

**NEPAL**

**Basic and Primary Education Programme  
Phase II**

Quality Assurance System  
for  
Janak Educational Materials Centre

10-30 September 2000

Kenneth Cowan

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## 1. INTRODUCTION

The consultant worked in JEMC from 11-29 September 2000 to follow up the work on a quality control system done in 1999. The timing for this follow-up was originally scheduled for around March/April 2000, but was postponed at the request of JEMC (whose major production period of school textbooks starts at that time). The terms of reference for this visit were as follows:

1. To ascertain what progress has been made at JEMC following recommendations made in the consultant's report of September 1999, and to agree with senior management the steps which should be taken to introduce quality control, and therefore to improve the quality of all printed textbooks.
2. To provide JEMC with a Quality Control Handbook for staff at all levels.
3. To give on the spot training where necessary
4. Report on activities, findings, conclusions, recommendations and next steps.

### Abbreviations

BPEP	Basic and Primary Education Project
BPEDU	Basic and Primary Education Development Unit
CDC	Curriculum Development Centre
gm <sup>2</sup>	grammes per square metre (paper and board weight)
JEMC	Janak Education Materials Centre
MOE	Ministry of Education
PAT	Programme Advisory Team (Danida)
PPC	Primary Publishing Cell

### Acknowledgements

To BPEP and the entire production team at Janak who gave freely of their time and energy, as we moved toward quality consciousness.

In particular to Ramchandra Silwal and Subarna Pradhan, who patiently sought to answer my daily questions.

And finally to the bright-eyed school children of Nepal who we hope will enjoy and benefit from the new durable books



## 2. DURABLE TEXTBOOKS

### 2.1 Overview

The local press (*Kathmandu Post 13.9.00*) reported that 90% of primary school text books had been delivered in time for the new term – ‘a new record for Janak’ as the article commented. Even allowing for a degree of hyperbole, it is clear that there has been a major improvement in production and distribution compared with past years.

In addition, JEMC have produced a total of 484,500 durable textbooks grades 2-5 for the three areas designated for the pilot project: Jhapa, Kahvre and Darchula. These are broken down as follows:

275,125	Jhapa	delivered early September 2000
158,372	Kahvre	delivered early September 2000
50,500	Darchula	despatch due end October 2000

**483,997 total produced**

The 50,500 durable books for Darchula have been held back due to the impossibility of reaching schools in this region during and after the monsoon season. Many landslips and fallen bridges have been reported in this area, but it is hoped to despatch these by the end of October.

This is substantially less than planned, but, with Danida’s agreement, it was decided that grade 1 books should be withdrawn from the pilot scheme, since they contain too large a workbook element, and would require substantial revision before production could commence.

JEMC are to be congratulated on the speed of their production (about 6 weeks after installation of the new bindery) and also on the quality achieved, which suggests a quantum leap over the quality of all textbooks they had previously produced.

### 2.2 Quality Assessment of Durable Textbooks

The project involved 16 titles in total. Good quality paper and board, a modern sewn binding line, and laminated covers contributed to textbooks which have a technical quality close to European standards.

However, a number of specific quality points need to be reviewed when next durable books are produced. These will form an integral part of the quality control system due to be installed by the end of this year (December 2000). The main quality issues which follow are presented in tabular form for ease of reference, with some more general issues amplified afterwards.

<b>Item</b>	<b>Comment</b>	<b>Action</b>
Format	Standard of 213 x 160mm varies on width by up to 2mm in both dimensions	Accurate setting of 3-knife trimmer
Paper bulk	100 microns – well within range specified (90-110 microns)	None
Paper weight	72gm <sup>2</sup> – 2gm <sup>2</sup> higher than specified (70gm <sup>2</sup> )	None
Paper opacity	Acceptable	None
Cover board bulk	380 microns – above range specified (330-360 micron)	None
Cover board weight	290gm <sup>2</sup> – 10gm <sup>2</sup> heavier than specified (280gm <sup>2</sup> )	None
Print quality	Some scratches and scum on plate ( <i>see comments below table</i> )	Revise film, check printing plates
Ink density (text)	Ink density varies throughout, both within the page, and on alternate sides of the sheet ( <i>see comments below table</i> )	Ink density control on press
Section marks	These show in the book at the start and end of each section, and should scarcely be visible	Reduce section mark width by half on imposed film
Bank note illustrations	Many of these have lost any detail in the original reproduction  ( <i>see comments below table</i> )	Rescan to improve detail
Covers	Well printed, but spine lettering needs adjusting in some cases ( <i>see comments below table</i> )	Reposition on film
Binding	Well sewn, tight backs	None
Gluing	Often missing at foot and head ( <i>see comments below table</i> )	Adjustment settings on gluing station
Section folding	Some sections are creased at the head  Other creases have occurred due to careless stacking before binding	Larger perforations on folder  Wooden end boards to be used without exception
Finishing	Well laminated and trimmed	None
Cover Design	Covers would benefit from a consistent design to give all grades a recognisable design link ( <i>see comments below table</i> )	Discuss with designers

## 2.2.1 General Quality Points

### FILM QUALITY

Over long usage, it is evident that some film has been damaged, or been sufficiently badly scratched to show up on the printing plate. These pages should be re-filmed, most noticeably in *Sero Fero 2* and *Sero Fero 4*.

### BACKGROUND SCREEN TINTS

Some tints seem to have been damaged and require changing (eg *Maths 2* varies from dark to light grey within the same title – see *Maths 2*, *Maths 3* and *Nepali 3*).

### PLATE QUALITY

Scumming may be due to poor resurfacing of plates, where pre-sensitised plates are not being used, or a failure to balance ink and damper fluid on press. Assuming the former is the case, then it may be advisable to consider a more advanced method of resurfacing plates, or to use only pre-sensitised plates for textbooks. The effects of scumming are most visible in *Sero Fero 2*, *Maths 3*, *Sero Fero 4* and *Nepali 5*.

### PRINT QUALITY

There has been a dramatic improvement in print quality, partly as a result of better quality materials but also due to care in presswork. None the less a few aspects require attention in order to approach international quality standards.

Ink density needs to be more tightly controlled on press. Screen tints (see item 2 above) are highly sensitive to variations in the weight of ink applied, resulting in some filling in of screens, and variations of tone between light and dark grey.

A more widespread problem is the variation of ink densities on different sides of the same sheet, resulting in alternate spreads being dark and light. In extreme cases this has led to distortion of letters. This is a common print problem but can be reduced by tighter quality controls, so that all sheets run for one title on press are checked against a standard density sheet kept for the purpose. The most evident examples are to be found in *Maths 2*, *Maths 3*, *Nepali 3*, *My Country 4*, *Sero Fero 4*, *Nepali 5*, *Maths 5* and *Sero Fero 5*.

### ILLUSTRATIONS

Most illustrations used are in black line only and present no printing problems. However the representations of Nepali bank notes in *Maths 2* and *Maths 3* need to be rescanned since almost all details have disappeared leaving only the numerical value to distinguish one from the other. *Maths 4* on the other hand (p 123) is very clear and represents the notes to their best advantage.

## SECTION MARKS

These black marks which identify each section in sequence for binding need to be replaced with marks half the present width. They never appeared when books were side-stabbed, but are now too obtrusive for a sewn book.

## BINDING

Almost without exception, books examined show a problem which could eventually jeopardise their durability. The covers had not been glued for the last centimetre of the spine at head and foot. Side gluers have likewise neglected this vital area of the book, so that covers are in danger of beginning to separate from the book block in due course. This has to be remedied on future titles if the pilot project is to succeed.

## COVERS

Generally good apart from a few titles where the cover will require re-imposing in order to achieve correct positioning on the bookblock. No colour should appear on the spine, and the background colour should bleed off at the foot without leaving a white band. See *Sero Fero 2, Environment 4, Maths 4, Environment 5, Nepali 5 and English 5*.

### 2.2.2 Design

The laminated covers look very attractive, giving the colours their full value, and enhancing the contrast between the durable and non-durable books.

Their appearance could benefit even further from an overall design review by the PPC, which would appear to be already planned. The main purpose should be to make the books look as though they belonged to the same 'family', with a clearly identifiable style for each book in the series.

Although the following points relate to the covers, the same principles of style also apply to the text:

- a) Use of a graduated colour tint or a solid, but not both
- b) Spine lettering in black only on a white spine
- c) Use of colour tint on back cover as standard
- d) Prepare a standard grid for covers so that text and illustrations always appear in the same relative position
- e) Keep text out of the illustration area

## JEMC LOGO

This may be an opportune moment also for JEMC to review their logo (which appears on the back cover of each book), so that it more closely reflects the dynamic image of a developing company.

This may seem a minor detail, but the power of a good logo should not be underestimated. European and American companies invest many hundreds of thousands of dollars in developing a good logo to represent them, and although JEMC is currently a state monopoly, this may not always be the case.

### 2.3 Raw Materials

Cover board and text paper were supplied from India and conform closely to the required specification.

Although no paper racking had been ordered or erected, the IBD consultant Tony Ashe was able to advise on suitable methods of storage on wooden pallets, stacking to a height of no more than two pallets. In addition, all paper and board were double packed as specified resulting in minimum wastage.

Trouble-free running on press meant that, although more expensive than the Nepalese papers supplied by Everest and Brikuti, the real cost of the better quality paper was little different. No spoilage rates were available, but staff suggested a rate of less than 5%.

#### PAPER USAGE (in sheets)

	<b>text paper</b>	<b>cover board</b>
Total ordered	4,666,0000	279,000
Total received at JEMC	4,617,000	281,600
Total used	3,112,500	154,000
Balance	1,504,500	127,600
Physical stock check	1,729,000	63,800

The quantity of sheets used would suggest that JEMC have produced nearer 600,000 books than the 483,997 listed. They claim that a total of 608,000 books have been produced, and that these are held in stock at Janak, although no such evidence has been seen by the consultant.

The paper remaining (verified in a physical stock-check) should be sufficient for a further 250,000 books, but the difference between actual and theoretical paper stocks needs to be resolved during the course of the consultant's next visit in November.

## 2.4 **New Plant and Equipment**

### 2.4.1 Pre-press

This department, with two G4 AppleMac computers, a high-end scanner and the imminent arrival of the latest Heidelberg imagesetter, will have some of the most powerful pre-press equipment in Nepal.

At present the G4 AppleMac's are being utilised as expensive typewriters. They were specified for the conversion of disks from the CDC and PPC, who are currently still providing hard-copy camera-ready copy (CRC) as before. If any corrections are required these are still carried out by the CDC and PPC, whereas JEMC now have more than enough capacity to make any last minute corrections themselves. The AppleMacs are also fully equipped with advanced design and photo manipulation software, as well as with QuarkXpress which combines text and illustration in final page format.

The department notably lacks a laser printer. The ink-jet printer supplied by DANIDA is for colour and black and white proofs, and does not have a high enough resolution to generate material suitable for reproduction.

*It is recommended that the laser printer in the internet computer room be installed in the pre-press department, or a new A4 laser printer purchased specifically for pre-press use.*

When the imagesetter is installed, digital logic dictates that the disks be sent direct to JEMC by the CDC and PPC, with a hardcopy print out for reference. The imagesetter will then produce negative or positive film of a complete title automatically saving the whole process of film production by camera. This alone should improve the crispness of text and help to avoid current inconsistencies in screen tints.

With compatible imposition software, the imagesetter will supply ready-imposed film in units of 8 pages, yet further improving speed and accuracy.

*If imposition software has not yet been ordered, it is recommended that it should be ordered and installed at the earliest opportunity in order to maximise the productivity of the imagesetter.*

Given the amount of highly sensitive digital pre-press and paper testing equipment in this department, it is imperative that it should be fully sealed from the exterior environment, and full air conditioning installed at the earliest possible date. For the same reason, the two entry doors into the computer room should never be opened simultaneously, and should be self-closing.

### 2.4.2 The New Bindery

The Astra sewing machines and the Wohlenberg collator and binding line have made one of the greatest contributions to the successful production of durable textbooks. JEMC now have the only automated sewn binding line in Nepal, producing with efficiency books which open easily and are securely bound.

The only quality problem lay in a failure to apply spine and side glue the full length of the book. This was of concern since it opened up the possibility of covers becoming detached from the book-block, but has now been corrected.

The other binding lines (for non-durable textbooks) produce side-stabbed books, which will continue to be the main binding style for JEMC textbooks until better quality paper is used. Sewn binding requires paper of a certain strength, otherwise there is a tendency for the cotton thread to break through the centre spread of each section, allowing it to fall out.

All training appears to have been correctly carried out by the machine manufacturers. A further 10-14 days training on the Astra sewing machines remains to be completed in order to iron out a few remaining adjustment problems.

Creases are, however, still appearing in folded sections of the durable textbooks.

These come from two possible sources:

- ❖ The automatic folders will produce creases on the centre section if the perforations used are insufficient to allow the air to escape on the final fold.
- ❖ If folded sections are tied with nylon straps, they are likely to crease in storage. All sections from the folders should be ram-bundled with wooden boards both ends.

All gathered and collated sets, sewn book blocks and finished books should not be stacked in excess of 1.5m high on pallets. There is a greater risk of wastage when this height is exceeded as sections in particular become less stable and frequently fall off.

Unless folded sections, collated sets or book blocks are being processed immediately, a heavy sheet of, say, cover board should be placed over the top layer of each pallet load to prevent dust accumulating.

#### 2.4.3 Packing

Shrink-wrapped packs are reasonably resistant to damp and dust, but have no protection from rough handling or dropping which can seriously damage them.

This is particularly serious for deliveries into remote areas like Darchula where packs of books are transferred from truck to donkey to man-back before their final destination.

It is proposed that the current books due to leave for Darchula, as well as any future durable textbooks, should be packed in double-walled corrugated cartons before despatch. These are readily available locally and should be made to size, in order to take four shrink-wrapped packs in one layer.

***1,000 cartons will be required for 50,500 books for Darchula, allowing an average 60 books per carton (4 x 15). The interior measurements should be 330 x 430 x 155mm high.***

It is crucial that the books have extra packing within the carton to avoid any movement of the books during transport and distribution. The cartons should then be sealed with packing tape top and bottom, and clearly labelled with title, grade and quantity.

#### 2.4.4 Waste Paper

It is part of a full quality control system that no waste materials are allowed to remain on the works floor, especially in operating areas.

JEMC suffers greatly from a lack of a system to handle waste paper on a minute-to-minute basis. The result is that operators of presses, folders, guillotines and three-knife-trimmers are frequently having to work with piles of waste paper underfoot.

Quite apart from health and safety considerations, it creates a bad environment for a quality conscious printer, and the problem needs to be addressed urgently.

Fortunately, the solution is simple and direct.

Construct a number of large containers - one per printing press, one per two folders, one for each guillotine, three-knife trimmer, collator and binding line. The construction should be as light as possible and fitted with small wheels (not castors) so that it can be moved easily even when full. A few extra containers should be available so that, while a full container is being wheeled away, it is immediately replaced by an empty one.

***The ultimate aim is that no waste paper or board throughout the whole plant is ever thrown onto the floor.***

### 3. JEMC – THE QUALITY ASSURANCE SYSTEM

#### 3.1 Introduction

The standard of technical quality achieved on the durable text books produced in July and August 2000 is a dramatic improvement on any books previously produced by JEMC, and a great credit to all those involved in their production. It is a significant proof that, with the correct machinery and good quality materials, quality standards approaching those operational throughout Europe are achievable.

However, it is equally clear that a quality control system is now required

- to operate at all production levels
- as part of an integrated management system
- to offer greater work satisfaction to operators

For JEMC this will require a complete change from a quantity- to a quality-based ethos. Given that up to 20 million textbooks are planned for production by next summer, great determination will be required by the management to change the quantity-based emphasis of the last forty years.

While this change requires strong encouragement from management at all levels, it will only work when operational staff progressively feel involved in the quality of work they produce. The durable textbook project has already provided ample evidence that all those concerned achieved a great degree of work satisfaction in their production, and the hope is that, as these guide-lines are adopted, the rest of the plant will feel progressively involved and committed.

#### 3.2 Preconditions

The preconditions for an effective quality assurance system are that

1. Realistic standards for each production operation are set and agreed with the personnel concerned.
2. These to be written down, translated into Nepali, and kept for daily reference in each production department
3. These standards to be monitored on a daily basis by the Quality Controller responsible.
4. Any problems in maintaining these standards should be discussed in detail at fortnightly production management meetings, with a carefully documented written record of each meeting indicating problems and solutions.
5. The Production Director should be ultimately responsible for the successful implementation and monitoring of the quality achieved in all departments.

#### 3.3 The System

*The first step in setting up the System will be the appointment of four Quality Controllers (QC's). The four Quality Controllers are needed to cover all shifts with one spare. They would all cover all areas of production unless management decide they would rather specialise.*

- 1 Their prime responsibility will be control of quality throughout the plant, and throughout each shift.
- 2 It is critical that they be fully technically qualified. If they find a quality problem at any stage of production they must know where to look for a solution

The system will work as follows:

- QC's will have an office to act as a base, but will be expected to move around the plant throughout their shift carrying out spot checks on film preparation, plate-making, printing and binding.
- QC's will be responsible for 'signing off' each of the following items
  - (a) film flat
  - (b) printing plate
  - (c) printed sheet (text and covers)
  - (d) folded section
  - (e) collated sections
  - (f) sewn or side-stabbed book-block
  - (g) finished trimmed book
  - (h) shrink-wrapped packs
- QC's will receive signed sheets, sections, collated sets and finished books back from operators as soon as they have completed their part of the job. They will be expected to keep these for 3 months against quality complaints.
- QC's will also be responsible for keeping a detailed daily record of any quality problems encountered on a *Quality Assurance Sheet*, including the following details:
  - the book title
  - date
  - page numbers / section number
  - machine
  - operator
  - quality problem
  - action taken to solve the problem
  - any significant loss of machine time.
- QC's will meet with the Production Director at regular fortnightly Production Meetings with their *Quality Assurance Sheets*. These should be used as a basis for discussion of any quality issues which have arisen over the previous two weeks.
- Machine Operators (the person charged with the correct running of his/her machine) will be responsible for
  1. obtaining a signature from the QC for each new flat, plate, sheet, section etc,
  2. using the signed copy as a constant reference for maintaining the agreed quality during the production run

3. in the event that quality falls below the level shown on the signed sheet or section, and that the operator cannot himself solve the problem, the QC should be called immediately
4. Completing a detailed *Quality Control Card* ( see sample set in Appendix) to show that he has carried out all required quality checks. Detailed check points for each production department are listed below.

### 3.3.1 Pre-press

This is the first production department to handle material received from the CDC and PPC.

As such it is essential that the closest liaison is made between the CDC, PPC and JEMC in order to improve planning and scheduling, as well as resolving technical and design issues between the three parties.

It is apparent that there is little regular liaison between them at present – designers at CDC and PPC had not seen the new prepress equipment at JEMC at the time of this report. It is suggested that, as soon as the imagesetter is installed, CDC and PPC should be invited to see the upgraded Prepress Department, and to review the extra facilities then available.

#### QUALITY CHECKPOINTS

- CRC to be checked carefully for accuracy and completeness – screen tints in particular need to be examined under a minimum 15x magnifying glass.
- Disks received need to be checked on screen to ensure that they correspond in every way with the hard-copy printout supplied.
- Film from the imagesetter must be checked for completeness, consistent density and (if imposed) correct imposition
- If more than one colour is involved (e.g.covers) a proof should be taken on the colour printer for checking correct colour separation and positioning.
- A *Quality Control Card* should be completed before the CRC or film is sent to the camera or platemaking departments.

### 3.3.2 Film Preparation

#### QUALITY CHECKPOINTS

- Check CRC for image quality, completeness and accuracy
- Check film for consistent and correct density
- Check film for scratches or blemishes
- Check film for completeness and accuracy against CRC or hard-copy printout
- Check imposed flats for accuracy (squareness and positioning)
- Check that section marks have been correctly inserted. NB. for sewn books these should be no wider than 5mm
- Check covers are correctly positioned for spine width and bleed
- Complete *Quality Control Card* before sending film flats for platemaking

### 3.3.3 Platemaking

Two kinds of plates are currently in use: pre-sensitised and re-surfaced plates. Both are exposed to 12-15 seconds UV light on an automatic vacuum frame, before automatic (pre-sensitised plates) or manual development.

Most plates are recycled, although where runs are short, some plates are stored for re-use. Since these are merely stacked against a wall, they are subject to scratches and other damage, which show up as marks on subsequent reprints.

*It is recommended that, if vertical racking cannot be provided, then at least a paper interleave be taped to each plate to protect the printing surface.*

### QUALITY CHECKPOINTS

- Check imposed flats are clean and without blemish or scratches
- Check that new developer is used in the automatic plate processor after a maximum of 40 plates have been processed
- Check finished plates for scratches, missing image areas, even tint screens, extraneous dust or dirt marks
- Complete *Quality Control Card* before plates are sent to the printing press

### 3.3.4 Printing

This is one of the most critical departments within JEMC. Provided that film and plates supplied are correct, it is the quality and accuracy of printing that largely decide the final appearance of the finished textbook. Although the main presses range from six to twenty years old, they are still perfectly capable of producing good work, as shown by some of the new durable textbooks.

Maintenance is a vital factor in the efficient performance of any production machine, and especially so with printing presses where a delicate balance has to be maintained between fountain solution and printing ink, plate and blanket, and in particular the condition of the paper or board.

While presses are given a thorough clean once a week, it is clear that this is insufficient. The Nepalese papers used create a great deal of paper dust which settles on the entire press – the Komori perfectors, in particular, had 2mm of dust covering the entire upper superstructure. This has serious effects when trying to keep plate and blanket clean on the run, and creates print problems especially on solids or screens.

For this reason, every printing press should have all dust cleaned off with a damp cloth *before starting work each day* in order to minimise quality problems and prolong the life of the machine.

## QUALITY CHECKPOINTS

- Check plates for serious scratches or other marks which will transfer to the printed sheet. If these are found, ask for a remake of the plate and note on the *Quality Check Sheet*. Move on to the next plate available.
- Check paper quality and condition. If the condition of the paper is such as to seriously affect machine speed or accuracy, call the Quality Controller, and enter on the *Quality Check Sheet*.
- When machine make-ready is complete, the following items need to be checked:
  - *Correct imposition when folded*
  - *Pages square to sheet*
  - *Correct ink density (minimum quantity of ink required to give a solid image)*
  - *Screen tints clean with no 'filling in'*
  - *No extraneous marks or scratches inside the trim area*
  - *When 'backed up' (printed both sides) pages and folio numbers should fall exactly on the same position as the relevant page on the reverse of the sheet*
- After these checks, take pass sheet to the Quality Controller for checking (same checks as above) and signature
- The signed sheet should be kept alongside the press for reference throughout the run
- The operator should check every 400 sheets against the signed pass sheet
- Any sheets which fall below the agreed quality level (the signed pass sheet) should be treated as waste and removed from the printed sheet pallet
- If problems occur on press which involve more than 10 minutes lost machine time, this should be noted by the operator on the *Quality Control Card*.
- On completion of the job, the signed press sheets should be taken to the Quality Controller for safe-keeping.

### 3.3.5 Binding

## QUALITY CHECKPOINTS

### *FOLDERS*

- Check sheet has been correctly imposed (correct page sequence)
- Check all folds are absolutely square
- Check that there are no top corner creases – larger perforations may be required
- Reject any obvious waste sheets left in the printed sheet stack
- After final make-ready, take folded section to Quality Controller for signature
- Keep signed signature by folder until job is complete, when it should be returned to the Quality Controller

### *COLLATOR AND SEWERS*

- Check carefully that sections are placed in the hoppers in correct sequence
- Reject any obvious poor sections (out of square, badly creased, incorrectly printed etc)

- Check section sequence step-wedge section marks
- Check tightness of sewn book block
- Take sewn book block to Quality Controller for signature
- Keep signed copy by sewer until job is complete, when it should be returned to the Quality Controller

#### *BINDING LINE*

- Check adhesive application correct for full length spine and side gluing
- Check that the correct glue temperatures are being maintained (slightly higher for side glue)
- Check hot-melt spine glue film thickness is maintained at 1.0 – 1.5mm thickness
- Check glue application rollers regularly to ensure they are running clean, and apply the full depth of adhesive
- Check three-knife trimmer is allowing correct margins throughout the book and correct cover trim
- Check that there are no visible cut marks on the book edge, indicating that blade requires sharpening
- Take first complete sample after make-ready to Quality Controller for signature
- Keep signed copy by binding line until job is complete, when it should be returned to the Quality Controller

#### *SIDE-STAB BINDING LINES*

As above but with following additional items:

- Check that correct weight of wire is used for size of book
- Check that wire is set correctly so that the two ends almost meet but do not overlap
- Check pressure of wire-nip to ensure wire lies absolutely flat on the page, neither digging into it nor sticking up into the cover

#### *FINISHING*

- Check lamination has no bubbles or tendency to delaminate
- Check shrink-wrap packs of books are firm and well sealed

#### *PACKING*

- Check cartons are correctly packed to allow no movement of books within the cartons during transit
- Ensure cartons are sealed with tape top and bottom
- Attach labels with title, grade and quantity to each carton

#### **4. CONCLUSIONS AND RECOMMENDATIONS**

The easier part of the pilot project – the production of higher quality textbooks – is a great success.

Good materials, new machinery and careful training have resulted in a good quality product, and all those associated with the production of the new durable textbooks should rightly be proud of their achievement.

The more difficult aspects of this project are now in hand; ‘more difficult’ since they involve the introduction of management concepts which are new to JEMC – concepts of cost, planning, scheduling and quality control. These involve highly detailed and meticulous procedures, outlined in this report and the parallel report by IBD consultant Tony Ashe.

While the benefits of new machinery and materials are highly visible and immediately appreciated by printer, teacher and student alike, the introduction of detailed management systems shows benefits over a longer period of time, as the company gradually improves its efficiency, and gains control over all aspects of its operation.

The following recommendations summarise the points raised in the body of this report.

##### **a) Pre-press**

Provision of the following items:

1. Laser printer (A4) for outputting reproduction-quality text and line illustrations in hard copy form.
2. Imposition software to produce imposed film from the image setter ready for final stripping and plate-making.
3. Air conditioning for the pre-press computer room.
4. Self-closing doors for entrance to the computer room to maintain an ambient temperature and to exclude dirt and dust.

##### **b) Packing**

1,000 double-walled corrugated cartons for all books supplied to Darchula.

This is urgent (for end October), and involves expenditure of no more than NR40,000. It is also crucial if the textbooks are to be protected during distribution.

##### **c) Waste Paper**

A comprehensive system of mobile waste paper containers at all points where waste paper is created. This is crucial for health and safety, and for the general efficiency of the plant.

##### **d) Quality Assurance System**

After discussions with each production department, a complete quality control manual was left with senior management (Ramesh Joshi, Subarna Pradhan and Ramchandra Silwal).

1. The manual is to be translated into Nepalese, ready for the consultant’s return in November 2000.

2. Any amendments are to be made in November after full discussion with those involved.
3. A team of technically qualified Quality Controllers are to be appointed with guidance from the consultant. They will move into operation during the consultant's November visit.
4. A senior member of JEMC management (ideally the Production Manager) should be appointed as the responsible person for all quality control.

**e) Management Training**

Once the quality control system becomes fully operational, and is judged to be running according to plan, 8-10 carefully selected members of staff directly involved in its implementation, would benefit from management training.

This could be for a period of 6-8 weeks with a printer in Singapore who is already running similar control systems. Given the practical difficulties in releasing key workers, it may be advisable for them to go in two separate groups so that they are not all away simultaneously.

This lies outside the immediate Danida project, and it is recommended that JEMC puts together a plan. Such training is central to the success of quality assurance, and needs to be implemented within the first 6 months of 2001.

## **5. NEXT STEPS**

The following technical assistance inputs are recommended:

- a) 2 week consultancy 20 November – 1 December 2000
  - to finalise the quality control system during meetings with key members of staff
  - to assist in the selection of the 4 Quality Controllers
  - to introduce the system to operators in each production department
  - to assist in the implementation of the system throughout the plant
  
- b) 2-3 week consultancy February-March 2001  
To coincide with the reprint of durable textbooks, and to ensure that all aspects of the quality control system have been implemented.
  
- c) 2-3 week consultancy May-June 2001  
To check the implementation of the quality control system at the peak of the production season when quantity pressures are most likely to endanger efficient quality control.



## APPENDIX

### QUALITY CHECK SHEETS

These sheets are for the use of machine operators throughout the plant.

The only exception is the Quality Assurance Sheet (next page) which is solely for the use of the Quality Controller. The Quality Check Sheets would be supplied to each machine operator in pads, and filled in at the start of each run.

They are to be used to ensure that full quality checks are carried out before each successive stage of the book production process is undertaken.

They will also be used as a record of quality checks made on each title, so that they are available for reference in the event of subsequent quality problems.

They are also designed for use at the fortnightly Quality Control Meetings if required



**Quality Assurance Sheet**  
**QUALITY CONTROLLER**

Date	
Book Title	
Section / page numbers	
Operator	
Machine	
Quality Problem	
Action taken	
Loss of machine time (over ten minutes)  Other observations	
Signed (Quality Controller)	

**Operator's Quality Control Card**

**COMPUTER / IMAGESETTER**

Date			
Book Title			
Section / page numbers			
CRC accuracy completeness screen quality  DISK Checked against hard- copy – OK?			
FILM - text Density Accuracy Completeness			
FILM – cover Density Accuracy Completeness			
Signed (Operator)			
Signed (QC)			

# Operator's Quality Control Card

## FILM PREPARATION

Date			
Book Title			
Section / page numbers			
CRC accuracy completeness screen quality  FILM – TEXT Check against CRC Density Accuracy Completeness			
FILM – COVER Density Accuracy Completeness			
Signed (Operator)			
Signed (QC)			

**Operator's Quality Control Card**

**PLATEMAKING**

Date			
Book Title			
Section / page numbers			
IMPOSED FLATS Clean Blemishes or scratches Correct imposition  PLATES Clean Blemishes or scratches Correct density Good screens			
PLATE DEVELOPER Check all materials			
OTHER			
Signed (Operator)			
Signed (QC)			

## Operator's Quality Control Card

### PRINTING

Date			
Book Title			
Section / page numbers			
Machine			
PLATES Scratches or other marks			
PAPER Quality Condition			
MAKEREADY – check Imposed sheet (fold) Pages square to sheet Ink density – same both sides Screen tints Accurate backup Dirty marks or scratches			
Loss of machine time (if over ten minutes)			
Signed (Operator)			
Signed (QC)			

**Operator's Quality Control Card**

**FOLDING**

Date			
Book Title			
Section / page numbers			
Machine			
IMPOSITION			
SQUARE TO SHEET			
TOP CORNER CREASES			
OTHER			
Signed (Operator)			
Signed (QC)			

**Operator's Quality Control Card**

**COLLATING**

Date			
Book Title			
Section / page numbers			
Machine			
SECTION SEQUENCE			
FAULTY SECTIONS			
STEP-WEDGE SECTION MARKS			
Signed (Operator)			
Signed (QC)			

**Operator's Quality Control Card**

**SEWING**

Date			
Book Title			
Section / page numbers			
Machine			
SECTION SEQUENCE			
FAULTY SECTIONS			
TIGHT SEWING			
Signed (Operator)			
Signed (QC)			

**Operator's Quality Control Card**

**BINDING- SEWN BOOKS**

Date			
Book Title			
Section / page numbers			
Machine			
ADHESIVE Full length of spine Full length of sides Spine glue temperature Side glue temperature Spine glue thickness Side glue thickness			
COVERS Scored 4 scores Square to book Spine correct position Correct bleed 3 edges			
THREE KNIFE TRIM Correct trim Blades sharp			
Signed (Operator)			
Signed (QC)			

**Operator's Quality Control Card**

**BINDING- SIDE-STABBED BOOKS**

Date			
Book Title			
Section / page numbers			
Machine			
<b>SIDE STAB</b> Correct wire weight Correct wire setting			
<b>ADHESIVE</b> Full length of spine  Spine glue temperature  Spine glue thickness			
<b>COVERS</b> Square to book Spine correct position Correct bleed 3 edges			
<b>THREE KNIFE TRIM</b> Correct trim Blades sharp			
Signed (Operator)			
Signed (QC)			