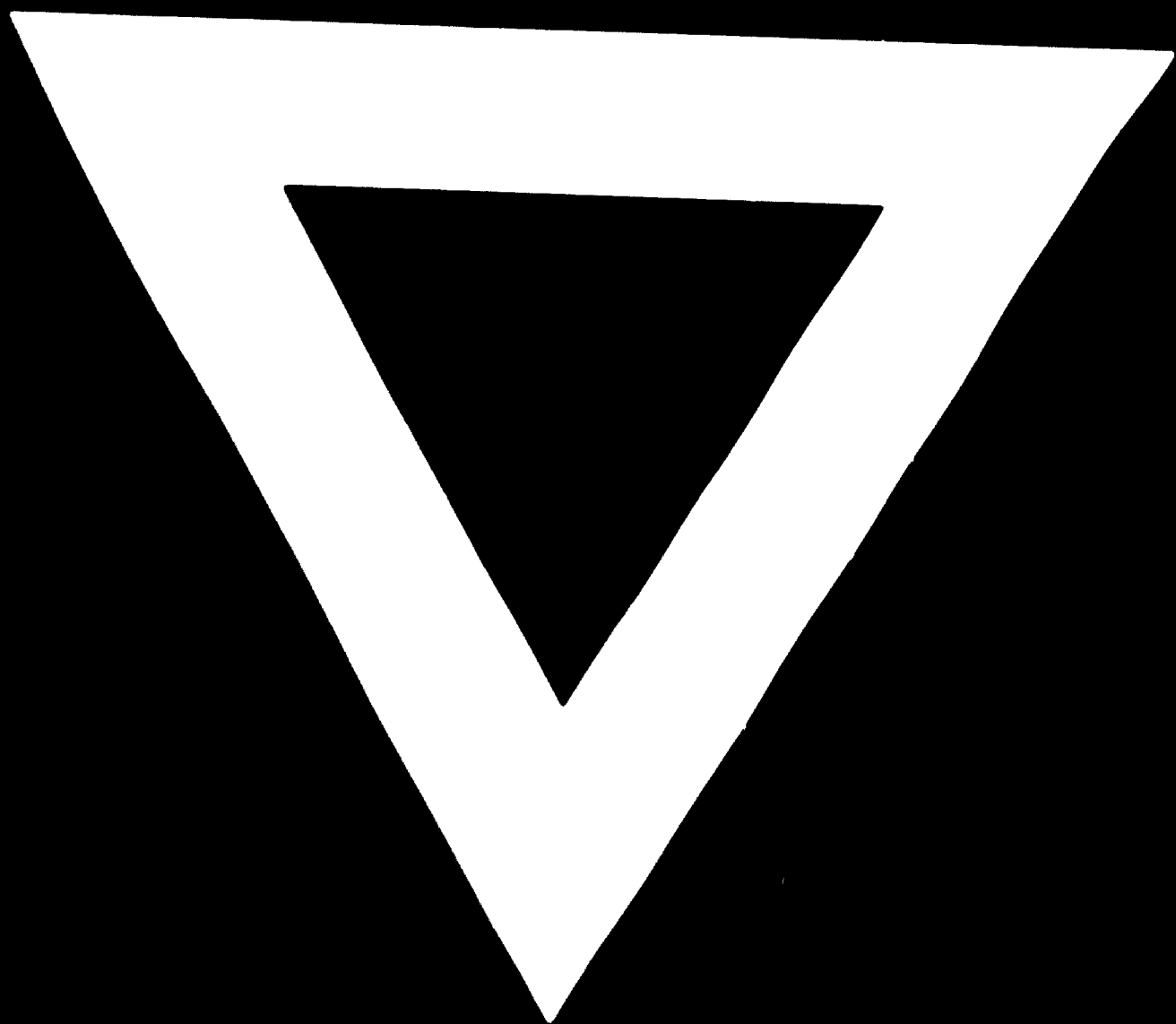
The perfect binder combined with gathering machine to form a simple automatic perfect binding line

High capacity perfect binding line including hot-melt and gazing units



The highest capacity perfect binding line NB 3-S is available in modifications to suit every special binding requirement





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