

Using innovation to combat hazardous child labour in glass bangle manufacturing

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Background and Introduction

Glass bangles of different types – are popular fashion accessories in Pakistan and South Asia region. Manufacturing of glass bangle is carried out mainly in Ferozabad district of India and Hyderabad in Pakistan. Much of the work in this sector is home-based, with the involvement of all members of a household including children. Approximately 9800-10000 children¹ are engaged in Glass bangle Industry in Hyderabad in Southern Pakistan. The total number of workers engaged in this sector has been estimated to be 30000². Hyderabad (approx. 100 km from Karachi) is the hub of this industry in Pakistan, as the traditionally bangle making families have migrated from India and settled here. The processes of glass bangle industry are described at the end of this article.

In December, 2007, the Centre for the Improvement of Working Conditions and Environment in the Labour Punjab (CIWCE) was invited by the ILO's Timebound Programme to improve occupational health and safety in this sector. A specific objective was to improve the working conditions of young and adult workers by making the work less or non hazardous. For this purpose, a number of interventions were carried out by CIWCE. This article describes these interventions and illustrates how these interventions may lead to remarkable improvement in the safety and health of workers and elimination of hazardous child labour from this sector. The processes where interventions were carried out are given in red boxes at the end of this article. It may be recalled that the contribution of CIWCE has been acknowledged at global level for its innovative work for improving the working conditions of marginalized and vulnerable workers. An ergonomic loom designed by this centre has won highly prestigious Tech Award of Innovation for combating hazardous child labour in carpet industry. (http://www.myhero.com/myhero/hero.asp?hero=S_Awan_Tech_2005)

¹ Baseline survey of Child Labour in Glass Bangle Industry Hyderabad (for ILO by Akida Associates), 2003

² A Rapid Assessment of Bonded Labour In Diverse Sectors: Glass Bangles, (Collective for Social Science Research, Karachi), 2003

Description of hazardous processes and the innovative improvements carried out to minimize or eliminate hazards.

Sadhaai (leveling)

Traditional method

During this process, the workers sit on their feet and , and place the bangles on a flame , as soon as the glass becomes soft, they press the other side to level the bangle, which was cut from a glass spring. The awkward posture causes musculoskeletal problems. There are also flame related burns. The bangles are places on the floors and sometimes the edges may poke into bare feet



Improvements

A modified work station has been developed, which is suitable only for the height of adult and young workers. They now sit on chairs and can relax their legs and backs while working. The finished bangles are placed in trays placed at both ends of the work station. A plastic matt on the floor ensures that the workplace remains clean as it can be wiped with a wet cloth. **A major advantage of this design is that one flame can be used to heat two bangles at the same time. This reduces the fuel consumption by one half. Thus it is a green job initiative as well.** The workers who have been provided have told that their aches and pains have reduced or completely vanished, thus they can finish more bangles and can earn



Jarai or glass joining

Traditional method

During this process, the workers sit on their feet and weld the open ends of the glass bangle together on a flame blown with the help of a blower fan. The sitting posture is highly uncomfortable causing pains and aches and there is a chance of severe burns. Some other changes are also being tested for this process.



Improvements

Improvements are still being tested in this process. One major improvement being tried is a raised work station which is suitable only for the height of adult and young workers. Special finger protecting gloves have been developed for this process, which protect the exposed side of finger of the worker from possible burns of blown flame. The finished bangles are placed in trays placed at both ends of the work station. A plastic matt on the floor ensures that the workplace remains clean as it can be wiped with a wet cloth. CIWCE is developing a plexi-glass shield for protecting the face of workers.



Tinsel coating (*maarvi*)

Traditional method

During this process, glass bangles placed on a roller are applied with wet paint and rolled on a heated rubber mat covered with a metal foil. The worker has to stop during rolling and put all his strength,. The process is highly cumbersome and leads to cumulative trauma disorders and wrist and back problems.



Improvements

While improved work stations have been designed for applying paint. A major breakthrough is the development of a **tinsel coating machine** developed by CIWCE which makes the work very easy and fast. The worker does not need to bend and apply manual force. In stead, the roller of bangles is rolled on a heated rubber mat covered with tinsel. A handle bar has to be pulled by one person, while another person maintains the required pressure on the tinsel. This innovation has been highly appreciated by the bangle making families



Moulded bangle making (aari process)

Traditional method

Special moulded bangles are made by melting the round glass bangles in metal dies on which a gas flame is blown. This process generates intense heat and worker has to operate the handle to rotate the dies thus exposing him to flames and heat.



Improvements

The molding process has been modified and now a modified machine has been developed in which all the process has been enclosed protecting the worker from the direct exposure to flame. Efforts are also underway to develop another machine for this process, on which the worker does not need to work close to the flame, instead he/she will have to roll a moving conveyor and the flame will be totally out of way.



Grinding

Traditional method

In this process, patters are engraved on the bangle surface by grinding it on a wheel grinded. The posture of workers is very uncomfortable causing backache and shoulder pains and frequent cuts.



Improvements

The grinding platform has been raised and the workers have been provided with stools. Lighting has been improved. This has resulted in better posture and less mistakes improving the productivity and comfort of workers.



Paint spray process

Traditional method

Some bangles are painted by spraying paints. The process is done in open air or in closed rooms. The toxic paint and solvent vapors spread all around. The sprayed bangles placed on rollers are also placed in the same areas.



Improvements

Special frames have been developed to dry the sprayed bangle preventing widespread evaporation of the solvents. Spray booth has been designed to eliminate spread of solvents and spray vapors in the work environment



Other interventions

A number of other innovations and interventions have been carried out to make the work safer and productive for adult and young workers and to reduce and eliminate hazards. The specific interventions are:

- Whitewashing of the premises to improve lighting
- Provision of exhaust fans and if necessary improvement of natural ventilation to improve thermal conditions.
- Improvement of wiring to prevent electrocution hazards.
- Provision of work dresses to the workers
- Provision and training on the use of first aid boxes.
- Posters, booklets and videos have been developed to promote the health and safety interventions

Impact and future possible actions

These interventions have been carried out mostly in during march-July, 2008. The initial response to some of the interventions like improved work stations for leveling and joining and tinsel coating and molding machines has been very positive and encouraging, it will take some time to know how much these interventions are resulting in reduction of hazards and combating hazardous child labour from this sector. However major effort has gone into “*engineering out*” child labour from key glass bangle manufacturing preprocesses. The size of the intervention is also limited (1-2 of sites have been improved for each of the process described here). We are expecting that some of the improved processes will become sustainable as local expertise is being encouraged by CIWCE to manufacture the improved machines and work stations. Once these processes are adopted by 10-20 each of the workplaces, it is expected these will be copied and adopted by others.

CIWCE would welcome any suggestions and expertise to expand and improve these interventions

Review of Glass Bangle Making Process

The main processes involved in bangle-making are describes in Fig 1.1. A description of these processes³

Around three dozen distinct processes and skills were identified in the manufacture of glass bangles. It is convenient to classify these various processes within three broad stages, identified by the output of each stage of the manufacturing process. In the first stage (Open Bangle) molten glass is converted into semi-circular open bangles that are bundled together into a *tora*. In the second stage (Closed Bangle) the open bangles are levelled and joined into closed bangles. The final stage (Finished Glass Bangle) takes the closed bangle and produces the finished glass bangle. Most of the processes in each stage of the production cycle involve the application of intense heat to glass for the purposes of melting, shaping, reshaping, and joining. The diverse processes require different sources of heat – including furnaces, ovens, and even small burners. Other generic processes include snapping glass, making bundles of bangles, and the application of chemicals for cleaning and polishing bangles.

Stage One: Open Bangles in Factories

The Open Bangle stage is almost entirely carried out in larger factories located in the SITE area. Relatively large high temperature furnaces are used to melt the raw material that consists mainly of used bottles. The furnace needs to be fired for a whole week before molten glass of usable quality might be obtained. The molten glass drips from the furnace in fine wires, which are rolled while hot, into spiral shapes over rolling pins. This first process is generally considered to require a great deal of skill and attention. Any break in the consistency of the molten glass wire emanating from the furnace can render the material unusable.

As soon as the glass spirals cool they are taken off the rolling pins. The spiral is then snapped in such a way that the outcome is a fine curved glass wire, or an open bangle. The open bangles are then bunched together into bundles known as *toras*, which

³ Excerpts from a report titled “A RAPID ASSESSMENT OF BONDED LABOUR IN DIVERSE SECTORS: GLASS BANGLES” by Collective for Social Science Research, Karachi-2003

contain around 300 bangles each. The jobs of removing the glass spiral from the rolling pin, snapping them open, and then bunching them into *toras* are all known, respectively, by separate names, and are all regarded as skilled tasks. Once the open bangle is in a *tora* it can be taken out of the factory for further processing in the smaller scale end of the sector at homes and small workshops.

Closed Bangles

The *toras* of open bangles are transported to small scale workshops or to home-based workers in the old city or in Lateefabad. There are two main tasks in the second stage. Open bangles are first straightened – the workers who perform this task are known as *sadhayya*, and then their ends are joined up by *jorayyas* to form closed bangles. Both these processes require the application of heat to the bangles. The work of the *sadhayya* requires the open bangle to be baked on baking trays in small ovens. Some *sadhayas* have these small ovens installed in their homes, while others rent oven space in other local workshops. The work of joining up the bangle – or the work of the *jorayya* – needs to be done using an open flame, and this too can be carried out either at home over a narrow stove, or in a workshop.

Stage Three: Finished Glass Bangles

The closed bangle is then taken to a further set of small workshops or home-based workers for a series of processes associated with “finishing”. Some of these processes such as cleaning and reshaping require further applications of intense heat over stoves or small ovens, while other processes such as polishing and dyeing require the application of various chemicals.

The finished glass bangles are also bunched together into *toras*, and these are transported to the main wholesale market from where they are supplied to other wholesalers and retailers in Hyderabad as well as across the country

