

Asur — an ancient Iron Smelter, can get Global Recognition

Ashis Kumar Sinha, Research Scholar, SNU, Jharkhand, India. email: newsashis@rediffmail.com

Abstract

Asur an ancient iron smelter; threatened with extinction can get global recognition with reviving their traditional iron smelting technique. Asur— a primitive tribe of Jharkhand— were the ones who first made iron in the world now are threatened with extinction. They are traditional iron smelters and metal workers; ancient metal relics discovered from various Asur sites in modern times. As per archaeological evidence Jharkhand has a long tradition of metallurgy of copper, gold and iron smelting and it is believed that a nomadic group known as Asur had introduced the craft of iron smelting in this region.

Asur are under stern threat from existing model of development as country's developmental projects deprived of from their land, water, forest and other natural resources. Hails form one of the most ancient ethnic group Asurs' are said to be the descendant of Mahishasur (a demon king); residing in Gumla, Latehar, Lohardaga and Palamu district of Jharkand and in North Bengal (Alipurduar— a sub-divisional municipal city of Jalpaiguri district of West Bengal) too. The population of Asur in Jharkhand is 7783; covers only 0.14 percent of the total population of the state. Asurs' were the one who first made iron in the world are now threatened with extinction; still carrying out hunting, gathering and shifting cultivation. Asur have traditionally been iron-smelters but the practice has now become a thing of the past. The tradition has been lost with the arrival of modern technologies. For several years now, implementation of the Forest Conservation Policy by the Government and introduction of latest metallurgy techniques have been given death blows to the industry of iron smelting by the Asurs. Earlier, this tribal group earned their livelihood through iron-smelting but now they have shifted towards cultivation, hunting, collections of food and rearing of animals. Asurs' are slash burn cultivators but forest acts and regulations have snatched away their traditional rights over the forest. This has affected their practice of iron-smelting and shifting cultivation. Now they are settled in villages mostly in the hilly and forest terrains in Jharkhand. Study found that Asur tribe needs immediate government attention as they are stragglng with all odds to survive. Beside others instant all essential steps are in-need to preserve and revive their ancient traditional iron smelting technique which is eco-friendly while their smelted iron having anti-rust property. Its' worth mentioning that Asur's use to tap those ores that are neglected or rated as low grade and not considered important for smelting by modern steel mills.

Asur can win 'global recognition' by reviving of their traditional technique and with the proper marketing of those iron products (which has anti-rust property) in the international market. This can also give a strong boost in their socio-economic status, study found.

*Along with reviving their traditional iron smelting, rearing of **Silkworm, Pear and Tea Plantation** on the slope of the hills can script Asur's growth story too. As Asur's habitats are blessed with natural cover, climate and soil, which are most favorable for rearing of Silkworms, cultivation of Pears as well as Tea plantation, study reveals.*

Key Words : *Asur, Ancient Iron Smelter, Primitive Tribe, Mahishasur, Jharkhand*

Intorduction

Asur— traditionally been iron-smelters are residing in the hilly terrain of Latehar, Lohardaga, Palamu and Gumla districts including in the pat area of Netarhat plateau in Jharkhand now on the verge of losing their identification too. Despite the sturdy initiative of the government they still are carrying out hunting, gathering and shifting cultivation. There was a time when the co-existed with the forests and the minerals but this co-existence has become the problem for them.

Like other tribes, Asur stands on a thin line between extremists and the government; exploited and destroyed by both. In areas where the extremists have a strong presence, not following their orders could result in gruesome killings. Thus, any meeting called by any of these rebels is an unspoken compulsion for them. In such a scenario, resorting to random firing and blaming extremists for using innocent tribes as human shields is not only a failure on the part of the security forces but also on the state to provide safety to its citizens.

Research Area -

Different Tribal (Asur's) villages in Jharkhand includes the district of Lohardaga, Latehar, Palamu and Gumla.

Work plan/Methodology-

Research was carried out by personal visit and observations, questionnaire, interviews and conversations with different Asur's villages in the hilly terrains across the Jharkhand. Besides the tribal people's opinion and comments, many earlier research reports, as well as views of educationalists, professors, head of

departments of the concern subjects, particularly of anthropologists have been taken into consideration during this study and research.

A literature survey was also carried out on the study area before the field work started.

Most of the works are based on the field studies. Information on the tribal issues, needs and demands were collected during the study and survey of different Asur's villages across the Jharkhand.

During field work, interviews were also conducted.

Research Methodology

Research was carried out by personal visits, observations, questionnaire, interviews and conversation with different tribal peoples in different villages across the Jharkhand.

A.) Primary Data

Primary data was collected by

- Schedule
- Personal visits
- Observations
- Questionnaire
- Interviews and
- Conversation with different tribal peoples.

B.) Secondary Data

Secondary Data was collected from various Books, Journals, Newspapers, Magazines, Internet (including other electronic and print devices), Case study, Government records and non government organizations records. Relevant information was extracted after processing and analyzing the recorded data as well as information's.

Aims and Objectives of Research

1. How to preserve or protect Asurs' traditional iron-smelting practices.
2. To know the Asur's life and their culture.
3. To find out if there any way to save their original culture.
4. To know the economy and their means of production.
5. To know how the exploiters are exploiting the tribes.
6. How to uplift and enhance tribal's life

7. How effectively join them with the main stream of development.
8. To know about different issues (health, nutrition and habitat) of Asur's.
9. How to solve their various issues
10. To draw attention of the government towards the needs of the PTG.

Significance of Research

India is an amazing amalgamation of various races and cultures, with a landscape as diverse as its population. Between 60 and 70 million Indians are tribal people. Outside the north-eastern region many face conditions ranging from deprivation to disintegration, and a relentless assault on their land, resources, culture and civilization. Its' worth mentioning that, Tribes— India's poorest people live in the richest areas- their conditions continue to be the weakest. Mining has made the government richer but the people of the region poorer. Usually the first targets of land grab, displacement or development in the manse for globalization, urbanization, industrialization and mining tribal people in this country.

Not only Asur but Indian tribes are under stern threat from existing model of developmental in the country; need to jointly fight against the forces that exploit the natural resources for economic growth.

Limitations and direction of Future Research

There are certain limitations of every project and every experiment. Though every effort was to make it an objective study, some biasness at the end of the respondents cannot be ruled out.

Collected data from primary as well as secondary source were analysed and compared with the academic studies.

However time limitation to complete the research is constraint since it needs more time and efforts which is proposed as prospect studies.

Expected Contribution from the Study

This research will help us to understand the various issues of Asur tribes which are still exploiting them especially in Jharkhand and suggest measure to eliminate the middle men from the system by establishing direct channel between the government and the tribal. Research study would help in effectively eliminating their issues and also help us to identify the areas of further policy reforms for strengthening their socio-economical conditions.

Research would also help us to map the gap between government schemes for the upliftment of tribals and their successes ratio especially in Jharkhand. It also highlights the role of media in bridging this gap. It will help us to explore possibility to bring tribals in the main stream of the society earliest.

The Asur

Asurs were amongst the Proto-Australoid groups inhabiting the Jharkhand and western regions of West Bengal; traditionally have been iron-smelters. They are a tiny primitive tribe, threatened with extinction; divided into three sub-tribal divisions— Bir Asur, Birjia Asur and Agaria Asur. The Birjias' are recognized as a separate schedule tribe in Jharkhand which also come under PTG.

Distribution

Hails form one of the most ancient ethnic group Asurs' are said to be the descendant of Mahishasur (a demon king); residing in Gumla, Latehar, Lohardaga and Palamu district of Jharkand and in North Bengal (Alipurduar— a sub-divisional municipal city of Jalpaiguri district of West Bengal).



In Jharkhand Asurs' are mostly found in the part are of Netarhat plateau in Jharkhand. Netarhat plateau is formed of laterite rocks, located at 23.4833°N 84.2667°E, the highest point is 3,696 feet (above the sea level); covered with thick 'sal' forest.

Economy

The economic activities of the Asur was iron-smelting but now they depends upon shifting cultivation, hunting, collection of foods and other Minor Forest Produces, Fishing, agriculture, labor and service. But forest regulations and Acts have deprived them from their economic activity.

Land:- The hilly lands belong to tribal are rocky, sloping, undulating, less fertile and of low quality which do yield easily; plough even.

Irrigation:- Most of the Asur's lands are non-irrigated. In the part areas level of sub soil water is very deep and it is very difficult to sink wells due to rocks. They (tribal) have to depend upon monsoon for farming and can yield only one crop in a year.

Debt:- Their income is not sufficient to meet the basic needs; they often bound to take loan.

Study found that about all Asur families are under huge debt to meet their both end needs. They have taken loan from the local 'mahajans' (money lenders) and repaying the interest from their wages which they got after working at construction sites, brick kilns. Some of them are forced to migrate to other places in search of work as well as wages and sometimes they have to sell their lands to return their loan amount and interests. They do not get work regularly and are also exploited by their employer. Asurs are not paid as per Government Minimum Wages Act; Female members are also sexually exploited. Asur also prepare mats, baskets, ropes, and rope carpets from the leaves, grasses and chops available in the forest. They also weave umbrella and winnowing tray, wooden containers and sitting tables (Pida).

Asur people are also engaged in Government jobs as 4th grade staffs, school teachers and in Jharkhand Police too. Despite the sturdy initiative of the government Asur are far away from the development.

Traditional Iron Smelting in India

History

The history of iron making by the tribals in various parts of India dates back to 1300 to 1200 BC. These tribals— Asur, Birjiya and Agarias earned their livelihood by smelting iron in the village and cater to local needs.

Asur's folk tale says that the weapons used in Mahabharat era were made by the Asur tribes.

The descriptions of swords, spears and other steel weapons are found in several ancient Indian literatures. Iron implements and weapons belonging to the 4th century BC have been unearthed at Adittanathur in Tamil Nadu comprising of agricultural implements, tools for black smiths.



Delhi iron pillar



Ancient sword



Iron beam at Konark Temple

Remarkable evidence of metallurgical skills of iron which has anti-rust property

The iron pillar of Delhi, a striking evidence of the skill attained by the early iron masters in India, is believed to have been constructed in the 4th century AD (Anno Domini {Latin word} or After Christ). It is 24 feet in height and estimated to weigh about six tonnes.



Pix : Dhar iron pillar's

The Dhar pillar (Dhar is located in the Malwa region of western Madhya Pradesh state in central India) of iron is much larger than the Delhi Pillar. Its length was about 44 feet and is now laying broken in three pieces. There are several iron beams in the ancient temple of Konark probably built in the 9th century.

Numerous iron beams exist in the Jagannath temple of Puri in Orissa (built in the 12th century) Meanwhile, descriptions of iron guns are found in the 16th century literature; most Mughal guns weighed about 30 to 40 tons and maximum length about 31 feet are described.

Until the 13th - 14th century AD, India was the only source of ingots of Wootz Steel essential for making the Damascus sword; the iron monuments like pillars at Delhi and Dhar, iron beam at Konark, Damascus sword are the few testimonials of ancient metallurgical skill of India.

Asur's traditional Processes of Iron Smelting

There are a number of groups in India, whose main occupation is iron smelting or related to iron working—Asur, Brijias, Agaria and Lohar. These four ethnic groups have a good idea about the traditional iron smelting techniques in India.

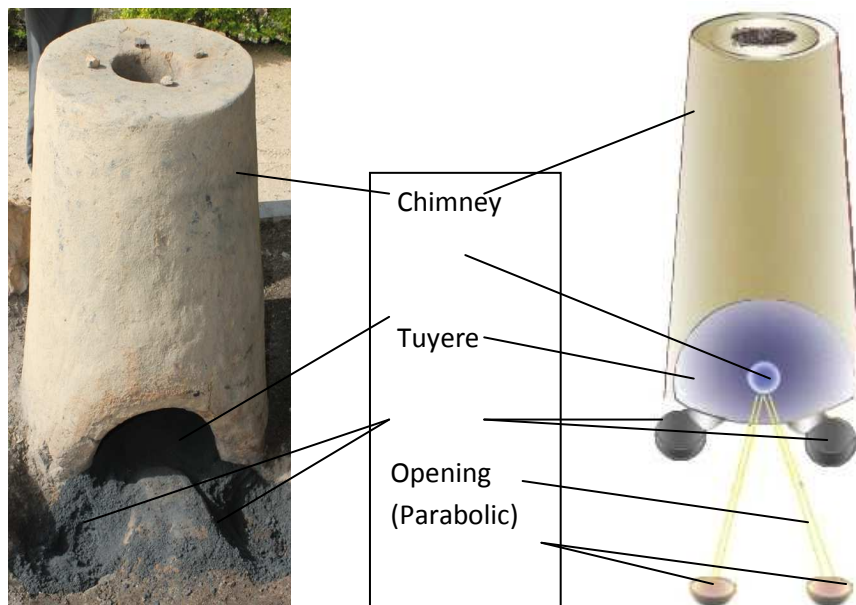
Notably, Jharkhand has a long tradition of metallurgy as archaeological evidence of copper, gold and iron smelting has been found in this region and it is believed that a nomadic group Asur had introduced the iron smelting in this region. Though, how old the Asur's are associated with Jharkhand is still unknown.

Primitive Furnaces



The ancient processes make use of two distinct types of furnaces in their operation, which differ in their physical form. The basic principle of operation is same for both. The First furnace is a shaft furnace and is fully subterranean while the second is partly subterranean and constructed over a rectangular pit. These furnaces are about 30 inch in height and their bottoms are concave, while the cylindrical furnace shafts rise up as chimneys. These furnaces are built of ordinary clay. The charge comprising of iron ore and charcoal is fed into the shafts. One clay pipe is inserted through a parabolic opening in the bottom of the furnace which acts as a tuyere. The opening through which the

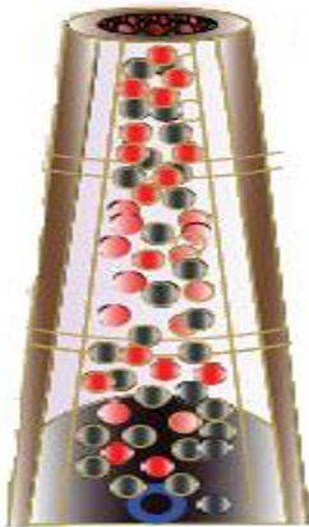
tuyere is introduced is sealed with clay.



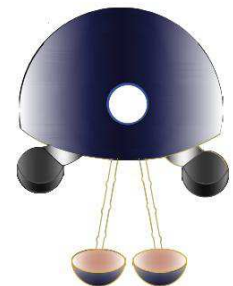
Pix : Primitive furnace and its parts



Upper Section of the Furnace



Section of a ancient furnace



Parabolic opening of furnace

Furnace

The furnaces are almost cylindrical in shape but its size varies from place to place. Clay mixed with straw are used to prepare the furnace; contains two opening, one at the top and other at the ground or lower level. The top opening is used for allowing charcoal and ores while the lower opening meant for attaching the tuyeres, extracting slags and wrote iron. The air used to be blown into the furnace through tuyeres.

Foot Bellow

The Asur used a pair of foot bellow for blowing air into the furnace. The foot bellow has three



components— (i) A solid wooden bowl (ii) two hollow bamboo as blow pipes and (iii) a leather bellow. One end of the bamboo pipes each connected with the earthen tuyeres while the other one is fitted to the wooden bowl covered with hide. The wooden bowl acts as conduit for passing air from bellow operation. Now Asura are also using hand blowers.

Tuyere

The earthen tuyere basically a nozzle through which air is blown at a high flow into the furnace for smelting operation.

Iron Ore

Asur used three different varieties of iron ore— Magnetite the first one which they termed as POLA, the second one is Hematite known as BICHI and third one is Laterite termed as GOTA. By observation and experience Asurs were able to locate a site for the ores. They used ores on the crust of above the earth surface which are neglected for smelting by the modern steel mills. Modern mills rated it as low grade and considered it useless for smelting.

Charcoal

Charcoal is used for firing the furnace, prepared by burning Sal (Shorea Robusta) wood in a pit covered by leaves and sand. The charcoal used for smelting as a source of energy is proved to be a far less pollutant (because of its low sulphur content) in comparison to the fuels used by the modern steel mills.

The dimensions of a primitive furnace

<u>Sl. No.</u>	<u>Parts of a Primitive Furnace</u>	<u>Size</u>
1	Complete Height of the Furnace	28" - 30"
2	Thickness of the Furnace wall	5"
3	Height of the Chimney	11" - 13"
4	Upper diameter of the Chimney	53" - 60"
5	Diameter of the Chimney mouth	5.5" - 6"
6	Lower diameter of the Chimney	70" - 75"
7	Width of the opening at ground	10" - 12"
8	Height of the opening (parabolic)	6" - 9"
9	Length of the Tuyere	6" - 9"
10	Diameter of the Tuyere	1.5"

Operation of Primitive Furnaces

Ore is broken into very small pieces and then it mixed with charcoal (made from sal wood). First few layers of charcoal are arranged inside the furnace. Later mixture (ore and charcoal) is arranged by packing the furnace. (Notably, no flux is used by any of the primitive iron smelters.)



Fire is lit through the bottom hole and tuyere is introduced. After sealing the furnace with clay, air is blown in the furnace. With time of intervals fresh mixture of ore and charcoal is also charged and air blowing continues.

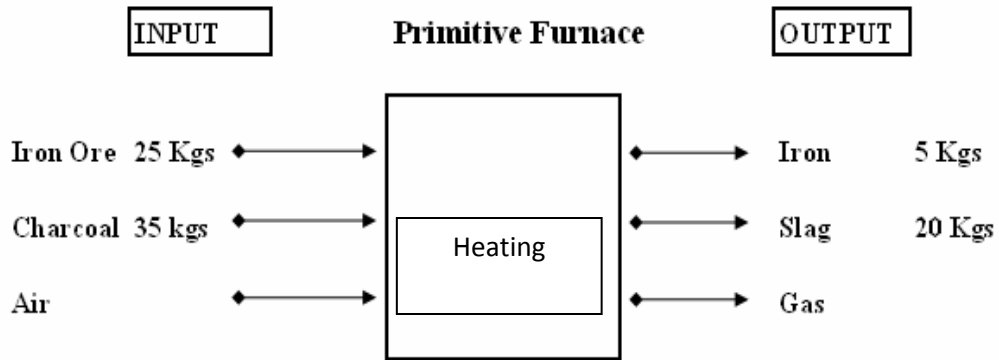
Process continues till 8 to10 hours and slag is extracted through the holes (on the both sides of tuyere) in the pits. Later foot bellows or blowers are removed and clay seal is broken to draw out the lump of iron (smelted) from the bottom of the furnace. Now this iron lump is wrought with hammer to

squeeze out the slag, as the lump is contaminated with slag and charcoal.

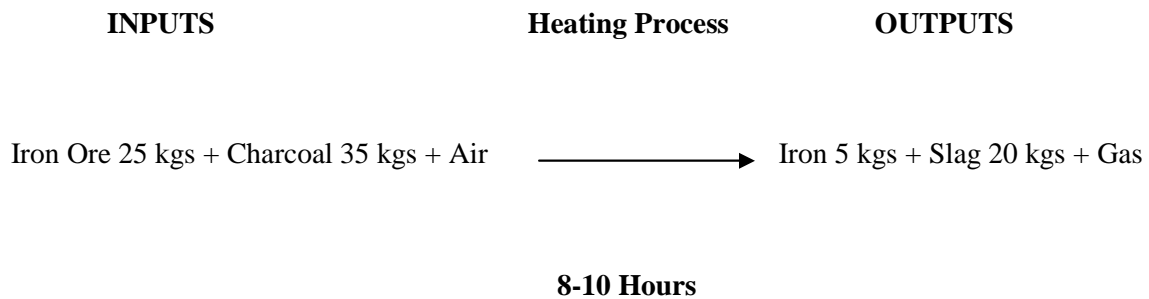
This iron is re-heated and again wrought with hammer then used for making tools and other items.



[A pig is sacrificed before the iron smelting process started to appease supernatural power]

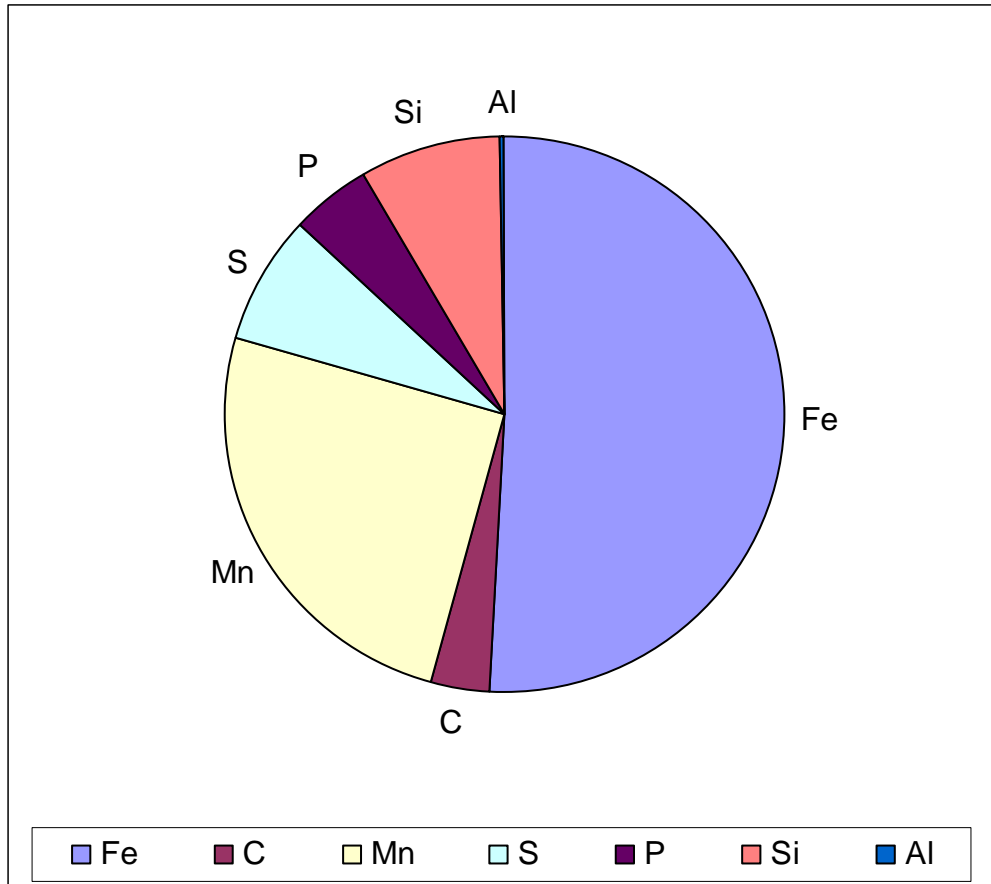


Pix : Block digrame of Iron smelting process in a primitive furnace



Chemical Analysis of Iron smelted by Asur

Chemical Analysis of Iron smelted by Asur	
Fe	0.99%
C	0.06%
Mn	0.49%
S	> 0.14 %
P	0.093% - 1 %
Si	0.16%
Al	0.003



The Iron smelted by Asurs' has anti rust properties

The iron smelted by them has anti-rust in property. Their iron never corroded as a thin layer of a compound protects the iron from rust. A protective layer is formed catalytically due to presence of high amounts of Phosphorous in the traditional smelted iron which protects it from rust.



The presence of high amount of phosphorous is due to mixing the ore with charcoal in the iron making process.

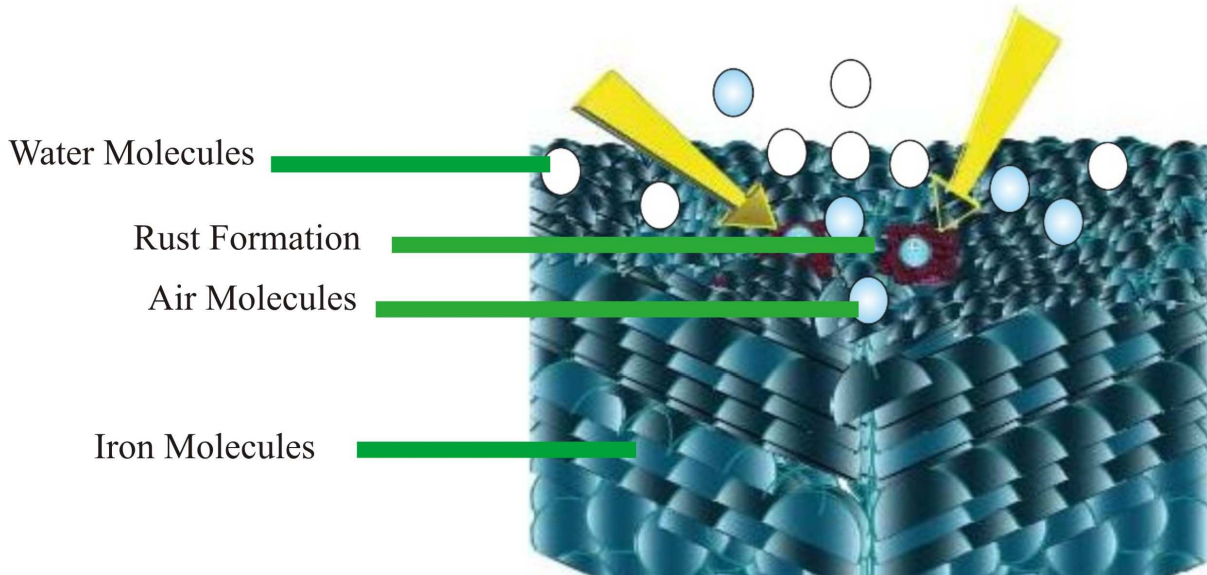
Pix :- Tipu Sultan's Swords

According to the metallurgical reports (NML and BSL), Iron smelted by Asur contains as much as one percent of Phosphorous against less than 0.05 percent in iron smelted by modern still mills. In stead of charcoal modern steel mills uses lime stones in their blast furnaces and most of the phosphorous is carried a way with the slag.

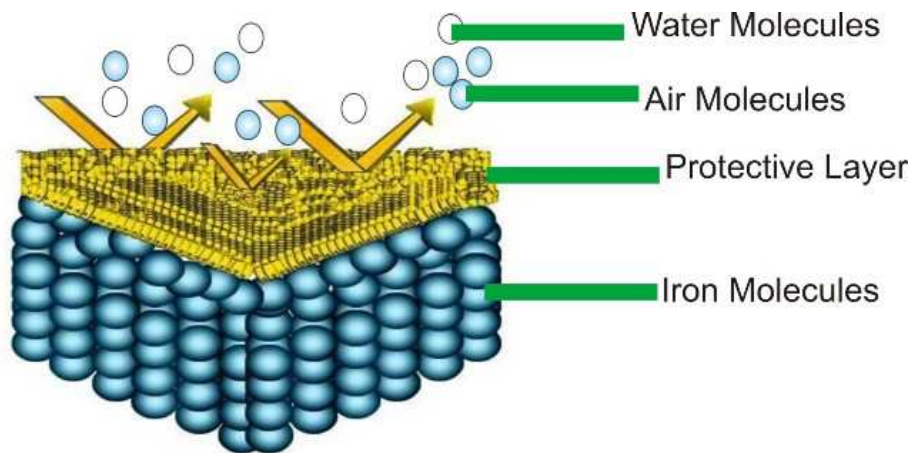
There are several striking evidence of the skills of the Asurs includes — Damascus swords, Tipu Sultan's Sword, the iron pillars at Delhi and Dhar, iron beam of Sun Temple at Konark. Reports published on the Iron Pillar of Delhi reveals that this pillar did not get corroded as a thin layer of "misawite", a compound of iron, oxygen and hydrogen, has protected the cast iron pillar from rust. The protective film took form within three years after erection of the pillar and has been growing ever so slowly since then.



After 1,600 years, the film has grown just one-twentieth of a millimeter thick. This protective film was formed catalytically by the presence of high amounts of phosphorous in the iron. The high phosphorous content is a result of the unique iron-making process practiced by ancient Indians, who reduced iron ore into steel in one step by mixing it with charcoal.



Pix : Modern Iron which has rust property



Pix : Asur's smelted iron which has anti-rust property

Traditional Iron making in modern perception :

In general its' believe that the traditional iron making is wasteful. The charcoal used in this process gives rise to deforestation. But it's not true; the ore and fuel used by Asurs are not affecting the environment. "Most of the charcoal is made by them with dead trees lying in the forest", study also found.

Asurs' are using those ores on the crust of above the earth surface which are neglected for smelting by the modern steel mills. Modern mills rated it as low grade and considered it useless for smelting.

Role of Traditional Iron Technology on Ecology

Study found that Asura's iron smelting tradition is much safer, cheaper and eco-friendly. The charcoal used for smelting as a source of energy is proved to be a far less pollutant (because of its low sulphur content) in comparison to the fuels used by the modern steel mills.

The furnaces used by Asur's are small and it do not cause harm to the atmosphere or ecology.

Factors that have given a blow to the indigenous iron smelting tradition

There are several reasons behind the tribals indigenous iron smelting tradition which gradually losing its ground

1. Implementation of the Forest Conservation Policy by the Government as tribal are deprive of from their forest right.
2. Introduction of latest metallurgy techniques.
3. High production cost.
4. Better tools are available in the market on low cost
5. Iron smelting is very hard work and time taking.

In a bid to revive this dying tradition Government should take all essential steps earliest.

How to 'Revive' and 'Preserve' Asur's traditional iron-smelting practices

The ancient processes of iron making are having low productivity since a large percentage of iron is lost in the slag. Sufficient amount of air is not blown into the furnace due to poor air blast (blowing) system. Huge amount of charcoal is used in the smelting process.

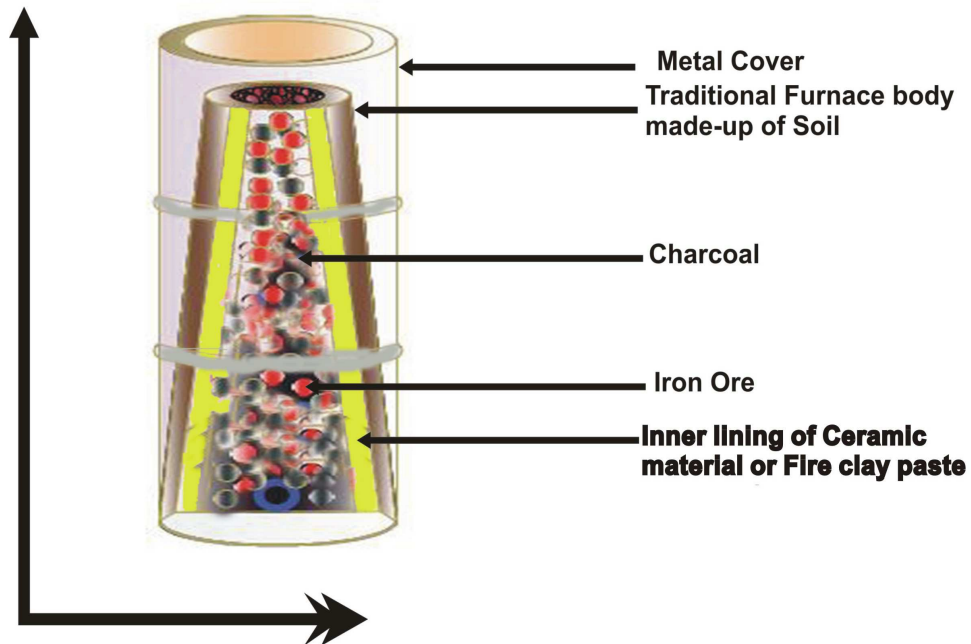
About 35 kgs of charcoal is used for getting 5 kgs of wrought sponge iron and the temperature obtained is quite low.

But after few modifications in the design and operation in the furnace as well as air blasting mechanism productivity can be increased and it would become more energy efficient.

Proposed Modifications in the Design and Operation of Ancient Iron Making Furnaces

With the little modifications in the design and operation of the ancient iron making furnace can increase its productivity. It can also make the furnace more energy efficient.

1. The size of the iron ore and charcoal in the charge mix should be optimised.
2. The quantity of air blown into the furnace should be optimized
3. By increasing the height and diameter of the furnace volume can be increased which make the raw materials pre-heated (before smelting) and make the furnace more energy efficient.
4. By covering the furnace with an iron drum or any metallic sheet to reduce the heat losses as well as increased the temperature of the furnace.
5. Giving an extra layer of ceramic material or paste of fire clay inside the furnace to withstand higher operating temperature and to reduce the heat losses.
6. Present blowers (Hand or foot driven) should be replaced with Solar Power operated blowers.



Pix. : Graphic representation of Modification in traditional Iron smelting furnace

Findings

Making Decorative pieces, Statues, Show pieces, Wall hangings, Ancient Tools (Table tools), Emblems, Trophies, Shields including others form those irons and by selling it in the international market can give a strong boost in socio-economic condition of the Asur's.

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