Complete assignment report

Inquiring Institution:
Nepal Ceramics Cooperative Society
Thimi, Bhaktapur, Nepal

volunteer pottery consultant
Peter Fink, ceramist

supported by
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Index:

This report is dedicated to all previous

and further ceramic experts in Nepal

Bhaktapur square, with traditional car

Introduction:

Nepal Ceramic Cooperative Society (further: NCCS) inquired in 2003 to Swisscontact "Swiss Foundation for Technical Cooperation", an assignment for a Senior Expert to come to Thimi. This second "Swisscontact Senior Expert Corps"-assignment is taking place four years after the assignment of Mr. Jules Kuster. Other experts have been working at NCCS before, and for longer times, and many members have been trained for ten years by a GTZ-Project (German Technical Cooperation) in Bhaktapur stopped in 1994.
For this one-month assignment, Swisscontact proposed me: Peter Fink to NCCS, as a person with the required profile. Independent ceramist and vocational teacher for Technology, Business management and Marketing, I have been contracted one year before my assignment in Nepal.
For my stay NCCS specially hired Sun Hari Prajapati to assist me in my work.
The main aims of my mission had been described as follows:

- improve the quality of glazed red clay production (prevent glaze crazing, chipping, stronger body)
- increase production capacities of members workshop
- improve market information
- improve business environment and relations for export
- increase technical knowledge
- get government attention for recognition of potters skill

First meeting: assignment program

A. Working methods:

1. Sources of information

To get best background information about Ceramics in Nepal, collected information as follows:

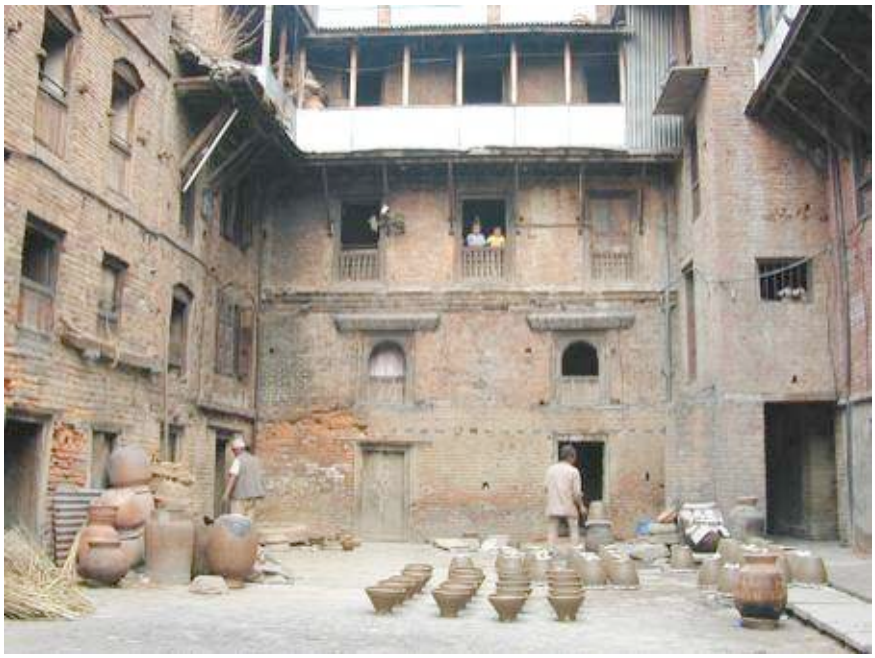
- I visited different NCCS-members workshop, to better coll information, a questionnaire (see appendix) has been elaborated.
- I contacted previous experts (some of them with more than 10 yea experience in Nepal), Jules Kuster, Robert Hausner, Jim Danish a Reid Harvey.
- Visits and meetings in related organizations: Skat-consulting (Verti Shift Brick Kiln-Project in industrial ceramic brick production in Lalitpu Association of Crafts Producers Nepal (commercial partner and expor of ceramic products), Fair Trade Group Nepal (Nepali promoter a exporter of crafts product), the SOS (Foundation for Ceramic Traini and the Ceramic Promotion Unit (CPU) in Bhaktapur (Governmer Organization and Training institute)
- Meeting with the director of skill testing program Mr. Chandra Bha Nakrami, and visit to the Council for Technical Education and Vocatio Training (CTEVT) in Sanothimi.
- A stoneware export project done by ceramist Ani Kasten in Th Ceramics, and supported by an American Foundation.
- Documents relative to a recent Grant equipment Project (20(prepared by Robert Hausner too "Deutscher Entwicklungs Dienst" (o Û 200'000.-), for NCCS, Association for Crafts Producers and Janak Women's Development Centre (cancelled for interne reasons betwe the three receiver organizations).
- One year assignment report of Thekla Stegemeyer (1995/96)
- Analyzes of all available technical researches done in Nepal by cooperative, previous experts and Ceramic Promotion Project (CPP).


Brick and tiles production of NCCS member

2. Practical researches

All practical researches had been made in difficult conditions with very l equipment in the NCCS-Office with the kind help of CPU for regula

electric firings and Krishna Art for fritting and tiles extruding, as well Thimi Ceramics for glaze milling.
A problem was that previous researches had not been documen usefully. I had also the impression that the information provided by NC before and during my stay was voluntarily hidden; I had to collect lot information like a "detective".



Traditional pottery production in Old Thimi

3. Meetings:

Every Friday evening, a weekly review of 2 hours have been spent w interested members and staff to comment researches, analyzes and t results, time for exchanges and to approve next steps and test ro Other smaller meetings with staff have been held.

Friday meeting with members in the NCCS office room

4. Trainings

In addition to the consultant work three small workshops have be organized to train members on different subjects and to take b advantage of my training capacities.

Very clear communicated the training-meetings still remained in sn groups.

Training No III: Nepali Potters talking about form and design

B. Practical researches done:

1. clay related

á **introduction:** every NCCS-member produces her own cl some members use ready made Dang clay. The Kathmandu Valley h many pits with very good quality. Thimi-clay will not be available in a f years and could be replaced by the Lele-clay pit. A first contact has be established with authorities. Dang-clay has a good quality but comes fr far away (transport costs).
Clay researches done by CPP (1994) and Jules Kuster (2000) are n used in practice; the recommendations have not been followed in spite quality problem.

á **aims:**
Make the body stronger, without warping tendency and increase therr expansion of clay to better-fit glazes. The colour should not be affect too much. Ensure using local clay materials on long term.

A Bhaktapur clay pit

á **researches:**

Dang and Thimi clays have been tested in Switzerland before assignme
No Calcium Carbonate content has been detected. Sieve analyses dic
detect disturbing particles. Porosity and behaviour to temperature whe
judged normal for this kind of clay. Warping was observed over 1110¡C.
clay tests are glazed with upper part NCCS-glaze and lower part CG 2
All test where fired in electric Kiln up to 1080¡C. Some tests also in
Kerosene Kiln, but over fired to 1120¡C! With no other significant chang
as provided by higher temperature.

Dang-clay, Thimi-clay and Lele-clay has been (re)tested as follows:
100% clay
70% clay - 30% Talc (recipe CPP)
81% clay - 12% Marble - 7% Talc (recipe Jules Kuster)
70% clay - 30% Fireclay (F1)
70% clay - 15% Fireclay - 15% Feldspar (F2)
At 1080¡C all clay are stoneware hard fired (stronger than steel).
Warping tendencies have only been observed on pure Dang-clay and pu
Lele-clay. Total shrinkage 9-11% (except CCP-recipes 6-7%)

Dang and Lele-clay are almost identical with darker colour, glazes
Thimi clay has worth crazing tendencies, that's why we follows with t
clay. Recipe CCP with 30% Talc gives a very (to?) clear colour.

2. test row
70% Thimiclay - 30% Quartz (F3)

75% Thimiclay - 15% Marble - 10% Talc (F4)

3. test row
75% Thimiclay - 10% Marble - 9% Quartz - 6% Talc (F5) 7%porosity
63% Thimiclay - 27% Talc - 7% Quartz - 5% Marble (F6) 8%porosity
69% Thimiclay - 16% Talc - 8% Quartz - 5% Marble (F7) 8%porosity

Best results observed with recipe F5 with very little differences to other l test results.

All workshops confirmed very good working behaviour in practice. And t added small amount of raw materials should not affect too much t behaviour of the clays in the production cycle. But the warping tendenc most absolutely bee reconsidered in practice.

- **recommendations and follow-up:**

Make a last test in usual production cycle with 100 kg of clay with rec No. 5. If ok, recommend to your members to mix their clay with recipe N 5. If a problem will appear in daily working practice by firing up to 1080 the clay composition should be reconsidered and adapted consequence. The same if the clay layers in pit changes.
Guarantee access to the Lele clay pit or search for others, sufficien large and regular local clay pits in Kathmandu Valley.
Plan seriously to bring up in the next 5 years a clay production unit supplying all members of a regular and good quality of clay for glaz ceramics. As a clay producer it's then up to NCCS, to check the c quality before, while and after production by right analysis. Memb better concentrate their energy in production, design and commerce ceramics than producing small amounts of clay in small production units Clay production can provide serious and regular income to NCCS.

glazed ceramics, Dan Krishna Prajapati

2. glaze related

á introduction:

To glaze local red clay, without using lead compounds, a selected a very precise glaze technology is needed. Firing temperature, r materials, glaze-production and glaze-composition are to be check regularly. The CPP-project introduced a small-scale industrial technique technology of glaze fritting (production of glass powder) in Nepal in t eighties. As they left Nepal in 1994, NCCS continued the frit producti Members of the cooperative are not satisfied by the glaze-frit produced the Cooperative. The Alkali-borosilicate glaze-frit develops colours well l crazes and gives a very ÒwildÓ glaze by dissolving engobe colours, this usual for this type of glaze.
No quality control is made by the cooperative and members consider t glaze as irregular.
In 2000 Jules Kuster proposed to NCCS to replace the self made frit by mix of two Degussa frits with good results. These frits are not produc anymore. But the recommendations have never been followed or ev tested in real production cycle.

á aims:

Find a glaze or change frit-formula to provide a non-crazing transpar glaze for red clay production.

á researches

I decided to follow three different parallel researches:
A: searching for industrial frit producers in India, Thailand or China
B: test new frit recipes without crazing tendency
C: Improve existing frit

raw material store-room at NCCS

Strategy A: working with a industrial glaze frit

Previously I tested successfully on Dang and Thimi clay, indust European Frits: Ferro 52 455, Glazura 099 91 and also 2 white glazes. No crazing and good colour development has been observed.
Also I got informed about the costs from Europe to Nepal (frit ~240Nrs + shipping ~70Nrs/kg + Nepali import taxes?). These were judged as high.

In this aim, usual Indian NCCS-suppliers have been contacted per E-Mail as well as a frit producer in Thailand and China.
From Sahaj 4 glaze samples arrived within 5 days. Starke-group a responded and sends 2 glaze samples that couldnÕt be tested befor was leaving. A Thailand's supplier was only interested to supply lar amounts. Other (~10) suppliers did not respond.

Tests to see the influences of the main raw-materials on this glaze addition of 20% of each (to 80 % CG 231): Feldspar / Kaolin / Quart $BaCO_3$ / Wollastonite / Marble / ZnO / Talc / Thimi clay
By addition of 10% to 90 % CG 231: $MgCO_3$ / TiO_2 / $ZrSiO_4$ / $MnCO_3$
We obtained a very large palette of interesting results for memb training and further glaze researches.

Sun Hari prepares triaxial tests with industrial glaze CG 231

Sahaj (Exel) transparent glaze **CG 231** has been tested. No crazing w observed in 1080¡C on all clay samples. The clay colour changes a li and if applied thick, cloudy effect appears. A very little boron effect a appears.

Triaxial tests to try to reduce very small boron effect in CG 231
A= 97% CG 231 + 3% Bentonite
B= 75% CG 231 + 3% Bentonite + 20% Barium Carbonate
C= 75% CG 231 + 15% Kaolin +10% K-Feldspar


Shree Krishna Prajapati fritting in his frit kiln

For transparent glaze best recipe in Strategie A:
90% CG 231 - 7% BaCO3 - 3% Bentonite - +CBC

For white glaze best recipes in Strategie A:
Sahaj (Exel) white glaze **CG 212** has been tested. No crazing w
observed in 1080¡C on all clay samples. Typical perfect zirconium whi
Well to be used in usual work conditions on pieces. Easy but sm
colouring possibilities of this glaze possible.
2 other alternatives were tested very successfully:
80% CG 231 - 12% Marble - 8% ZrSiO4
50% CG 212 - 40% CG 231 - 6% Marble - 4% ZrSiO4
The first alternative permits to buy larger amounts of transparent gla
(better price and less storage problems).


Shyam Shresta loads crush bowl with test frit

Strategy B: test other frit recipes without crazing tendency

10 different glaze recipes (transparent and white) using European r materials and frits had been tested in Switzerland before assignment Dang and Thimi clay. Some tiles had been tested in autoclave "20 yea guaranty". At the same time a small piece fired at 1080¡C, with NCCS- glaze had been autoclaved, no crazing appeared. Some recipes dic present crazes and boron effect was often observed. Research has-be stopped to bee picked up later with local frit raw materials. Three test f recipes have been melted in crush bowl for further and finer tests. C recipe got lost in milling. 2000g of transparent and white frit has be melted and milled in small ball mill for 8 hours.

frit milling at NCCS workshop

Transparent glaze:

Compositions transparent test frit 2:

0.275 K2O
0.160 Na2O 0.055 Al2O3 2.926 B2O3
0.365 CaO 0.320 B2O3
0.048 MgO
0.077 BaO
0.075 ZnO

Recipe for fritting test 2:

Quartz 50% - Borax 20% - Marble 12% - K-Feldspar 10%
Potash 10% - Barium Carbonate 5% - Talcum 2% - Zinc oxide 2%

With frit No 2 a 7 steps Triaxial research has been made for detecting b
Al2O3 - SiO2 relation and appearing boron effect:
A= 97% Frit2 + 3% Bentonite
B= 55% Frit2 + 40% Kaolin +5% Marble
C= 55% Frit2 + 33% Quartz +5% Marble +7% Kaolin
No crazing, well melted but much bubbles observed in upper part (A).
To high Aluminium oxide content in corner (B).
Very small boron effect was only observed in high Silica corner (C).
Best result: Test frit 2 69.17 %
Kaolin 10.33 %
Marble 3.30 %
Bentonite 2.67 %

White glaze:

Compositions white test frit 3:

0.100 K2O
0.200 Na2O 0.400 Al2O3 3.300 SiO2
0.500 CaO 0.600 B2O3 0.200 ZrO2
0.100 BaO
0.100 ZnO

Frit recipe:

Quartz 31% - Borax 16.6% - Marble 11% - ZrSiO4 8.1% - Soda ash 6.3%
Potash 6.1% - Kaolin 5% - Barium Carbonate 4.4 % - Talcum 2% - Z
oxide 1.8%

For glaze recipe: add 13part Kaolin to 100part frit 3 (weight after fritting)
Gray glaze with bubbles and small crazing tendencies.
No ready to use results could be found in this first test rows. Time is sh
and usable results still far away.

Strategy C: Improve existing frit

We mixed up three 5-step test rows by mixing NCCS-Glaze with 3
Quartz, 20% Marble and 20% Wollastonite to reduce crazing tendency.
Small betterment with up to 10% Marble, always boron effect v
Wollastonite and possibility to ad up to 7% Quartz without melting chang

We mixed up 7step test row with Test frit 2 and NCCS.
Best recipe without crazes called **Transition frit:**
33% Borax - 33% Quartz - 15% Feldspar - 5.8% acid Boric - 4.8% Bariu
Carbonate - 4% Marble - 3.3% Potash - 1.8 Zink oxide - 1.8% Talc //
add 12% Ball clay after fritting

Alternative transition glaze also tested successfully:
60% NCCS-frit - 28 %Test frit No2 - 4% China Clay - 6,6% Quartz - 1,4
Marble

á **recommendations**

Producing of small amounts of frit in glaze in small kiln and ball mill
small quantities is not economically viable. Making this huge work with
any quality control and an unsatisfying result is irresponsible.
Replace self-made frit by industrial frit.
Close follow up to suppliers need to be done, even when it is very hard
deal with Indian suppliers. If there is no result by phone and mail,
personally to India to pick up samples and material by truck. It will also
a good way to buy your material once a year directly in India.
Transition possibility:
Use Strategy C, use reviewed transition-frit, and fire a medium amount
this similar frit and test in real conditions (1080¡C).

typical Nepali Kerosene kiln, build in 2005 , Tej Bahadur PrajapatiÕs workshop

3. firing related

á **introduction**

Use of Kerosene steam burner in brick kiln and firing technology is v similar in most workshops producing glazed ceramics. The steam burr is loud. The temperature differences are high (over 20¡C) and t members do not control enough their firing temperature (some do not all!). Firing temperature is 1000¡C -1040¡C.

á **aims**

Improve ceramic quality

á **researches done**

Temperature control has been done with Process Temperature Cont Rings in different places of the kiln. Good results, only 20¡C differences the tested kiln. The final firing temperature was with 1020¡C to low.

typical Nepali steam-Kerosene burner

Pyrometers: The measurement differences between 2 differe pyrometers at the same place where 150¡C ! The pyrometers are r protected by porcelain tube, corroded and are not precise.

Self made cone research: to get economic and clay related cones tested with mixes made of Thimi-clay and CG231.

A plaster mould to produce double cones by pressing has be made.

plaster mould for double cone pressing

A first range of a 9 step-research was mixed as followed:
88% Thimi - 11% CG 231
83-16% / 78-20% / 73-25% / 69-30% / 64-35% / 59-40% / 54-45%
50% Thimi – 50 % CG 231

For 1080¡C we recommend following mix:
64% Thimi clay - 36% CG231
This mixture has to be made by wet prepared clay, and sieved to 1 meshes. At the end of the firing the cone should just reach and touch slabs. Always test new production mixture, in comparison with old before using. Because of clay pit changes.

Used firing schedule:
Following firing schedule for glaze firing was used in controlled electric l at CPU in Bhaktapur:
180Õ to 150¡C – 240Õ to 1020¡C – 100Õ to 1070¡C – 30Õ to 1070¡C
Controlled by PTCR-rings this schedule shows a final firing temperature 1080¡C .

á **recommendations**
Control final temperature with cones in every firing.
Fire up to 1080¡C, with slowly finish 1 hour from 1040¡C -1080¡C.
Use protected pyrometers to avoid corrosion, and better precision.

Self-made cone research

Kopan Gompa: rich and colourful cultural heritage

4. colour related

á introduction

NCCS is supplying to their member a small palette of colour engob colour glazes, industrial stains and a self-made black under glaze colc CPP Engobe-base has been changed later without any test (replacement of 30% Talc by ZrSiO4 ; a pure non sense!).

á aims

Make colours visible in the office by systematic sampling of all availa products. Enlarge engobe colours palette and invite to perso researches. Improve base engobe for dark and light colours.

á researches done

Engobe colour:

Comparison of changed base recipe:

1= used recipe 30% Kaolin – 25% Ball clay – 30% ZrSiO4 – 5% ZnO – 10% CG231
2= CPP recipe 30% Kaolin – 25% Ball clay – 30% Talc – 5% ZnO – 10% CG231

The (old) CPP recipe is better and much more economic!

Engobe tests for white and dark base engobe.

3= new recipe white 30% Kaolin – 40% Ball clay – 10% Quartz – 10% CG212
4= new recipe white 50% Kaolin – 10% Ball clay – 20% Quartz – 20% CG212
5= new recipe dark 60% Thimi clay – 20% Shiusa clay – 20% Quartz

New colour test have been made with base 4 (best results on green cl and base 5 for dark colours.
Available colour stains have been mixed (+10%) and samples made.
Important oxides have been added (+3-6%) to show the influence engobe colours.
Engobe samples have been glazed with NCCS-glaze (upper part) a CG231 (lower part).

Glaze colours:
Glaze samples have been made to show the colours to the NC customers.
In the upper part of sample tile:
available colour stains in Òon glazeÓ- technique on white glaze CG 212
Lower part of sample tile:
colour stains have been mixed in CG 231 (+10%)Òin glazeÓ- technique

á **recommendations**

Follow this first palette by adding more colours and oxides. Use n Engobe bases and glazes in practice.


Engobe production from Krishna Kaji Prajapati

C. An organizational approach:

location of NCCS-office and store-room in Old Thimi

2. NCCS office organization related

á **introduction:**

The NCCS office is very well located in Thimi. Members use this situat for exchanges, tea drinking and serious meetings. Meetings are held the office.
Suppliers listing and product information are not available or not v classified.
Office seems not well cared for. Drawers are filled up with old stuff.
Paper work seems not classified or ordered. Invoices are stored dou and useless papers and books are still kept.
Office fit out is ok, but not practically installed.
There is only one telephone line for three working persons, Fax a Computer, but NCCS-header shows special Fax number.
A small library is available (ceramic technique and managing).
No samples or done researches can be seriously seen or followed.
Some raw material powders are stocked in the office for testing. Some them do not have labels or are wrong written.

á **aims:**

Improve efficiency and productivity of NCCS.

á **actions:**

- I decided to separate dust work from office work and meeting room. V held some meetings with staff to redesign and rearrange office room a

store room.
- We started a supplierÕs list with complete production information a price, to be updated regularly.
- Stock report (raw-material inventory) haze been changed in a new fo (Excel list with more useful information).
- Writing of correct raw material names has been corrected and update inventory is going on.
- Labels for the plastic containers with necessary product information ha been introduced (toxics).

reorganisation of office-room by Binu Shresta

á **recommendations:**

For long term survives of NCCS, I recommend to respect meeting tim
(some members do not attend anymore) and work more tightly.
Management control from side of Cooperative members and fr
president is needed, all office work has to be seriously rechecked, and
tasks redefined. For that item create a work-group or consult a skil
office related person. Start this huge work now.
Working hours of staff strictly respected. Part timework is also possit
the staffs seem under occupied and not well trained. On the other s
staff should be paid correctly.
In short: tending to more professionalism.
The NCCS suppliers list has to be continuously maintained and ordered.

NCCS-Manager Pancha Krishna Prajapati

3. NCCS production and workshop related

á introduction

The room used for storage, ball milling, glaze preparation etc. is small the size of NCCS. No possibility to produce clay here. Additional outs area for fritting and drying of glazes is available but not practical. T whole situation is not suited for this kind of work. No car accessibility, sn narrow and rooms on different levels. No water. This room should also ready for testing activities, but no quality control is made systematica The raw material is stocked in bags all over without any system. Colour materials are kept beside of white materials and toxic materials are marked. Bags are kept open, and all is extremely dusty, no possibility clean the floor correctly without vacuum cleaner.

unloading a raw material tr in front of NCCS store-room

á **aims**

Improve efficiency, quality control and productivity of NCCS.

á **actions**

I started systematic planning of this area. Therefore a plan has be elaborated. For more security running belts and wheels has be recovered ore made surer. The raw material in small boxes stored in t office, joins now the big, ordinary bags. No more doubles are kept.

narrow NCCS store-room and workshop

á **recommendations:**

Store with system: stain and colouring oxide, clay material, stone powd soluble frit material, frit and glaze. Kiln material.
Make always fast accessible: Scissor, tape, marker and huge trash box empty and very dusty bags.
Mark every material, every bag correctly and mark toxic with skull.
Install some heavy shelves to better use space in height.
Install water place with run off.
Provide a vacuum cleaner for wet cleaning every week.
Look for another more practical and larger storage room where you a can produce clay and make regular testing for quality control.

Nepali workshop culture?: motorbike workshop near Bhaktapur

5. design, production and working conditions related

á **introduction:**

As the assignment took place at the NCCS-Office, all production rela questions could only be observed in my workshop visits. I think that a of small things could increase production capacities. My answers are a very general.
The essential design question does not seem interest my Nepali fellows

At work at Everest Pottery

á **aims:**

Increase production capacities and make a better market situation Nepali ceramics for local and export market at the long term.

á **recommendations**

Production:

- Reduce production cycle; glaze as fast as possible bisque ware.
- Wash hands before unloading kiln and handling bisque ware. Ne wash (and dry) bisque ware, before glazing, store and protect well fr dust. Blow out before glazing.
- Think more systematic about workshop out fit, water points and tools, make-work easier, surer and faster.
- Work more carefully and avoid trash at every production step.
- Start jiggering production for flat pieces (bowls, saucer, plates). Stu well about sharing this investment (mould making, wheel, space) w other workshops or the NCCS.

storage of glazed ceramics ready to fire

á **recommendations**

Design:

- Reduce and define product range, focus more your activities and give clear face to your production. Write down (and follow), your own line.
- Renew products, colours and pattern from time to time and s producing unsuccessful products.
- Control your design quality by talking about it with customers, deale and potters and try to increase quality (function, aesthetics, etc.




Newa Art CeramicÕs production

á **recommendations**

Working conditions and ethics:

- electric security: fix properly electrical installations (use sockets (v fixed) and plugs, fix lines to the walls in tubes).
- mechanical security: running wheels and belts have to be corre covered to avoid touching by hands, hair, children, cloth, etc.
- health security: mark toxics with skull and store only in closed box Use spoons and do not touch toxic materials by hand. Never eat a drink in glazing, decorating and glaze-mixing area. Never wipe, always wash floors with enough water. Make available easy washing floors by proper fit out. Clean up all workshop areas once a week. Ins kilns only outside in open rooms.
- employment conditions: keep your staff for long-time by increas working conditions like salary, health conditions, encourage trainings a promoting.




staff of different Thimi workshops

6. marketing and communication related

á **introduction:**

It is difficult for me to follow all communication activities from NCCS their members, because of language problem, Nepali letter and sh time. But I still found some possible ways of improvement.

I observed that the linkage to other organization is made more in view donor opportunities that real collaboration.

á **aims:**

Increase communication capacities to members, donors and custom for export activities, as well as government recognition for the professic

á **completed work:**

- This assignment report is the most important part to communicate completed technical work and the recommendations. This especia because my work has not been done in the workshops, but in the offic hope some members will take the time to read, and put recommendations into action.
- Documentation of the completed technical work stored in office.
- Better arrangement of office to feel better inside the office.
- Sampling: you can see what the cooperative supplies to their memb glaze-samples, engobe-colours, stain colours, industrial glazes a supplier documentation and library.
- Increasing colour range of engobes and glazes
- Elementary technical documentation of glaze behaviour. So examples stored in the office shows how different materials react with glaze.
- I opened the possibility to have a free 2 hours information meeting dc by CTEVT, before starting application to develop a skill test that will recognized by Government.
- I proposed to NCCS to create some members portfolio samples publication on Internet.

new office outfit after assignment

á **recommendations**

Professionalize office. Define different marketing tasks for membe donors and customers.
Increase meeting point activities by completing ceramic library a subscribing to ceramic magazines.
Researches in sampling and enlarge engobe and glaze colours choice.
Review content of Internet site www.pottersnepal.org and add n members portfolios, display Internet address on all your documents.
Ask for Skill development meeting by CTEVT.
Plan skill-training activities for member.

D. Summary of the mission

I consider the future of Nepali ceramics as promising if these recommendatic are strictly followed:

Easy steps do be done now

- Care about quality at every production step
- Start cones production
- Apply and control clay recipe and control your clay
- Apply and control firing temperatures
- Apply for skill standard development
- Use your own ceramic in private use

Need to be done in the next six month

- Use qualified industrial glaze frit
- Arrange workspaces more efficiently also by investing in tools
- Pay better, train and promote your staff
- Personalize and focus your ceramic production range
- Start jigger production for flat ware
- Work and train (together?) on design questions and get informed ab the international market trends

Takes more time to do, may be two years?

- Professionalize NCCS office organization
- Train staff and remunerate better
- Review NCCS (organization, tasks, membership, commercial part)
- Change location of office and store room
- Produce and control clay in huge production unit

I hope that this time Nepali potters apply the recommendations that have be given since 1984 by international qualified experts and reformulated today h by myself.

Only if most of the recommendations are followed, I encourage Swisscontact continue support on three levels for at least 5 years:

- training development, in and outside the country
- support for quality control and production
- office organization, marketing and communication

Good Luck!

Peter Fink, Thimi in May 2005

Appendix:

Trainings: resumes of contents

Training I

Temperature - material - atmosphere
What is happening in my kiln?

Temperature is always relative to the firing time and the used kiln
Pyrometer can only be an indication. Open pyrometers are not precis
because of ongoing oxidation between wires. Use of pyrometric cones
recommended.
The practical results are always preferred to theoretical uses.

20¡ -100¡C	physical water dries
100¡ - 200¡C	physical water in small spaces between clay materi continues to dry; drying only completed over 200¡C (1lt of water extends instantly to 1650 lt of vapour)
200¡ - 650¡C	clay materials (Kaolinite-Illite-Montmorillonite etc.) loc their chemical water, organic material carboniz (therefore you need Oxygen), free Silica chang molecular structure at 573¡C by increasing volume 2%.
650¡ - 900¡C	nearly all materials in the clay start decomposition loosing CO2 or transforming to unstable componer They get free to realize new relations with otl materials.
900¡ - 950¡C	beginning of building of new and stable minerals: Gehlenit, Plagioklas, Wollastonite, etc.

On higher temperature new materials are consolidated or start fusi
Over 1100¡C Calcium and Iron will be very active this is incontrollable
earthenware bodies.
Over 1150¡C parts of Feldspar are very slowly going to soften stonewa
bodies.
Over 1350¡C only refractory bodies (Fireclays) with very high content
Aluminium oxide (36%) stay strong in the heat.

Firing schedules:

4-10mm thick	100¡-200¡C	per hour
20 - 30mm thick	50¡-80¡C	per hour

1st step: be very careful until 200¡C (3 hours)
2nd step: let go your kiln slowly 4-8 hours
3rd step: reduce burner output to reach very slowly the maxir temperature, for the last hour. If you fire this way no soaking is necessa If you reach your maximal temperature very fast, a soaking for 30-45 indicated for homogenization of kiln.
Theoretical recommendations for Kathmandu Valley clay firings:
bisque firing 950¡C, glaze firing 1070¡C

PS: Training I:

3 possibilities to resolve a problem
(with raw material-production-firing-design-marketing etc.
all problems in small scale craftsmen workshop)

pay for it *means*
- searching a competent partner
- make sure partner is well qualified
- do what he asks you to do
- pay him

give up *means*
- change orientation
- search for other possibilities

learn how to do it yourself *means*
- systematic controlling
- testing and research
- asking, reading and learning about it
- spend time on the problem

Training II

Materials for clay and glazes
Do I know my ceramic materials?

theoretic part:

á Glaze is not possible without **Silica (Quartz).** The best glaze would o bee 100% Silica, but temperature of fusion is with 1713¡C much too high

á Phenomena called **"eutectic"** permit to decrease fusing temperature. T eutectic point is the lowest point of fusing from two (or more) materia The more materials you add, more sophisticated is the mixture, and y will not be able to make any visual diagram. The fusing-line between tho materials is not linear, but goes in very strange undefined ways. O practical test can show reality, the researches can be very long a complicated and are based on large amount of theoretic know-how.

á For different temperatures you need different glaze materials, to ma Silica melt. In low temperature until 1100¡C Lead is best. If you av Lead, only glaze-frits can replace it, because of the solubility of necessary materials for fusing. Technology in this temperature range very sophisticated and needs regular raw material and processing, go quality control and **high-level know-how**. NCCS is not suited to ma that work well.

Practical part:

Class the NCCS raw materials in groups:
- glazes and frits (and soluble frit-materials)
- clay material
- colour stains and colouring oxides
- others

Training III

Form and Design
What are the keys of successful designing?

theoretic part:

á Keys of Form and Design can be divided in different aspects:
- expression
- function
- aesthetics
- price and production

practical part:

á **expression:** draw a sad, angry, weak, strong and futuristic mug.

á **function:** think about different possibilities to hang a picture on the w figure out positive and negative aspects of every technique?

á **aesthetics:** witch of the 5 cups on the table would you, a western tour your mother buy? Think about why?

á **price and production:** witch of the 5 cups on the table are mo expensive? Why is industrial production more economic and what are negative points of industrial production? How is the Nepali ceramic mar divided?

Workshop; symbols of Nepal:

á enumerate all possible symbols of Nepal

á why do western tourist come to Nepal?

á is every Nepali symbol recognized as it, by the western tourist?

á Draw ceramic production with Nepali symbol for western tourist, every id is welcome

á Try to separate good and bad ideas

- Results of questionnaire

Questionnaire for NCCS members

visit of 14 workshops, responses of 9 returned questionnaires, the answers are mainly related to glazed cera -workshops, no scientific claim, elaborated to better understand the problems.

Clay

used clays: mainly Dang - Thimi with up to 5% Talc - Bhaktapur with 0-10%Talc
clay quality: forming process, drying process, colour, firing process is always qualified as **good**
comments: *only problem warping if fired over 1080C*
Quality control of the clay: there is no quality control (only one member controls the quality)
comments: *if you have problems you should research to find out. Clay body tests seem priority.*
If the cooperative would prepare a perfect clay, all members could imagine to buy it there
comments: *very good commercial opportunity for cooperative: sell their own prepared clay to their members*

Glazes

Cooperative and industrial glaze frits are both used, but the cooperative frit is qualified as not regular and not satisfying, only very small problems in applying, but big problems: crazing!
Members only colour the glaze sometimes. The members rarely check the frit.
comments: *You have problems with this glaze but you even do not check it before using it! Could be interestir see more changed rich glazes*

Firing

The firing schedules
For bisque firing: temperature between 700-900 C times: 6-8 hours
Glaze firing: temperature between 1000-1100 C Times: 8-12 hours
comments: *very low bisque firing temperature, no soaking. glaze firing to low , firing time is ok.*
Recommended: bisque 950 C, soaking 15', glaze: 1070 C soaking
Firing temperature control
mostly only pyrometers at one place are used
comments: *to low temperature control in the workshops, at least control with cones from time to time*
Firing temperature
Temperatures in the kilns have consequent differences (over 20 C).
comments*: in these conditions it is extremely difficult to fire the cooperative frit without some crazing.*

Production, Design & Marketing

The production capacities and product ranges seems ok.
The market analysis is **very different** from each member. The market situation is not very present.
The skill in Marketing could be more trained, also by the cooperative. In marketing the possibilities of the Inte could be increased. **No interest in product design.**
comments*:*
members do not have many ideas to increase production. Designs are only customers related. No personal ideas produced. Design control only by customers. The market and specially the international market are ra followed up. Members do not seem very open and not very auto critical.

Co-operative

Members are **not very satisfied** by the work from the cooperative, but participate quiet often to the meetings anc very open to participate by offering time, professional collaboration or trainings.
Members could imagine a **more professionalized** cooperative even if this costs more.
Most important in order: technical support and researches, marketing support, glaze and clay supply and last be (loan and workshops). Ideas: more information about reports and samples, asking for money outside: NGO's donations, dry powder glaze.
comments*:*
Regarding the non-satisfaction of your members, you should create a work-group to analyze tasks and orientatic your cooperative and make some propositions towards more professionalism. May be also definite all your serv and add clay selling, and do more systematic sampling. If you continue to sell your own frit it is very importa always control the quality.

- Member portfolios

will be displayed at www.potsfink.ch/nepal or www.pottersnepal.org after receiving complete information from NCCS.

- Address list (not exhaustive, for more information)

- Nepal Ceramic Co-operative Society
  Shree Krishna Prajapati, president, ceramics@mail.com.np

- Swisscontact Senior Expert Corps, www.swisscontact.org
  Switzerland: Nicole Luis nl@swisscontact.ch
  Nepal: Neeraj Singhal ns@swisscontact-nepal.org.np

- Peter Fink, ceramist, volunteer pottery consultant, www.potsfink.ch

- Previous experts
  Robert Hausner, ram@wellcom.at
  Jim Danish, jimdanisch@sohum.net
  Jules Kuster, CH- 8224 Lšhningen
  Reid Harvey, purifier@localnet.com

- Stoneware project at Thimi Ceramics,
  Ani Kasten, www.anipots.com, www.thimiceramic.com

- Association for Crafts Producers
  Meera Bhattarai, Executive director, www.acp.org.np
  Maya Ilg, Swisscontact SEC, textile expert

- Fair Trade Group Nepal
  Nina Shahi, Coordinator, www.fairtradegroupnepal.org

- Vertical Shift Brick Kiln,
  Urs Hagnauer, Skat-consulting www.vsbknepal.com

- Council for Technical Education and Vocational Training (CTEVT)
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  Sanothimi Bhaktapur , admin@ctevt.wlink.com.np

- Swiss Agency for Development and Cooperation
  Dinesh Paudel, forest engineer www.sdc.org.np

- Related websites
  www.pottersnepal.org
  www.nepalhandicraft.org
  www.craftrevival.org

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