

Enhancing Competitiveness of Small and Medium Size Foundries- Scope, Challenges and Way Forward

By

Foundation for MSME Cluster

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Introduction

It is estimated that there are more than 48,300 foundries registered globally. Of these, India has over 5500 and ranks second only to China in the total number of foundries.

Small size units constitute about 80%, medium size about 15% and the balance 5% being in large sector. The small and medium size foundries are mostly found in clusters at nearly 47 locations in the country. The cluster size ranges from 30-300 depending on the location. Hence, we can safely state that about 5,700 units (registered and unregistered) are in MSME category and about 300 units in large sector.

Out of the total 4,050 gray iron foundries in India, 1,000 units are in Northern India. Roughly 750 of them take the **Cupola Route** for production of castings. Most of these cupolas are operated in traditional style with high coke consumption. In many cases, the coke: metal ratio ranged as low as 1:4 or 1:5. The energy cost comprises of 30% of production cost (70% in melting) through coke, furnace oil and natural gas.

Imagine the value of the saving effected, if coke consumption is reduced by even 10%. In fact, the possibility of savings is even higher.

Evolution of Divided Blast Cupola (DBC)

Initially Blast Furnace operation, Warm /Hot Blast Cupola and Oxygen Enriched Cupola were developed which were not much successful, particularly in small and medium size units.

In Divided Blast Cupola, air is supplied through two sets of blast pipe, tuyeres and wind box. The pressure and volume of each air supply can be separately controlled.

Advantages

a) **Higher combustion efficiency of coke**

b) BCIRA figures suggest –

i. 40-50°C increase in metal tapping temperature

Or

ii. 15-32% reduction in coke consumption for same melting ratio.

Or

iii. 11-22 % increase in melting rate at same temperature and coke consumption

Improved combustion efficiency will reduce carbon dioxide emissions by as much as 25-30%

Adoption of DBC – Present Scenario

It is found that although energy being buzz word among various institutes and government agencies, still only about 100 foundries has changed into DBC till now. In spite of a long period of 15 years this technology did not pick up although the savings were clearly demonstrated.

Barriers to Penetration

- i. **Investment Barriers:** New DBC involved huge investment which was out of reach of small units. Hence, only those units which had investment capacity or recipients of government/ institution subsidy went for this technology.
- ii. **Barriers to Technology Acceptance:** Some foundries had in the past constructed a DBC through local consultants. But these furnaces were not optimally designed. Hence, their performance fell short of expectations. Moreover there were no incentives for labour and so there was lack of motivation on their part as well to accept the technology.
- iii. **Lack of Awareness/ Not willing to learn:** Most of the units are owned by non-technical persons, who were dependant on “Charge Hands” or supervisors. Local associations were weak and did not make concerted efforts to spread awareness of the benefits of DBC. Fabricators were also unaware of this technology and no concerted efforts were made to train them. All this coupled with the mindset of the Charge Hands/Supervisors acted as a big barrier to the acceptance of this technology.
- iv. **Lack of Good Consultants for MSME Sector:** Consultants who were technically competent, preferred to work with large foundries since it involved least resistance. Handholding support required for the small and medium size units was not available.

Coordinated Cluster Development Approach

It was felt that a co-ordinated Cluster Development Approach will help increase the penetration of this technology.

The basic principles are:

- i. Identify the important stakeholders*
- ii. Strengthen the linkages that are critical to reach the intended goal*

The approach helps to create an environment conducive for developing inter-firm co-operation and also support from public and private institutions to promote local production, innovation and collective learning.

Samalkha Foundry Cluster

Samalkha is a small industrial town near Panipat about 80 km from Delhi. It has about 30 small and medium size cast iron foundry units, producing castings for “chaff- cutters” which are used for cutting fodder for cattle feed. About 1500 workers are employed and total production is about 3,000 tons/month. The workers are not technically trained and employ traditional methods of production. The foundries operated Cold Blast Cupolas which were not properly designed.

It was with the objective of developing the foundries at Samalkha that “**Foundation for MSME Clusters**” (FMC) stepped in. A programme called “**Promoting Innovative Clusters**” (PIC) was initiated with the help from Department of Science and Technology (DST), Government of India.

The main purpose is to improve the operational and workshop practises and develop the cluster by strengthening the cluster with FMC acting as a facilitator to ensure that cluster is sustainable in the long run.

The Samalkha Story

The steps involved in developing Samalkha Foundry Cluster are:

- a) **Selection of Cluster:** It was found that the unit owners at Samalkha were not technically qualified and culturally not interested in upgrading their technology. Moreover, the foundries produced castings for chaff cutters – an engineering product at lower end of the spectrum. Thus it was felt that there is great scope for intervention and development of the cluster.
- b) **Trust – Building and Social Capital:** Building a trust level among the stakeholders is very important for ensuring a fruitful joint activity. The **social capital** is the sum total of all such relationships and their quality depth. Trust level initially was found quite low. So a workshop was organised to understand

the existing problems and discuss with them about the different activities which can be planned over a period of next 2.5 years.

Baseline information on cupola operation was collected in the format adopted from IIF. Pre- intervention log sheets revealed a sad story- too much of coke consumed per ton of metal. On the basis of exposure visits and discussions one unit came forward for converting the cold blast cupola to divided blast operation. An expert was hired but left in less than 2 months and the cupola could not be operated satisfactorily. Another expert willing to work with MSMEs was appointed after a further search. The results of the cupola operation were much better and paved the way to build trust in the cluster.

Samalkha Foundry Association was formed with the financial support by FMC. The process followed for upgradation involved:

- i. Request from the unit owner for the grant from the association.
 - ii. This grant is returnable to the association in instalments. (the units have increased their profitability and have started repaying)
 - iii. This amount now acts as a revolving grant for upgradation of other units and development activities of the cluster.
 - iv. Exposure visits were organised which enhanced the co-operation among members.
 - v. Now trust level has increased and so also the joint activities.
- c) **Diagnostic Study (DS)** – An in-depth diagnostic study was carried out to understand the actual working of the units after the receipt of baseline information. This is done by Cluster Development Agent (CDA), who is a full time employee of the Foundation.

It was found that there was no linkage between the cluster and the technical institutes and the existing association is weak who lack information about the existing schemes.

The BDS providers were identified and proper networks developed. FMC also helped to form linkages with various institutions like institutions and Government agencies.

- d) **Action Plan:** The action plan was prepared by the CDA along with the unit owners and the association stakeholders.

Action plan for Samalkha included:

- Organising workshops with the unit owners
- Organising exposure visits to benchmark clusters like Coimbatore and Ahmedabad
- Introduce MIS in the units with systems to improve shop floor practices.
- Improving mould preparation and pouring practices

- Improvements in operation of existing cupolas
- Conversion to DBCs/ installation of new DBCs.
- Setting up a model foundry in Samalkha

e) **Implementation:** The short term activity started with the survey of existing cupola operations. In about five units, suggestions were made to improve the operation of the cupola. The coke consumption reduced by 10-20%. Next, 7 cupolas were converted to DBCs and two new DBCs were installed.

Exposure visits to foundries in Coimbatore and Ahmedabad made the unit owners realise the scope for improvement. One unit has been reactivated with due consideration for material movement to make it a model hand moulding foundry for small components.

Some patterns are being made for match plate moulding at Agra, Goraya and Ahmedabad. Log sheets for cupola operation have been successfully introduced and now the operations are reviewed at monthly meetings of the association.

New markets in Gujarat and Madhya Pradesh have been identified for their products – chaff cutters. Trial orders have been received and executed.

f) **Monitoring and Evaluation:** The association has become self sustaining and monthly review meetings are done in presence of CDA. The member's issues are discussed and decided at association level.

Observations and Conclusions

The first phase of intervention has been in improvement of cupola operation

- 5 units – By bettering the practices
- 7 units- by converting to DBC
- 2 units- by installation of new DBC

The data has been collected from 5 units where only practices were changed and 7 out of 11 DBCs installed. It was found that the foundries used cokes of different moisture levels and ash contents. Coke consumption figures have been converted to the base of 28% ash coke.

The project initiated in May 2008 has so far resulted in coke savings of about 440 tons annually. The cumulative savings works out to about Rs 44 lakhs as shown in the Table 1 below

Number of enterprises intervened	16
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Cumulative Coke Savings (in tonnes per annum – 12 units)	440
Cumulative Cost Savings per annum (in Rs) (12 units) (The price of coke - Rs 10 per kg)	44,03,000

Table.1 Cumulative Savings at Samalkha Foundries

Present Status

The work has been extended to neighbouring clusters – Kaithal and Faridabad. In Kaithal, one DBC has been erected and two more units are likely to install the DBCs. In Faridabad, 4 foundries have installed new DBCs and 8 more are likely to follow. In addition, operation practices have been improved in 3 units. In Panipat, 2 new cupolas are likely to be installed shortly.

Way Forward

- a) The project is to continue up to 2012 and has targeted energy savings in 150 units.
 - i. 50 units by installation / conversion to DBC.
 - ii. 100 units where practices are to be improved to effect coke savings
- b) Project envisions sustainability by-
 - i. Strengthening local industry associations
 - ii. Adoption of documentation and reporting systems
 - iii. Linkages with technical institutions and new market segments.

When intervention is completed in 150 units as per plan, the potential savings will be over 7500 tons of coke annually. This is a huge cost saving in addition to considerably lower emission of green house gases.

This can have a positive impact on the value addition of the enterprise and consequently the market share of the cluster.

(A) Technology change (DBC) (50 units)	
	Coke Savings
Potential Coke Savings (In MTs/ annum)	2640
Potential Cost Savings (In Rs)	264 lakhs*
(B) Adoption of Best practices (100 units)	

Potential Coke Savings (In MTs/ annum)	5017 MT
Total potential cost saved (in Rs)	501.7 lakhs
Total amount of coke saved (A+B)	7657 MT* per annum

(*The price of coke - Rs 10 per kg)

Table: 2
Targeted Savings by 2012 (when 150 units would get the benefit)

Energy savings, although very important, is not the panacea for all problems of the foundry sector. The working conditions are poor and there are social issues related to occupational health and safety. Government and industry institutes need to take initiative to create awareness among owners and workmen.

Since green house gases (GHG) are reduced, it is possible to seek carbon credits through CDM. For this, reporting mechanisms will have to be developed at cluster level. If this goes through, it will be the first of its kind and will lead to healthy competition among different clusters. This will have a positive effect on the industry as a whole.

It is crucial for the government, private institutions and policy makers to come forward collectively and devise policies for development of the foundry sector. Adoption of **Cluster Approach** will be a boon for foundries in MSME sector.