

**NEPAL**

**Basic and Primary Education Programme Phase II**

**JEMC Binding Line and Progress Monitoring**

**28 August – 15 September 2000**

**Tony Ashe**

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## APPENDIX

Costing and Estimating Manual



# **1 INTRODUCTION**

## **1.1 Background**

This project is a pilot scheme for the production of approximately 840,000 books, using improved materials and sewn paperback binding to increase durability, as part of the Basic and Primary Education Programme, second phase (BPEP II). In an earlier stage of the project, new binding equipment was installed in the Janak Education Materials Centre at Sano Thimi to produce these durable books.

As part of this process, to derive maximum benefit from the new equipment, it was decided to introduce some management systems into JEMC – Production Control, Quality Control, and Costing and Estimating. The design and initial implementation of these systems have been covered in previous reports.

At the same time, paper testing equipment was also installed, and training given in its use to a core of JEMC staff who were then required to pass on their knowledge to other personnel.

## **1.2 Consultant's terms of reference**

For this visit, the consultant's terms of reference were:

- To monitor the new binding line to ensure books are being correctly bound, that JEMC staff working on the equipment understand how to get the best out of it, and that supervisors and managers are alert to crucial aspects.
- To ensure that the suppliers of the new equipment have performed their contract properly, and understand any continuing responsibilities which they have towards JEMC.
- To comment on the consumable materials which have been bought for the production of durable textbooks.
- Report findings and any recommendations to JEMC and PAT office.
- To follow up progress on the production management, costing and estimating system, and paper testing; reporting on progress with implementation, and giving further on-the-spot training as necessary.
- To prepare a work plan for a further 3-week visit in November 2000, and ensure that both JEMC and the PAT office are briefed and have a schedule of items to be covered in the future visit.
- To report on activities, findings, conclusions, critical issues, recommendations and next steps.

## **Abbreviations**

BPEP Basic and Primary Education Programme  
IBD International Book Development Ltd  
JEMC Janak Education Materials Centre  
PAT Programme Advisory Team, Danida



## **2 THE NEW BINDING LINE, AND THE BINDING OF DURABLE TEXTBOOKS**

### **2.1 General impressions**

The recommended binding machinery is now installed and working. All the machines are of excellent quality – well up to that of most plants in Europe, and should provide reliable service for many years. Textbooks are being produced to a high standard, and it is clear that the training given by the manufacturer(s) has been well carried out. Housekeeping continues to be a minor problem – the whole operation would be much smoother, safer, and quicker, if trim and rubbish were cleared away regularly.

The Shoei folding machine (actually installed in the same room as the rest of the folders) is virtually the same model as those already installed, and therefore will provide similar performance. Since there is already considerable experience of this type of machine within JEMC, no problems are anticipated.

The 16-station Wohlenberg gathering machine, although larger than was originally recommended (12 stations + 1 manual feed), gives the option of gathering books of larger size and extent than at present. This will be useful if it is decided to go ahead with full production of durable textbooks.

Both Aster 160 sewing machines are running well – although there is occasional down-time, due to the presence of moisture in the compressed air supply. Some condensing equipment is being sourced for insertion between the compressor and the sewers, and this should cure the problem, which probably will only occur during the monsoon (but there is a monsoon every year!). These machines are each capable of 160 sections per minute, but are currently running at around 130 – which, with a book of 6 sections, gives a combined output of around 2,600 books per hour.

The Wohlenberg binder is hand-fed. The objective of providing equipment to JEMC was to establish if durable textbooks could be produced at JEMC, and if they would last sufficiently longer than the current style. If so, then all the books could be bound in this way. Certainly the first point appears to be made, the second has yet to be proven. If it is decided to go ahead with full production, then the binder could easily be fitted with an automatic feeder. This should approximately double the current speed of 4,000 books per hour. At present there is no justification for buying such a feeder – since the binder in its present form outpaces the sewing machines' ability to provide sewn bookblocks.

Glue, for both side- and spine- glueing, is presently sourced in Germany. This is expensive because of the cost of freight. JEMC staff are investigating the possibility of sourcing this glue via India.

The Wohlenberg 3-knife trimmer is performing well. Again, if full production was considered, then automatic feeding would be necessary. At the moment, it comfortably keeps pace with output.

Unfortunately, the shrink-wrapping machine does not appear to perform as had been hoped. It is only wrapping about 5 bundles (of 15 books) per minute. It is not practical to increase the speed of this unit; but the use of thicker film than that used at present, might allow the wrapping of 2 piles of 10 books each at one pass – which would effectively increase throughput by 33%. A trial is to be arranged before the consultant's next visit.

It should be borne in mind that both the gatherer and the sewing machines are designed to take a 2-up section (i.e. twice the length of that handled at present). If sections could be printed as 2-up 32pp, and gathered and sewn in this form, output effectively would be doubled. The 2-up sewn bookblocks would, however, have to be split to single copies before binding.

### **2.2 Management and supervision**

This is not an issue. It is obvious that JEMC staff have made enormous efforts in the installation of this equipment – and the result is a bindery that would not be out of place in any Western factory. Credit for this rests mostly with the management and supervision staff at JEMC, who have achieved wonderful results in the short time at their disposal. Particular credit must go to Ram Krishna Silwal and Subarna M Pradhan, who obviously have put in a lot of extra hours to make the installation such a success. The machinery suppliers clearly have

given very thorough training in the use of the equipment – it is heartening to see the level of confidence with which the JEMC staff operate sophisticated modern machines. Output levels and quality are quite acceptable, but both should improve slightly as familiarity increases.

The consultant saw no reason to intervene in the supervision and running of the new bindery – except to suggest an increase in speed on the sewing machines (which was promptly acted upon), and to make some suggestions on improvements that might be made to the shrinkwrapping operation. This, unfortunately is the slowest process in the new bindery, and will, to some extent, determine the overall output. There are some changes to be made to the way of working which may improve throughput, but the process is by nature slow, and certainly would need additional capacity if full production was to be switched to durable books.

Housekeeping and general tidiness remain unsatisfactory. It just is not seen as an important issue within JEMC, and until this attitude alters, changes are unlikely to take place. It must be said that tidying up the floor would only result in a small increase in output – but the safety aspects are important.

### **2.3 Supplier's compliance with contract and acceptance of continuing responsibilities**

There was, apparently, a problem with the supply of compressors/vacuum equipment with the sewing machines. This problem appears to have been resolved, since the sewing machines have compressed air supplies. Nonetheless, this problem is, perhaps, symptomatic of an underlying problem with this particular supplier (Tradelink). In the normal course of events, the agent supplying machinery should make everyone aware of any particular requirements regarding power supplies, compressed air lines, water, etc.

Although compressors are now installed and working, there is a further problem with moisture content in the air supply. This can, and will, be resolved by the fitting of chilling/condensing units. Nevertheless, the difficulty should have been anticipated, and pointed out, by the supplier or the agent, particularly since the latter is well aware of local climatic conditions.

Problems of malfunction on the shrinkwrapping machine were only addressed after the consultant had brought the matter up with JEMC staff – who, in turn, chased up Tradelink for repair of the faulty part.

The consultant has not seen the contract for this installation. However the issue is fundamental. The requirement for continuing support clearly needs to be given more emphasis in the writing of future contracts.

### **3 CONSUMABLE MATERIALS**

#### **3.1 General remarks**

The paper and board supplied are of good quality and seem to run very well on both printing and binding machines. There should be no problems with the durability of the books as far as materials are concerned. Wastage levels have fallen considerably. An IBD colleague is checking actual levels as part of the Quality Control exercise, but it would appear that they have at least halved – an encouraging result.

Standards of cover laminating are excellent, with no signs of ‘silvering’ or de-lamination. The additional resistance to marking and tearing should help durability.

Glue, thread, etc., also seem satisfactory. The only issue here seems to be the expense of importing adhesive from Germany. The cost of the glues themselves is not particularly high, but the transport cost is. Attempts are being made to obtain comparable materials from a more local source (probably India).

The storage of the paper and board was checked and seems to be satisfactory. Future deliveries will have to be carefully monitored, in view of the traditional attitude to handling and storage of materials – which has, in the past, caused considerable wastage of paper.

#### **3.2 Other issues**

JEMC have bought paper, on their own account, from a Nepalese mill for the older style of textbooks, and this is of extremely poor quality. The consultant was shown one pallet-load which would not feed on the printing machine because of excessive moisture content – although the mill claim ‘normal’ levels of moisture (about 7%).

Since none of the new paper testing equipment measures moisture content, the only advice which could be given was to insist on the mill concerned sending a technician with testing equipment to measure the moisture content in the presence of JEMC staff. The consultant left Sano Thimi before any outcome was determined. One JEMC manager wants additional testing facilities to allow them to measure moisture content in paper, but such an item would cost several thousand pounds, and the problem can be resolved in the way suggested.



## **4 FOLLOW-UP ON MANAGEMENT SYSTEMS**

### **4.1 Production Management system**

Results on this part of the project are disappointing. Although the system itself is built onto an existing system of production control, there has been no attempt to follow through with the suggested improvements. Production control boards, which were designed in April 2000, and are the fundamental core of the system, have not been completed, or put up on the wall. The reason given for this failure is 'pressure of work' and it is true that May, June, and July are the busiest period for textbook production. Nevertheless, time could, and should, have been found to carry out this short and simple task.

### **4.2 Costing and Estimating System**

Once again, this is disappointing, and there has been absolutely no progress made since the consultant's last visit. Much of this latest visit was spent on further discussion and training – culminating in a re-write and re-issue of the manual in an effort to make this complicated subject more understandable. JEMC have undertaken to ensure that this manual will now be translated into Nepali for more general use. It remains to be seen whether or not this actually happens. The estimating part of the system cannot be installed until the costing is completed and working.

Although it has been made very clear that current staffing levels will be insufficient for the extra workload that a costing system will bring, no action has been taken to address this problem. Put bluntly, there just are not enough people in the costing department to cope with the procedures and paperwork that this system entails.

### **4.3 Paper testing equipment**

The Colour Touch spectrophotometer, installed with other equipment on the consultant's last visit, broke down some weeks ago. JEMC advised the consultant of the problem at the time, and contact was made with the agent and the supplier, with a view to organising a repair. Because of confusion in communications, the information given to the manufacturer was incorrect – so a fresh start was made during week commencing 28<sup>th</sup> August. It appears that the video board is at fault, and a new item was dispatched from the US, via an IBD consultant who was due to arrive in Kathmandu on 11th September. In the event, the board arrived safely, but without fitting instructions. An interchange of faxes and e-mails resulted in the arrival of instructions, but, unfortunately, after the consultant's departure.

The rest of the equipment appeared to have remained untouched since May. As the paper supplied for the durable textbooks is perfectly satisfactory, its use was probably unnecessary. Some JEMC staff have expressed a wish for themselves to have training in the use of this equipment, but there was insufficient time available for the consultant to manage this. However, training could be done by those staff who have themselves been trained in its use, using the cascade principle, as planned, or it may be possible to arrange for the consultant to carry out this training on the next visit.

### **4.4 Issues arising**

None of these systems seem to have been followed up, subsequent to the consultant's previous visit. The difficulties involved in the installation of western-styled management systems into JEMC were heavily emphasised in the consultant's original report (December 1999), and experience seems to support those conclusions. Quality Control is being dealt with by an IBD colleague, but it seems that the situation is broadly similar.

It may well be that the size of the task(s) has been seriously underestimated. Certainly there remains much to be done.

However, if a costing and estimating system is to be introduced, then more effort is required from the JEMC management to make it work in practice. Much of the consultant's time has been spent on explaining the costing system, and re-writing the manual, so as to make it more easily understandable. But a stage has now been reached where further simplification will render the scheme unworkable. The revised version of the manual will be found in the Appendix. It was agreed with JEMC staff that the calculation of the cost rates should be a JEMC task, to be completed before the consultant's return in November 2000.

It is now essential for JEMC management to accept that the consultant's role, which has so far consisted of designing and documenting the scheme virtually single-handed, must change to one of facilitation and support. Most of the work of implementation has to come from JEMC – otherwise there will be no commitment, and the project will founder. Not least of the details to be tackled is the matter of extra staff for the costing department, including recruitment and training. Detailed recommendations will be found in section 6.

## **5 CONCLUSIONS**

### **5.1 New bindery installation**

The actual installation of the new binding line is an unqualified success. All the machinery is working to a satisfactory standard, and the quality of the books produced is extremely good – subject to some minor modifications, to comply with Quality Control standards (which is outside the brief of this report). There are slight technical problems to be overcome in the air supply to the sewing machines, but these are in hand and do not affect the durable quality of the textbooks.

The machinery manufacturers have done an excellent job of training and only a watching brief need be kept on this aspect of the project. Management and supervision are both of a very high order, and the level of commitment is very impressive.

There is some cause for concern in the attitude of the machinery agent/supplier (Tradelink). It is by no means certain that they altogether accept, or understand, their ongoing role in advising on, and supporting, the machinery they have supplied. This situation will have to be carefully monitored, if problems are not to arise in the longer term. Certainly there needs to be more precise spelling-out of roles and expectations in any future contracts with this organisation.

### **5.2 Consumable materials**

All the materials sourced for this project are satisfactory. Conditions of storage and standards of handling are very good.

### **5.3 Management Systems**

Although these have all been designed and are usable in their present form (once the cost rates have been calculated by JEMC staff), they require actual implementation, and this will necessitate further work by the consultant, and considerably more involvement on the part of JEMC management. The lack of any progress on the costing system gives particular cause for concern, as does the complete failure to grasp the manning and procedures issues which need to be addressed before any other action can be taken.

JEMC are keen to have the estimating part of the costing and estimating scheme. But this cannot be installed until cost rates are calculated and the costing scheme is completed.



## **6 RECOMMENDATIONS**

### **6.1 The new bindery installation**

This requires only a watching brief which can be carried out as a routine part of future visits.

### **6.2 Consumable materials**

In a sense, the success of these materials has led to a certain amount of self-regulation. The staff who use them are so pleased with the improvement in output levels, quality and usability, that continuity of the success is virtually assured. The problem will come if production reverts to the old paper, etc.

One point to be watched is the way any future deliveries are actually handled in transit. In an earlier report it was suggested that future paper deliveries should be packed in 20 foot containers which could be delivered directly to Sano Thimi without transshipment at the border. This would ensure that the paper arrived in good condition – and will almost certainly eliminate the poor handling and subsequent damage that arise from unloading with cranes, etc. Storage, too, could become an issue. Traditionally there is a rather casual attitude to storage of materials on site. However, this easily can be monitored by the consultant on future visits.

### **6.3 Management systems**

This really is the crucial issue. Elsewhere in this report, the point is made that JEMC management really have not taken on board any responsibility for implementing any of the management systems so far introduced. Instead everything has been left to the consultant, with the result that, although the design of the systems is complete, little has been done towards finalising implementation. On each of the consultant's visits, some activities have been left for JEMC staff to carry out before the next visit. Few of these activities have actually been done.

The recommendations are as follows:

- a) That JEMC catch up on the outstanding activities before the consultant's next visit.
- b) That procedures and plans for implementation be agreed, and manning levels calculated during the next visit (due to commence 20<sup>th</sup> November).
- c) That as part of those procedures a project team be formed, comprised of those JEMC staff who will actually run the system.
- d) That the consultant's role be defined, and agreed, as purely to support and advise on the design and implementation of the management systems, providing assistance as necessary.
- e) That a senior member of the JEMC management be appointed as the 'champion' of the system (see the December 1999 report for details of this).

The project team must be given time and resources to carry out the implementation. This implementation has to be clearly established as a JEMC responsibility, and the consultant's role must be absolutely understood as providing support, help and advice, not doing the whole job single-handed.

A manual has been designed and issued for for each of the Management Systems (Production Management, Paper Testing, and Costing and Estimating [the latter appears as an Appendix to this report]). The need for these management systems was established early in this project, and the manuals provide detailed instructions on how to carry out each activity.

All the Management Systems are useful tools in understanding and managing the business. They will make a great contribution to the success of the project, but only if and when they are successfully implemented. Implementation has to be a team activity, which requires full commitment from all JEMC staff.

#### **6.4 General management training**

A major problem with the whole project has been the lack of general management training within the JEMC management. Earlier reports suggested some form of 'exchange' or training scheme with a suitable partner, either in India or elsewhere in Asia, so as to foster understanding of how businesses should be structured and run, and how individual functions work together to ensure success of the organisation as a whole.

This activity is now imperative. Without it, the project will be very much more difficult to implement.

## **7 ACTION POINTS / NEXT STEPS**

### **7.1 Management systems**

JEMC should:

- a) Put the production control boards on the wall in the appropriate departments.
- b) Hold regular meetings, as originally agreed, to monitor progress and take corrective action as necessary.
- c) Make an estimate of the manning levels necessary for running the costing system.
- d) Appoint a project team to supervise and be responsible for its implementation. This team must include representatives of the staff who will actually be using it in practice, together with a senior member of the management, who can ensure that the project receives the time and resources it will need for success. Whichever senior manager/director is given this responsibility must also ensure that the project continues to move forward in between visits by IBD consultants.

The manual for the Costing and Estimating system will be found in an appendix to this report. In the introduction to that manual, it is noted that JEMC staff will be responsible for obtaining some costing information, inserting the values for the Estimating Standard Tables, and actually calculating the cost rates. It is necessary for the implementation programme that these tasks should be completed for the start of the consultant's next visit.

Action should commence on all the above as soon as possible, so as to have agreement on procedures before the consultant returns to Sano Thimi in November of this year

### **7.2 Future technical assistance to JEMC**

This is already covered in the short term, by the consultant's visit scheduled for 20<sup>th</sup> November – 8<sup>th</sup> December 2000. The successful installation of the new binding equipment gives a solid base on which to build further advances – particularly the introduction of management systems.

In the longer term, relatively frequent short visits, to review progress and advise on action, are more likely to lead to successful implementation of management systems than infrequent longer ones – because it is essential that JEMC should assume responsibility for implementation of the systems. A suggested timetable is as follows:

- 2/3 week visit in late January or early February 2001
- 2/3 week visit in March or April 2001

Progress can be reviewed after these visits, and the frequency and length of subsequent visits can be agreed. But it will take some months successfully to implement the costing system and support it through the problematical early stages to the point where it can be left in JEMC's hands.

It really is a matter of a fine balance, so that the visits are frequent enough to act as a real incentive to make progress, but not so frequent that the responsibility for the project is seen to lie with the technical assistance.



## APPENDIX

# COSTING AND ESTIMATING

(Revised September 2000)

This manual, although outwardly very similar to the original, has been completely re-written in order to accommodate input from JEMC staff, and also to correct slight anomalies which existed in the first draft.

However, the broad principles remain the same: to ensure that every cost in the business is recorded and incorporated into the cost budget for the year. The cost budget then forms the basis of the costing system, which is applied across all the production processes, to allow the 'recovery' of those costs.

This document begins with a draft 'framework' for the new system – listing the categories which make up the cost base as in the standard BPIF system, and documenting which items of cost belong in which categories.

It then goes on to detail how these costs are obtained from existing records and built into a cost budget, how the budgeted hours are related to the total costs, and how the hourly cost rates are derived from these two factors.

Finally, it gives details of how the cost rates form the core of the system, and are used for cost budget and estimating purposes.

Our system is based on *full absorption costing*, in which the hourly cost rates, which allow the recovery of all costs within the factory, contain both the direct and indirect costs – the same cost rates are used for both costing and estimating purposes.

Please note that this manual forms a 'how-to-do-it' guide; i.e. a framework, which gives JEMC staff a working base, upon which they can build a complete costing system, exactly tailored to their needs.

The areas shown on the plans at the back of the manual are rough outlines drawn up by the consultant – they are merely for use with the grids for allocating area, and are not necessarily accurate representations of the factory layout; they need checking before they are used. Some necessary information was not available at the time of writing (capital costs of the new Wohlenberg equipment, power costs on the new binding line, wage costs on the new binding line, etc.). The values for the Estimating Standard Tables will also have to be inserted by JEMC staff.

The calculation of the actual cost rates has been left to the JEMC staff involved in the project – they know exactly how to do it, there are simple step-by-step diagrams provided, and it is a useful part of the familiarisation process for them to carry out the calculation. In fact, it is essential that they perform this task; since they are the only people within the plant with complete knowledge of the system, once the consultant has departed – and they will be left with the responsibility of translating this manual into Nepali, and explaining the system to those with whom they work.

18<sup>th</sup> September 2000

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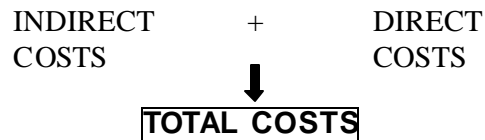
# COSTING

## COST BUDGET

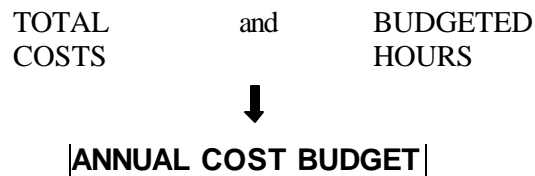
In order to obtain a cost budget, it is necessary first to build a cost base. The process of building a cost base, and using that cost base to calculate cost rates, which are then used for budget and estimating purposes, is shown below as a simple diagram.

### THE PROCESS OF BUILDING AND USING A COST BASE

**1. COLLECT ALL COSTS** from records of previous years, divide them into:

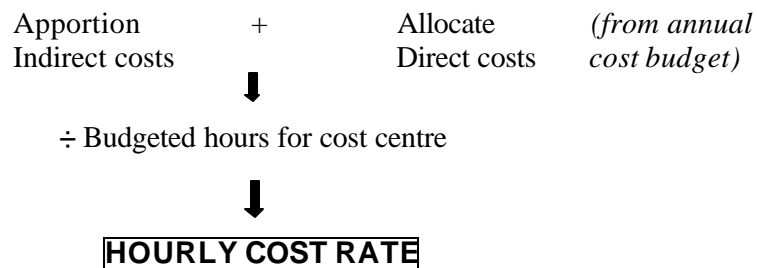


**2. CALCULATE BUDGETED HOURS** from records of previous years



**3. IDENTIFY COST CENTRES** – these are **Productive processes only**

**4. CALCULATE HOURLY COST RATES** for each cost centre



**5. USE HOURLY COST RATES FOR BUDGET AND ESTIMATING**

HOURLY COST RATE

Check costs against budget

(+ standard tables)

Estimating

The process of building a **cost base** is as follows.

The first step is to find the **total** annual cost of running the business. To do this, we must identify all the people and assets within the factory, and record them as either **INDIRECT** or **DIRECT** costs. (It is not necessary to divide the costs for **budget** purposes; but it simplifies **cost rate** calculations).

**A. INDIRECT COST** generally defined as cost which does not arise *directly* from production, and usually grouped under the following headings:

**LAND & BUILDINGS** – charged as ‘notional rent’; i.e. the rent that would have to be paid, if these were not owned. These are assets of the business, and proper provision must be made for recovery of the original outlay, and possible replacement.

**PLANT AND MACHINERY** – the capital cost of every item in the plant, depreciated over an agreed period; the cost of smaller machines (such as electric drills and test equipment), is combined into an agreed category and estimated for this purpose. Does *not* include the cost of production machinery.

**ADMINISTRATION COSTS** – the cost of people and items within the business which do not contribute *directly* to the manufacture or production of saleable goods. This category includes management salaries (including directors and managers, sales & marketing etc.), desks and office equipment, of-fice space, stationery, cars, telephones, fax machines, photocopiers, wages for non-productive staff (cleaners, maintenance staff and engineers, spare parts for production machines, stores staff, canteen staff etc.), insurance, uniforms, medical services and medicines. Supervisors’ wages, chemicals etc., are included under **administration costs** for *cost budget purposes*, but are recorded as separate items within those costs. (Because they will be *recovered* as **DEPARTMENTAL OVERHEADS**, by adding them into the **hourly cost rate** calculation for each department [and cost centre] as a separate item, see page 11 for details.)

**WORKING CAPITAL** – the amount of money used for the day-to-day funding of the business, plus the cost of any borrowings; calculated at normal interest rates.

**POWER** – normally electricity, calculated at cost per kilowatt/hour – but note that power used for production purposes will be charged *directly* to the process.

**FUEL** – any fuel used within the plant, including paraffin or gas for heating, fuel for vehicles etc.

**WATER** – this would also include any charges for sewage etc.

**RATES, LOCAL TAXES** – including charges for waste removal etc.

**STORAGE AND INVENTORY** – storage refers to raw materials, inventory is finished goods. Some allowance for this is made in the overhead; usually calculated as a percentage of the value.

All this information will be found in the records of previous trading years – such as the profit and loss account, and the balance sheet.

These **INDIRECT** costs are totalled. These costs are also referred to as **OVERHEAD** costs, or **GENERAL OVERHEADS**. A list of the indirect costs at JEMC will be found on the following page.

**COST BUDGET ANALYSIS- INDIRECT (OVERHEAD) COSTS TABLE**

	<b>1998</b>	<b>1999</b>
Notional Rent, land and buildings	8315424	8315424
Director's fees	172041	241010
Salaries and wages	17243811	20520859
Electricity and water	5769504	4140902
Transport and vehicles	1760717	2602390
Maintenance of buildings etc.	1251226	1169091
Insurance	1047236	1180651
Stationery	495535	664704
Postage and stamps	813891	656122
Newspapers	197427	196511
Travelling allowances etc.	1051587	1033260
Bank charges and interest	11752322	15819020
Advertising	1162870	1348747
Donations and prizes	705305	699030
Training	160037	269494
Fees to Book, and other committees	582890	305552
Audit Fees	50000	50000
Professional Fees	292271	444687
Depreciation of non-production machines	1938272	1938272
Depreciation of office equipment	159970	386844
Maintenance of machines	282233	638846
Spare parts for machines	2078622	2893790
Transport of finished goods	1848936	1249891
Chemicals	697733	595904
Rents	361913	248510
Rates	1197070	235463
Miscellaneous	107871	1659793
	<hr/>	<hr/>
	60798981	68908863
		<i>(up 13.34%)</i>

**B. DIRECT COSTS** may be defined as any cost which is caused as a *direct* result of a productive activity

- a) **WAGES** – paid to staff directly involved in production.
- b) **COST OF MACHINE** – capital cost of a *production* machine, depreciated according to tables supplied by Auditor-General's office, to give an annual cost.
- c) **POWER** – the cost of the power consumed by machine.

These costs are incorporated into the **cost budget** as **direct costs** since they arise *directly* from the process to which they apply – i.e. wages are paid, whether or not the people concerned are working, the machine has to be paid for, whether or not it is running. They form the *direct* part of the cost rate, and their costs are directly *allocated* to the production process to which they apply. The machine consumes no power when it is not running; but when it runs, the power it uses is a *direct* cost, and is *allocated* to the cost centre. A table of these costs will be found opposite.

Other items of direct costs for **cost budget purposes** are **direct materials**. Since the cost of these are **recovered** by charging them directly to individual jobs, they are best recorded under their separate headings (i.e. paper, board, ink, glue, chemicals etc.), which will make life easier when calculating **cost rates**.

Some items do not obviously fit into either the indirect or the direct category. An example of this is design; if the cost can be charged directly to a job, then it is recovered by doing so. If it cannot be directly related to an individual job, then it will have to be treated as an *indirect* cost, and *apportioned* as part of the **general overhead**.

Whichever category is decided for an individual item, the cost will still be incorporated into the final cost rate. When the *indirect* and *direct* costs are added together the total forms the basis of an annual **cost budget**, and this should contain every cost within the business over the budgeted year. However care should be taken; putting some items into a particular category may cause complications in the calculation of **cost rates** later on.

Producing a cost budget also includes recording total hours worked, numbers of staff involved in each process, working weeks in the year (holiday allowances, estimates of sick leave etc.). This gives the **budgeted hours** for each process (details on page 15).

**CONSULTANT'S NOTE**

*In the opening paragraphs of this document, the point was made that terminology is not important, and that the system should be tailored to suit JEMC. This is true – but it is strongly recommended that the standard Costing System should be followed as far possible, for the following reasons:*

1. *The standard system has been developed over a number of years, and it works!*
2. *At some point, another consultant may take over this project – it makes life needlessly complicated for everyone, if long explanations have to be given for every change in the system.*
3. *At the moment, there is a team of people involved in developing this scheme – these particular individuals may not be available at a later date to explain deviations from the standard scheme.*
4. *At some point in the future, this system will almost certainly be computerised. This process will be made more difficult if deviations from the standard system are not kept to a minimum.*

**COST BUDGET ANALYSIS FORM – DIRECT COSTS**

	WAGES*		DEPRECIATION		POWER		WEEKLY BUDGETED HOURS**
	1998	1999	1998	1999	1998	1999	
<b>Pre-press</b>	229370	252300	957609	957609	392040	392040	72
<b>Printing</b>							
Oriental Super		422400***		571638***			72
Sakurai	113728	125100	1426545	1426545	172800	172800	72
Komori	189545	208500	5187436	5187436	639360	639360	72
Miller	165545	182100	297297	297297	302700	302700	72
Heidelberg	189545	208500	379739	379739	397440	397440	72
Heidelberg	75818	83400	379739	379739	60120	69120	72
Komori	99327	109260	188910	188910	172800	172800	72
HMT	113727	125100	250313	250313	141696	141696	72
HMT	99327	109260	250313	250313	83808	83808	72
Harris	99327	109260	250313	250313	83808	83808	72
Harris	66219	72840	250313	250313	32141	32141	72
<b>Binding</b>							
Shoei Folders (x6)	70735	77808	788091	788091	155520	155520	72
Shupan	397339	437070	4054575	4054575	711936	711936	72
Itoh	265364	291900	2365170	2365170	153792	153792	72
Yoshino	265364	291900	107421	107421	547776	547776	72
Yoshino	265364	291900	107421	107421	139968	139968	72
Schneider	75818	83700	40901	40901	77760	77760	72
Schneider	113727	125100	41797	41797	77760	77760	72
Itotec	99327	109260	778115	778115	86400	86400	72
<b>New Line***</b>							
Gatherer							72
Sewing m/c 1				917000			72
Sewing m/c 2				917000			72
Binding line							
3-knife trimmer							
Lamination				433531			72
Shrinkwrap				265860			72

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<b>Materials*</b>	<b>1998</b>	<b>1999</b>
Ink	1557758	2275117
Paper	100837128	116405241
Chemicals	697733	595904
Other raw materials	4670386	5926813
Writers Charges	-	240000
Outwork	92761	1032706
Packing	692407	751341

\* Add 10% for 2000

\*\* 6 hour double day shift, 6 day week, 50 weeks per year

\*\*\* New machine(s) – rates for year 2000 only

## COST CENTRES

All businesses earn revenue by charging customers for the finished goods they produce. The costs in the **cost budget** must therefore be spread over those areas which are directly involved in the production of finished goods, so as to **recover** these costs. These areas are called **cost centres**, and the costs of each **cost centre** are **recovered** from customers by charging their activities to individual jobs at an **hourly cost rate** (via the invoice). After discussion it has been agreed that the best way of doing this is for each machine or process to be defined as a **cost centre**.

**Direct costs** which arise as result of the activities of a particular **cost centre** are *allocated* directly to that **cost centre**. A share of those costs which are not *directly* related to production (**indirect costs**, or **overhead costs**) are *apportioned* to each **cost centre**. In this way, the total costs of running the business (i.e. the total amount in the **cost budget**) are shared among the **cost centres**.

*Note the difference between allocate and apportion:*

*Allocation* refers to the process of charging an expense directly to a cost centre; because the cost arises directly from that activity or process. For example the wages of printing machine operatives.

*Apportion* means to charge a share of an *indirect cost* or *overhead* to a cost centre. An example of this would be the *apportionment* of the cost of land and buildings (notional rent!) to a process such as folding. The area occupied by the folding department is calculated as a percentage of the area of the factory site as a whole, and the resulting percentage of the cost of land and buildings is then *apportioned* to the folding department. Dividing this sum by the number of machines in the department gives the *apportionment*, or proportion of fixed costs, for each machine.

In practice, the **general overheads** are totalled, and the total is *apportioned* across the production areas. To do this, the **total general overhead cost** is divided by the **total area** of the factory, to give a **general overhead cost per square metre**. This is done as follows:

### CALCULATION

Total overhead cost	=	Rs68,908,863	(see table on page 5)
The total area of the factory	=	100,683 sq metres	
then the overhead cost per square metre	=	$\frac{\text{Rs68,908,863}}{100,683 \text{ sq metres}}$	
	=	<b>Rs684.414 / Sq metre of area per year</b>	

This **general overhead cost per square metre** is then *apportioned* to each **cost centre** on the basis of the area occupied by that **cost centre** (see details on page 10).

The **direct** and **indirect** costs for each **cost centre** are added together and this total, divided by the **total budgeted hours**, will give an **hourly cost rate** for that cost centre. This cost rate will be used to measure progress against the cost budget, and is also used for the purpose of estimating the cost of future jobs.

## NOTE

The following categories are also *direct costs*, but although they are included in the **cost budget**, THEY ARE NOT INCORPORATED INTO THE HOURLY COST RATE, since they are consumed in direct proportion to the amount of goods produced, and are **recovered** by being DIRECTLY CHARGED to **individual jobs** via the invoice, rather than to **cost centres**:

**DIRECT MATERIALS** – such as paper, board etc., which are directly used to produce goods for sale, and to which are added handling charges (allocated as a percentage of either weight or value). If these items have to be stored for any length of time, then the extra cost of this may be recovered by increasing the handling charge.

In the case of other **direct materials**, such as ink, chemicals, glue etc., although the amounts used vary according to the quantity produced, it is difficult to charge the actual cost directly to an individual job. Instead standard tables are used, which relate the cost to the quantity, and a standard charge is made based on these.

**OUTWORK** is also a direct cost – at JEMC the outwork varies directly with the quantity produced, and therefore may be charged directly to a job at cost + a handling charge.

## **CALCULATION OF HOURLY COST RATES**

As already explained, the hourly cost rates are made up of both **direct** and **indirect (overhead)** costs. In addition, production departments are divided into two classes when calculating cost rates:

**SINGLE OPERATIONS** – usually hand operations, with single operators; the hourly cost is calculated by dividing the total cost by the number of hours available. At JEMC the pre-press department falls into this category – so the *whole department* (as defined by the activity) is the **cost centre**, and has a **departmental cost rate**.

**MULTI-OPERATION** – usually machines, involving a variety of operations and processes, and several operators. Because different machines have different values, and varying numbers of operators, the **cost rates** will vary from machine to machine. In these cases, the *individual machines* are treated as **cost centres**, and the **cost rates** are calculated on this basis. Printing and Binding are treated in this way.

### **Factors involved in calculating cost rates**

The **cost rates** are based on the number of direct hours that are **budgeted** to be achieved at each cost centre – making allowance for such factors as shift patterns and non-productive time (e.g. washing-up and standing time, holidays, sickness etc.). Machine **cost rates** must be based on the actual productive hours in a year. Production records can be used to determine hours actually worked, and realistic cost rates are based on these.

As already explained on page 8, costs are allocated (apportioned) on an area basis (except in the pre-press) – so the first step is to establish the area of each **BUDGET CENTRE**. Note that all the space within the production areas is to be accounted for – in addition to the its ‘footprint’, each machine uses some additional space around it; for operator's working space, for access, storage of work in progress, and, of course, space for supervisor's offices, ancillary equipment (platemaking, knife grinding etc.)

Indirect and direct costs will then be shared between each **COST CENTRE** within the **BUDGET CENTRE**. The process of distributing the costs will vary slightly according to the circumstances. In the Pre-press, the whole department forms the **COST CENTRE**, so the total costs for the department are calculated on the total area, and this total is then divided by the number of *man hours* in the department, instead of by the area occupied by individual machines (see page 15 for details).

In the case of the Printing department, the machines, although they perform a similar operation, have varying sizes and capacities – so their value to the business will vary. It may be that an older press, although occupying a much larger area than a modern one, will actually have less value to the business because of its lower output rate.

The machines in the Binding department all perform different operations – so, in order to keep things as simple as possible, the distribution calculation is based solely on area occupied by the machine.

The following pages show how :

1. The floor area, in square metres, is measured for each **BUDGET CENTRE**
2. The floor area, in square metres, is calculated for each **COST CENTRE**
3. The **indirect costs** are apportioned to each individual **COST CENTRE**
4. The **direct costs** are allocated to each individual **COST CENTRE**

## 1. MEASUREMENT OF BUDGET CENTRE FLOOR AREAS

For this purpose the measurements on the factory floor plans have been used. Note that absolute accuracy is not necessary – only to calculate the proportion of the total productive factory floor area used by the **BUDGET CENTRE**, so as to distribute the costs within that area. The total production area is split up using a rough grid system (see Appendix D), the grid squares occupied by each operation are counted (allowance is made around each machine for operation, storage and access); the resulting total square metres represent that **BUDGET CENTRE'S** share of the productive floor area.

			<u>SQUARE METRES</u>
<b><u>THE PRE-PRESS DEPARTMENT</u></b>			
<u>OLD BUILDING</u>			
One room (New MACs)	3.50 x 6.35 metres	=	22.225
One room (Cameras etc.)	8.75 x 6.35 metres	=	55.563
<u>OFFICE BLOCK</u>			
One room (Old MACs)	3.50 x 6.35 metres	=	22.225
<u>EXISTING NEW BUILDING</u>			
Camera and film processor	3.50 x 6.35 metres	=	<u>22.225</u>
<b>TOTAL FLOOR AREA FOR PRE-PRESS DEPT.</b>			<b>122.238</b>
 <b><u>THE PRINTING DEPARTMENT</u></b>			
<u>OLD BUILDING</u>			
3 presses (Harris)	10.50 x 6.35 metres	=	66.675
<u>EXISTING NEW BUILDING</u>			
1 web press + 8 sheetfed presses			
supervisor's office			
platemaking			
roller washing etc.			<u>859.075</u>
<b>TOTAL FLOOR AREA FOR PRINTING DEPT.</b>			<b>925.750</b>
 <b><u>THE BINDING DEPARTMENT</u></b>			
<u>OLD BUILDING</u>			
Yoshino gatherer/side stab	10.50 x 6.35 metres	=	66.675
Schneider Senator guillotine	3.50 x 6.35 metres	=	22.225
<u>EXISTING NEW BUILDING</u>			
Itoh gatherer/Yoshino binder	21.00 x 6.35 metres	=	133.350
2 Guillotines, each	7.00 x 6.35 metres	=	88.900
Guillotine	7.00 x 9.60 metres	=	67.200
<u>EXTENSION – NEW BUILDING</u>			
6 Folders	27.825 x 19.55 split 50/50	=	271.989
1 Shupan binding line }			<u>271.990</u>
<b>TOTAL FLOOR AREA FOR BINDING DEPT.</b>			<b>922.329</b>



MACHINE	MAX. SIZE (1,000s)	SPEED	VALUE	CALCULATION
ORIENTAL SUPER WEB	882 x 504	18000	3,200	882 x 504 x 2 x 3.6
SAKURAI SINGLE COLOUR 1/0	820 x 560	6-8000	688	820 x 560 x 1.5
KOMORI PERFECTOR 1/1	1035 x 745	7-8000	2,313	1035 x 745 x 2 x 1.5
MILLER 2Col/PERF	920 x 650	5000	1,196	920 x 650 x 2
HEIDELBERG 2Col/PERF	1020 x 700	5000	1,428	1020 x 700 x 2
HEIDELBERG 1COLOUR 1/0	570 x 400	5000	228	570 x 400
KOMORI SINGLE COLOUR 1/0	700 x 500	5000	350	700 x 500
HMT SINGLE COLOUR 1/0	700 x 500	5000	350	700 x 500
HMT SINGLE COLOUR 1/0	700 x 500	5000	350	700 x 500
HARRIS SINGLE COLOUR 1/0	300 x 200	5000	60	300 x 200
HARRIS SINGLE COLOUR 1/0	300 x 200	5000	60	300 x 200
HARRIS SINGLE COLOUR 1/0	200 x 150	5000	<u>30</u>	200 x 150
			7,053	

So the floor area to be *apportioned* to any individual machine is the area of the printing department divided by the total value of the printing department and multiplied by the value for the machine. For example, using this formula to calculate the value for the Miller 2col/perfector:

$$\frac{925.750 \text{ sq. metres}}{7,053 \text{ total value}} \times 1,196 \text{ (value for machine)} = \mathbf{156.982 \text{ sq. metres}}$$

Since it has already been decided that the Bindery costs will be apportioned on a straight area basis, the area allocated to each machine can be read from the table on page 11.

### 3. APPORTIONING THE INDIRECT COSTS TO EACH COST CENTRE

The next step is to apportion the **indirect costs** to each **COST CENTRE**. **Indirect costs** consist of the **general overhead cost** plus certain **overhead costs** which arise on a departmental basis, and are referred to as **departmental overheads**. One example would be supervisor's wages, another would be chemicals (fountain solution) in the printing department.

The **general overhead cost** is calculated by multiplying the area occupied by the machine (156.982 sq.metres) by the overhead cost per square metre per year (Rs684.414 see page 8). The **general overhead cost** for the Miller would therefore be Rs107,440.679 per year.

Wages for supervisors are *apportioned* to each machine, via the **departmental overhead** on the same area basis as the **general overhead** (but note that it is *apportioned* within the department only); this has the benefit of relating supervision costs directly to the area supervised – any area requiring extra supervision will automatically raise the cost rate of that area. Supervisor's wages in the printing

department are Rs1,281,600 per year, so the Miller's share would be Rs217,324.473 ( $\text{Rs}1,281,600 \div 925.750 \text{ sq. metres} \times 156.982 \text{ sq. metres}$ ).

The cost of chemicals (fountain solution in the printing department) is also *apportioned* on (departmental) area, and added to the **departmental overhead** in exactly the same way. The total chemical cost is Rs655,494, so the Miller's share would be Rs111,153.939 ( $\text{Rs}655,494 \div 925.750 \text{ sq. metres} \times 156.982 \text{ sq. metres}$ ).

The cost of chemicals in the platemaking section (developer etc.) would be *apportioned* over the department (because the *department* is the **cost centre** ).

Originally it was decided to *allocate* the cost of spare parts as a **direct cost** to the machine concerned. However, this was not possible, and this cost has been added into the **general overheads**.

#### 4. ALLOCATING THE DIRECT COSTS TO EACH COST CENTRE

**Direct costs** consist of the following:

a. The cost of any machine used, calculated as its *depreciation rate* for the year

The Auditor-General's tables give 10% as the annual rate of depreciation for all machines, so the annual depreciation cost of all the machines has already been calculated (see table on page 7). In the case of **SINGLE OPERATIONS** (mostly hand operations, where the department is the cost centre) the depreciation cost of equipment is simply added into the departmental **cost rate** .

b. The cost of the power used by the machine

This is based on the units of electricity used by the machine, and measured in kw/hours. The cost of power for all the machines has also been calculated (see table on page 7). (NB the machine uses power even when non-productive; e.g. washing-up etc.) Again, where the department is the cost centre, the cost of power is simply added into the departmental **cost rate** .

c. The wages of the operators

Most machines have more than one operator. The wage costs for each cost centre is on page 7. As with the other elements, where the department is the cost centre, the total wage cost is simply added into the departmental **cost rate** .

Remember that <b>direct materials costs</b> are charged directly to the <b>job</b> .
--

The *indirect* and *direct* costs when added together will give the basic cost of the machine (or **cost centre**). This basic cost is then divided by the number of **BUDGETED HOURS** available.

## BUDGETED HOURS

In order to find the true hourly cost rate, allowance must be made for the actual productive activity of the machine – which will not be the same as its theoretical capacity. The presses are budgeted to be productive for 36 hours out of a possible 48 in a week, and there are 50 working weeks in the year, so the hourly cost rate is based on the annual cost, divided by 50 working weeks and then divided by 36 working hours.

If we continue to take the Miller 2col/perfector as an example:

Weekly cost			
General Overhead,	Rs 107,440.679	per year ÷ 50 working weeks	Rs 2,148.814
Departmental Overhead, (Supervisor's wages + printing chemicals)	Rs 328,478.412	per year ÷ 50 working weeks	Rs 6,569.568
Capital cost (see p.7),	Rs 297,297	per year ÷ 50 working weeks	Rs 5,945.940
Power (see p.7),	Rs 302,700	per year ÷ 50 working weeks	Rs 6,054.000
Wages (see p.7) [+10%]	Rs 200,310	per year ÷ 50 working weeks	<u>Rs 4,006.200</u>
		<b>Total</b>	<b>Rs 24,724.522</b>

The machine works a double shift, and budgeted *direct* hours per week is 72, so the **hourly cost rate** for the machine is the total above ÷ 72 = **Rs343.396**. If the budgeted *direct* hours per week changes, then the **cost rate** must be changed accordingly, so as to recover the same amount of costs over the increased or decreased period available.

**NOTE** If the wages or the cost of power increase, the direct part of the cost is increased accordingly (but **not** the *overhead*). If the number of working weeks in the year varies, then the cost rate must be varied proportionately, in order to recover the costs over the altered period.

Following this basic procedure, a cost rate is calculated for every **cost centre** within the factory. As mentioned earlier, the procedure is slightly different for the pre-press department. The total costs are calculated for the area, but these costs are then simply divided by the number of budgeted man hours. As the department works 72 hours per week, and there are 13 staff in the department, the budgeted man-hours per week are 13 x 72 = 936. So the total costs for the department are divided by 936 to give the cost rate per hour.

In order to document this, and to ensure consistency, a standard form is used. The completed forms are filed within the Costing department, to provide a permanent record of the cost rate calculations. The form is dated, and if any of the factors are altered, then a revised form is produced (with the date of the alteration) and kept on file.

A worked example of the COST CENTRE ANALYSIS FORM will be found on page 16.

These records will be used to keep the cost files up-to-date, and the cost rates are also used, in the form of tables, for the purpose of Estimating (see Estimating section for details).

## COST CENTRE ANALYSIS FORM

### ANNUAL COST

BUDGET CENTRE	<i>Printing Department</i>	
COST CENTRE	<i>Miller 2col / perfector</i>	
DEPT.FLOOR AREA	<i>925.750 sq. metres</i>	from plan
A. GENERAL OVERHEAD COST / SQ. METRE.	<i>Rs684.414</i>	see page 8
B. AREA APPORTIONED TO COST CENTRE	<i>156.982 sq, metres</i>	see page 11
C. DEPRECIATION COST OF ASSET	<i>Rs297,297</i>	see table on page 7
D. SUPERVISION COST FOR COST CENTRE	<i>Rs217,324.473</i>	see page 11
E CHEMICALS COST FOR COST CENTRE	<i>Rs111,153.939</i>	see table on page 7
F. NUMBER OF OPERATIVES	<i>5</i>	
G. ANNUAL WAGES COST	<i>Rs200,310</i>	see table on page 7
H. ANNUAL POWER COST	<i>Rs302,700</i>	see table on page 7
I. BUDGETED DIRECT HOURS PER WEEK	<i>72</i>	see table on page 7
J. BUDGETED WORKING WEEKS PER YEAR	<i>50</i>	see table on page 7

### WEEKLY COST

GENERAL OVERHEAD	<i>Rs2,148.814</i>	<b>(A x B) ÷ J</b>
DEPARTMENTAL OVERHEAD		
Supervisor's wages	<i>Rs4,346.489</i>	<b>D ÷ J</b>
Other	<i>Rs2,223.079</i>	<b>E ÷ J</b>
<b>Total</b>	<i>Rs6,569.568</i>	
CAPITAL (depreciation) COST	<i>Rs5,945.940</i>	<b>C ÷ J</b>
COST OF POWER	<i>Rs6,054.000</i>	<b>H ÷ J</b>
WAGES	<i>Rs4,006.200</i>	<b>G ÷ J</b>
<b>TOTAL COST</b>	<b><u><i>24,724.522</i></u></b>	

HOURLY COST RATE for Miller 2col/perfector

Total cost ÷ number of budgeted direct hours in a week (72) = **Rs343.396**

## **HOW COST RATES ARE USED**

We have seen how the annual cost budget is derived, and how the cost rate for each cost centre is calculated. This information is used to check costs against the **cost budget**; but the same figures are also used as the basis on which to **estimate** the cost of producing future work, (as shown in the diagram on page 3).

A costing system is a powerful tool for monitoring and controlling costs within a business. In order to do this effectively, the system must be set up, and administered, properly.

### **THE PROCEDURES TO BE FOLLOWED**

The essential requirement of the system is for a record to be kept of exactly how much every job cost to produce.

When the original job specification for a title is issued by the Publications department, at the same time a record, usually referred to as a **Job cost file** will be opened for that individual title. A recommended practice is to keep costs on each job in the form of a loose-leaf folder, using a separate sheet for each cost centre; with the first (top) page being a summary sheet of the costs – the summary, of course, will not be completed until the last activity in the factory is finished. See examples on the following pages.

This cost file is kept in the costing office, and it is that office's responsibility to record details of materials used, hours worked on the individual job by each cost centre, onto the correct cost sheet, and then to total the costs onto the summary sheet for that title. It should also note any problems encountered, their cause, and the solution applied to the problem.

*The information recorded on the Job cost sheets comes from the following sources:*

The amount of paper and board used is recorded against the job, as it is issued to each department, on a **paper/board daily return** or record form. This is a standard form, returned from the paper dept. every day to the costing office, showing the quantities issued to departments against each job. An example of a standard form is shown on page 23.

The *direct hours* worked are taken from the existing **shift production record** produced by each department, showing machines, operator(s) involved, title worked on, units produced, problems encountered etc. This document provides a permanent record of the actual labour cost; and the information from it is entered onto the **Job cost sheets** (see following pages for examples) for the individual title, together with paper and board etc. used on that title, from the **paper/board daily return**; on a regular (usually daily) basis, in the costing department – but note that ink, glue, etc. are calculated from standard tables, based on past usage. At the end of the production process, this cost sheet will provide a permanent record of the total **actual cost** of the job.

The actual cost is then compared against the estimated cost; if there are significant variations, these should be investigated, and the causes noted. It may be necessary to modify the machine speeds and output rates used for estimating (see Estimating section for details).

**NOTE** The process of creating and administering accurate cost records is time-consuming and demanding. Although there is an existing costing department, it will be necessary to employ extra staff to keep up with the increased workload – at least 3 full-time people will be needed to keep the records up-to-date.

JOB COST SUMMARY SHEET

TITLE ..... START DATE .....

NO. OF PAGES ..... COVER ..... ORDER QUANTITY .....

---

Rupees

---

**PRE-PRESS DIRECT HOURS**

..... @ .....

**PRE-PRESS DIRECT MATERIALS**

---

**PRINTING DIRECT HOURS**

Make-ready..... @ .....  
Running ..... @ .....  
Wash-up ..... @ .....

---

**BINDING DIRECT HOURS**

Folding ..... @ .....  
Gathering ..... @ .....  
Sewing ..... @ .....  
Saddle stitch ..... @ .....  
Side-stab ..... @ .....  
Laminating ..... @ .....  
Covering ..... @ .....  
3-knife ..... @ .....  
Shrinkwrap ..... @ .....

---

**PACKING DIRECT HOURS** ..... @ .....

---

**OUTWORK**

---

**TOTAL COST** \_\_\_\_\_

**NOTES**











## 2. ESTIMATING

### PRINCIPLES OF ESTIMATING

If each cost centre is productive for its budgeted direct hours, the customer is charged the budgeted rate for the job, and the materials used are accurately recorded and charged for; then the annual income will equal the annual cost. However, in practice this rarely works out precisely – there are always mishaps, operators off sick, materials wastage, machine breakdowns etc. In any case, we do not want to exactly balance the costs against the income. The normal objective is to make a profit, and to do this, we have to charge the customer the cost of the job + a profit margin.

Before work commences, we must produce an accurate estimate of how much each job will cost in overheads and direct costs; for which we use our **hourly cost rates** (which contain the overheads + the direct costs of labour etc.), plus the cost of any materials required (with their handling charge). Any required margin of profit is added onto this estimated job cost. For estimating purposes the cost rates are provided as a table, showing each **cost centre**, and its hourly **cost rate**. Whenever the cost rates are revised, then a revised table will be produced.

The details of the estimating process are as follows:

1. the estimator lists the processes through which the job will pass, and estimates the time which the job will take in each process, using **estimating standard tables** which show accurate outputs of all the available plant. The data in these standard tables is based on production records from past years – but they should be constantly monitored and updated.
2. This estimated time is then multiplied by the **hourly cost rate** (from the standard tables showing **cost centres** and **hourly cost rates**) for each process, to give the cost.
3. To this is added the estimated cost of the **materials** used, together with the cost of any **outwork** required. For consistency, and to help the estimator to make sure that everything has been included, a standard form is used for this purpose.

The estimator must be quite certain that every cost has been included in the estimate, and that the estimate reflects the methods of working on the factory floor. Any assumptions made in the estimate should be noted on the form, so that they may be allowed for when the actual job is put in hand.

Every estimator should have an up-to-date copy of the **plant list**, which has a detailed specification of minimum and maximum sizes, together with any special limitations, for every machine within the factory. Estimators should be familiar with all the processes within the factory, and have a good knowledge of the workings of these processes.

Many processes have special factors to be taken into account when producing estimates, such as: allowances for grip on printing presses, print finishing and binding allowances for extra paper, wastage and overs allowances for make-ready and printing and finishing. These are included in the PAPER AND BOARD WORKING ALLOWANCES, which will be found on page 26. Other factors to be taken into account include ink usage, which for estimating purposes at JEMC is based on past consumption records.



## **PAPER AND BOARD WORKING ALLOWANCES**

### ***Sheet fed presses***

Grip – 10-12mm

Colour control strip – 10mm

### ***Print finishing/binding allowances***

Trimming – *single cuts 3mm, double cuts 6mm*

Binding/sewing lap – 9mm

Lamination – 12mm

Perfect binding – 6mm in the backs (i.e. 3mm for each leaf)

### ***Wastage and overs allowances***

Sheet-fed, single colour – 100 sheets/ first make-ready, 50 sheets for each subsequent make-ready

Sheet-fed, two colour – 200 sheets/first make-ready, 100 sheets for each subsequent make-ready

Sheet-perfector Plus 3%overs/running waste for each pass through the press (includes overs for finishing)

### ***General finishing allowance***

*For normal binding operations 2%*

*Unusual or difficult materials will require special allowances.*

At the end of every job, the actual total cost (from the **Job cost summary sheet**) is compared with the estimate. If the actual cost is significantly different, then the source of the variance should be identified, and appropriate adjustments should be made to assumed rates of output, materials usage, etc. in the standard tables; in order to improve the accuracy of the estimating process.

In view of the relatively standard product at JEMC, it may be practical to produce tables for standard formats and extents, which would avoid the necessity of producing individual estimates for many books. However, in order to do this, it is first necessary to have a complete costing and estimating system installed and running.

**NOTE** – as with costing, the process of estimating is time-consuming and demanding. Since there is no existing estimating department as such, the system will have start from the beginning. It has been suggested that individual departments (possibly the supervisors) should be made responsible for producing their own parts of job estimates. The consultant would advise against this – although it is true that individual departments probably know their own part of the production process better than anyone else, this would be outweighed by the lack of consistency in the estimating procedures. Experience has shown that estimating is a process best left to staff specially trained in the discipline.

**APPENDIX A**

**ESTIMATING STANDARD TABLES**

*(Please note that the actual rates are to be inserted by JEMC staff)*

## PRE-PRESS

<b>MAC setting</b>	<i>simple text</i>	<i>tabular</i>
A5 page	?? minutes	?? minutes
A4 page	?? minutes	?? minutes

### **Creating photographic masks – per overall area**

Light ?? minutes	Medium ?? minutes	Heavy ?? minutes
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### **Retouching / spotting-out**

18 x 24cm film ? minutes	60 x 80cm film ?? minutes
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### **Scanning**

Monochrome scanner	per squared-up halftone ? minutes	
Colour scanner	set-up time ? minutes	
Minimum scan 5-10 minutes	A4 scan ? minutes	A2 scan ? minutes

*Note: scanning times will vary according to originals, amount of grouping, and the scanner*

Disk handling (standard check)	? minutes per file
--------------------------------	--------------------

<b>Disk conversion</b>	Set-up ? minutes + ? minutes per 12-page A4 disk
------------------------	--

### **Make-up**

*Preparing imposition layouts / laydowns*

2 pp ? minutes, 4 pp ? minutes, 8 pp ? minutes, 16 pp ? minutes, 32 pages ? minutes

Assembly / paste-up <i>paper</i>	? minutes per piece of material
Assembly <i>film</i>	? minutes per piece of material

### **Preparing masks by hand**

Simple mask ? minutes	Complex mask ? minutes
-----------------------	------------------------

PRE-PRESS continued

**Camera / contacting**

<i>Camera</i>	per line shot ? minutes	per tone shot ? minutes
<i>Contacting</i>	per line film ? minutes	per tone film ? minutes

**Imposition, planning to assembled film/flat from existing layout/laydown per colour (by hand)**

2 x A4	? minutes
4 x A4	? minutes
8 x A4	? minutes

**Proofing**

1 set 16pp A4 photocopies (black)	? minutes
1 x B1 size ozalid (one colour)	? minutes
1 x DTP visual proof (4-colour)	? minutes
1 x Iris ink-jet (4-colour)	? minutes

**Litho platemaking** times per plate

Pre-sensitised aluminium plates	
SRA3 (450 x 640)	? minutes
SRA2 (640 x 900)	? minutes
SRA1 (900 x 1280)	? minutes

**MACHINE PRINTING**

**Sheet-fed offset litho**

1 <sup>ST</sup>	Make-ready/set-up		RUNNING – IMPRESSIONS PER HOUR			
	FOLLOW- ON	WASH - UP	Up to 3000	3000- 10000	10000- 20000	20000+

Oriental super web

Sakurai

Komori perf.

Miller

Heidelberg Speed.

Heidelberg s/c

Komori s/c

HMT

Harris s/c

Harris small s/c

## BINDING & FINISHING

**Guillotine** (normal pile height 75mm)

### *Single-knife*

General cut/trim on basic guillotine	? cuts per hour
General cut/trim on auto guillotine	? cuts per hour
Repetitive cut on programmatic	? cuts per hour
Trimming booklets head & tail	? minutes per pile
Trimming booklets fore-edge	? minutes per pile
Splitting into two (one cut)	? piles per hour

### *Three-knife trimmer*

Make-ready/set-up	? minutes
Hand-fed	? piles per hour
Automatic	? piles per hour

## **Folding**

*Hand folding* ? folds per hour

### *Machine folding*

Set-up feeder	? minutes
Make-ready 1 fold	? minutes, 2 folds ? minutes, 3 folds ? minutes, 4 folds ? minutes

Output speeds	
4 pages	? sheets per hour
6 or 8 pages	? sheets per hour
12 or 16 pages	? sheets per hour
24 or 32 pages	? sheets per hour

## **Machine collating**

Make-ready	? minutes
12 station gatherer	? sets per hour

BINDING & FINISHING continued

**Hand insetting** ? A4 items per hour

**Hand insertng** ? inserts per hour

**Sewing machine**

Set-up ? minutes

Auto-feed ? sections per hour

**Binding line**

Set-up ? minutes

Gather, bind and 3-knife trim ? books per hour

**Perfect binding line**

Set-up ? minutes

Gather, bind and 3-knife trim ? books per hour

**Gather and side-stab line**

Set-up ? minutes

2 stitches ? books per hour

**Laminating covers**

SRA2 (640 x 900mm) ? sheets per hour

**PACKING**

**Parcels**

10kg-12kg parcel

? per hour

**Shrinkwrapping**

Set-up

10-12kg parcel

13-15kg parcel

**APPENDIX B**

**COST CENTRES AND COST RATES**

*(These are to be calculated by JEMC staff, as part of the process of implementation)*

## **COST CENTRES AND COST RATES**

	<b>No. of operators</b>	<b>Weekly Budgeted hours</b>	<b><u>COST RATE</u> Rs/hour</b>
<b>Pre-press</b>			
<b>Printing</b>			
Oriental super web		72	
Sakurai 1c	3	72	
Komori perf	5	72	
Miller 2c/perf	5	72	
Heidelberg 2c/perf	5	72	
Heidelberg 1c	2	72	
Komori 1c	3	72	
HMT 1c	3	72	
HMT1c	3	72	
Harris 1c	3	72	
Harris 1c	3	72	
Harris 1c (small)	2	72	
<b>Binding</b>			
Shoei Folder	2	72	
Shoei Folder	2	72	
Shoei Folder	2	72	
Shoei Folder	2	72	
Shoei Folder	2	72	
Shupan	12	72	
Itoh	7	72	
Yoshino	7	72	
Yoshino	7	72	
Schneider	2	72	
Schneider	3	72	
Itotec	3	72	
<b>New Line</b>			
Shoei Folder		72	
Gatherer		72	
Sewing m/c 1		72	
Sewing m/c 2		72	
Binding line		72	
3-knife trimmer		72	
Lamination		72	
Shrinkwrap		72	

**APPENDIX C**

**PLANT LIST AND SPECIFICATIONS**

*(These are to be checked, and revised as necessary, by JEMC staff)*

**PRE-PRESS**

<b>MACHINE</b>	<b>MIN. SIZE</b>	<b>MAX. SIZE</b>	<b>SPEED</b>
BROWN HORIZONTAL CAMERA			
DAI NIPPON VERTICAL CAMERA			610 x 510
DAI NIPPON PLATE PROCESSOR 860SG			
DAI NIPPON EXPOSURE FRAME			
AGFA DESK TOP SCANNER (MONO)			297 x 210
APPLE LASER WRITER SELECT			
APPLE MAC QUADRA 650			
APPLE MAC CLASSIC II			

**PRINTING**

<b>MACHINE</b>	<b>MIN. SIZE</b>	<b>MAX. SIZE</b>	<b>SPEED</b>
ORIENTAL SUPER WEB		882 x 504	18,000
SAKURAI SINGLE COLOUR 1/0		820 x 560	6-8000
KOMORI PERFECTOR 1/1		1035 x 745	7-8000
MILLER 2Col/PERF		920 x 650	5000
HEIDELBERG 2Col/PERF		1020 x 700	5000
HEIDELBERG SINGLE COLOUR 1/0		570 x 400	5000
KOMORI SINGLE COLOUR 1/0		700 x 500	5000
HMT SINGLE COLOUR 1/0		700 x 500	5000
HMT SINGLE COLOUR 1/0		700 x 500	5000
HARRIS SINGLE COLOUR 1/0		300 x 200	
HARRIS SINGLE COLOUR 1/0		300 x 200	
HARRIS SINGLE COLOUR 1/0		200 x 150	

**BINDING**

<b>MACHINE</b>	<b>MIN. SIZE</b>	<b>MAX. SIZE</b>	<b>SPEED</b>
SHOEI FOLDERS (x6)			1030 x 890 6000
SHUPAN 12 STATION GATHER/BIND/3K			5000
ITOH 12 STATION GATHERER			
YOSHINO PERFECT BINDING LINE			
YOSHINO 12 STATION GATHER + SIDE STAB			
SCHNEIDER AUTOMATIC GUILLOTINE			1070
SCHNEIDER AUTOMATIC GUILLOTINE			1070
ITOTEC AUTOMATIC GUILLOTINE			1370
<b>NEW LINE</b>			
WOHLENBERG 7011 16 STAT. GATHERER	360 x 190		460 x 320 5000 cycles
ASTER 160 SEWING MACHINES (x2)	150 x 75		420 x 320 9600 cycles
WOHLENBERG BINDING LINE			4000
WOHLENBERG 3-KNIFE TRIMMER			
AUTOBOND LAMINATOR			
VIBORG SHRINKWRAPPING MACHINE			300 cycles