A MINT IN MUGHAL TIMES.

By Arthur Needham

A short narrative/paper by Arthur Needham in celebration of the publishing of the second book co-authored by Mohammed Tariq Ansari "The Coins of Jahandar Shah". The book is one of a long numismatist series contracted by Manohar Publishers of Delhi. In this short paper the actual minting of the coins is discussed including procedures and the fineness of the product produced. Broadly it shows how metal was turned into the coins we are writing about.

In writing books on the subject of Indian numismatics we ultimately come down to wishing to understand the process of coin minting during that time. Under Akbar I the empire had expanded greatly. As each minor kingdom was over run Akbar, as every new ruler tried to do, issued coinage in his own name or that current in his empire.

The coins issued were in the comparatively new, to the great subcontinent, Suri standard of weights. The subcontinent, being a series of competing power bases, had not only a different series of coins for each kingdom but often a different series of weights and measures for the sale of goods and produce not only from kingdom to kingdom but also in many areas from city to city.

The expansion of the burgeoning empire and the necessity for the new government to be able to maintain a supply of money not only for normal commerce but also to pay for the large standing army and its requirements. Clearly the process of coining of a major enterprise.

We are perhaps beguiled by European works from the Renaissance period in Europe where scenes of appear to be coin mints contain a small number of fires/furnaces and small number of people working away culminating in the hammering of a coin. However the expanding Mughal empire was somewhat different to this as had the other empires in the sub-continent.

Population

The population of Europe and its various kingdoms in 1600 has been estimated at 75 million while that of the Mughal Empire has been estimated at 88 million.

Homogenous Empire or Small Kingdoms.

Within Europe were a number of empires which were in reality an alliance of a number of states. The Holy Roman Empire at this time consisted of no less than 41 separate entities with an estimated population of around 20 million. The Mughal Empire was being consolidated as a single entity by expansion and stretch from Kabul in the north to the Deccan in the south and spread almost across the whole sub-continent.

Single Money Standard or Differing Standards

With the coming of Akbar and the continued expansion of the empire the money standard was made uniform. That is to say, after a number of experiments during the early part of Akbar's reign, that a standard coinage in a tri metal system of gold, silver and copper based on the previous Suri kingdom standards was made standard across the ever expanding kingdom. Old coinage was ordered to be recoined into the new styles, the minting of a very large number of copper coins was undertaken and the exchange rate between the standard copper coin and its standard silver counterpart was standardised. A method of known depreciation of the value of the gold and silver coins was initiated so that the loss of weight due to normal wear or to illegal practices such as clipping the coin or filing to remove some precious metal were overcome. Further any on land trade in goods that required cash money had to be completed in the coinage of the Mughal Empire. That is to say international trade whether by sea or by land that required a monetary exchange the medium of exchange once within the empire was to be completed in coin of the realm. Therefore if other coins, for example minted in silver, were brought for commercial purposes onto land in the empire they had to be, by law, struck into coin of the realm. This also included silver bullion brought into the empire. At the lowest level for the populace stood the humble money that was made up of various items such as caurie shells and bitter almonds. At the major commercial end of trade and commerce stood an arrangement of commercial bills of exchange (hundis). The hundis could be for a few rupees only and negotiated across the empire to very large bills involving tens of thousands of rupees or more that could be converted to cash, generally freshly struck (sikka) rupees. So we have at all levels the ability of currency to flow.

It now becomes obvious that given the large amounts of actual coinage that was needed in the day to day commercial operations within the empire that the minting process needed to be on what may be described as a large scale enterprise.

There was a need to recoin older coins to ensure that their actual value (without discount) was maintained.

There was a need to coin new coins as the empire expanded.

There was a need to recoin bullion (in its bullion form or in the form of coins of other issuers) to be coined into coin of the Mughal Empire.

There was a need to maintain the fineness (purity) of the precious metal in the coins for the coinage to have the confidence of users of the coin.

There was a need to produce coins of a known weight so that the purchasing value of each coin was known and understood even though the various weights and measures systems across the empire were variable.

There was a need due to the actual size of the empire to have coinage available when and where required and to have the ability to mint coins at request.

The System of Free Minting

Within the Mughal Empire a system of “free” minting was introduced. That is to say coins would be minted on demand on the presentation of bullion. Essentially any amount of bullion in the form of old coins, non-standard issue and foreign coins, bullion itself and any form of the required metal could be presented to a mint and for a known fee (brassage and seigniorage) would be minted into new coin of the realm.

Basically anyone or group that could offer the necessary abilities could be given the right to mint coin of the empire to the specific known standard. Those owning such a mint could do so at a financial advantage and the government itself would receive a share of the revenue. It appears that the government also provided some technical expertise in the way of skilled personnel to ensure the mint produced coins of the necessary standard. Not only did these people have specific expertise but the system had an inbuilt system of quality control measures to ensure that the newly coined product reached the required standard in all areas.

So we have a major enterprise here that takes bullion in a number of forms, refines it to a specific fineness and then produces coins to a known standard of weight with a known impression from dies produced for the purpose. All in all a process that takes, time, skill, manpower and other resources to complete successfully.

Badshah Ghazi Shah Alam Sikkah 1121

Zarb Dar-ul-Sultanat Lahore Sanah 4 Jalus Manus Maimanat

The coin illustrated above is from our first book on the Coins of Shah Alam I. It shows the standard attributes of such coins including the AH issue date, the Regnal Year date, the mint name and in this case the mint epithet and other standard inscriptions for this ruler. The coin dies were frequently larger than the coin planchets so the full attribution details for a coin may be missing. Collectors should look at full attribution rather than "beauty" in selecting hand struck coins. The illustration technique to assist in learning was introduced by Tariq and Needham to the numismatic world.

In his paper "Minting Technology of the Mughal Empire" Najaf Haidar describes the organization of a standard Mughal mint and the various procedures for the production of coins. Much of this presentation does not need to be repeated however a number of points do need to be examined.

Najaf Haidar states the following "The raw materials passed through the hands of at least 10 teams of mint workmen in a long departmental chain before the finished product was approved for use. Quality control was rigorous and mint officials were held responsible for maintaining high standards. The technique of stamping coins with dies and hammer, known as die-striking or hammer striking, was widely prevalent in the medieval world and remained in use in India until it was replaced by milling in the nineteenth century."

It is evident from this that mints were in fact large establishments in the time of "cottage industry" and a significant amount of space and dedicated equipment and resources were needed to successfully run and manage even a medium sized mint.

As advised above the quality control was rigorous and the procedures known and controlled, at least in the important stages, by men of vast experience. This rigorously controlled process was needed to ensure that the final product, the coin, was of required standard.

Despite there being sufficient resources to look at the actual structure of the mints by work division and controls there appears to be no clear modern research into the absolute location and investigation into such a mint.

Further in Najaf Haidar's conclusion the following is stated "The technology was manual and based on the use of simple tools and devices. There was no use of animal power even for driving bellows to ignite strong fires. As a result, the furnaces and crucibles were not capable of melting large quantities of metal. The technology was labour-and-skill intensive and relied heavily on the long-standing traditions of smelting, refining and coining prevalent in India. Major changes in the recruitment of labour force and the mint buildings were not

frequent and, except for improvements in refining precious metals, no technological breakthrough took place to bring production in line with the supplies. The technology was put to the test during high seasons when the slow working of the mint invited complaints from merchants. An outcome of this was the growth of a money market where money-lenders and money-changers (*sarrafs*) turned to offering cash and credit facilities to merchants for investments at the coasts as well as the distant hinterland markets against bullion consignments brought for the mint."

This conclusion allows to us to search in the later period of the Mughal empire (the early 19th century) when the various protagonists battling for control of the old empire had caused some dislocation of "normality". If we move to central India we find that the processes employed in a number of mints were accurately recorded by Sir John Malcolm in his Memoir of Central India Part II.

The text pertaining to the actual operations of a mint are below

"The banker or merchant having obtained permission to coin, and having collected a sufficient number of silversmiths, makes a purchase of coins or other bullion as will turn out most to his advantage. These being, in general, baser coins than the new ones to be formed, are first brought to the Nearchee, or refiner; who, though not a permanent Government officer, has acquired, by agreeing to pay his share of the profits to the latter, a species of contract, the rates of payment to him, and other dues, being permanently fixed at one rupee for every three hundred and fifty refined, besides supply of fluxes from the Government and lead from the merchant. The mode of fining is always by cupellation with lead: three hundred and fifty rupees are placed at one time in the cuppel, with a certain quantity of lead according to the standard of the silver used, which by experience he knows will suffice for bringing it to a certain degree of purity, a little than required for the coin. The standard is then nicely adjusted, by adding a certain quantity of baser metal. The purified mass is then taken to the melter, who, putting one thousand rupees weight at a time in a large crucible on an iron ring, capable of being raised by attached chains, melts and runs into several flat moulds, about six inches long and half and inch broad, forming it thus into convenient pieces for cutting into the necessary dimensions. The melter receives for his labour half a rupee per thousand, half of which is paid by the merchant, and half by the government. The bars of silver are then delivered to the silversmiths, each of whom has a small raised fire-place and an anvil in front close to him. On one side sits another with scales and shears, for supplying him with square pieces of metal at nearly the proper weight. On the other side is a person whose business is to adjust the weight more accurately after it has been formed into its shape. The silver smith receives back the small lumps; heats them red-hot and, taking them up with a pair of small forks, gives them two or three smart blows on the angular points, then strikes the piece flat, and gives it afterwards one or two rapid turns on its edge, accompanied by gentle strokes of the hammer; and it thus receives a rudely round shape ready for the die. Before this operation, however, it is taken to another man to clean, by boiling it in a mixture of tamarind and salt. The planchets are then taken to receive the impressions or inscription: this is formed by two steel die; one firmly fixed in a heavy raised block, and the silver piece being placed on it; the other die in the form of a large heavy punch, is placed above by one man, while an assistant gives it a smart blow with a heavy hammer; one blow suffices: these men are relieved every two hours.

The number of rupees thus being completed, are carried to the assay master and, if approved, the fees are paid and the coin taken away by the proprietor, for circulation."

There are several further notes on what occurs if the coins are not up assay specifications but then the following note

"…with the proper quantity of purer metal to reduce them to the assay touch."

To review the actual size of the operations of a mint in central India the following is described

"The average number of rupees which a mint in Central India is capable of coining in a day, is about eight or ten thousand, employing about fifty silversmiths, ten or twelve stampers, six or eight refiners and two melters."

A further note states

"When I inquired, on my visit to the Mint at Indore, what their utmost efforts could produce in a day, the answer was eleven thousand."

Clearly we have a major operation here with over seventy workers directly employed and that does not include organisers, guards and the necessary suppliers of such things as charcoal for the fires. This was not a cottage industry by any means. Workshops employing this number of people even in sweated labour conditions need to be relatively large and a number of large fire places with their bellows needed to produce the required heat from the charcoal would have needed constant feeding of the heat source, charcoal.

Over time there will be further papers discussing process such as cupellation but certain items will be discussed at some length here.

1. Dies

The dies needed to be engraved either onsite or perhaps at a more central location especially for the smaller mints. However for the larger mints given the production numbers engravers were employed on site. Research shows that the fixed die (generally the obverse) lasted longer than the punch die. It is thought that a die set could last through 10000 to 15000 strikes.

2. Testing the Fineness of the Metal

There were technically three methods of testing fineness at this time.

a. Archimedes Method

Relied on the difference in weight between an object weighed in air and then weighed in water.

b. Fire Assay

Basically a process by the use of heat and additives to remove all of the metals and impurities other than the metal being analysed for and then using the difference in the weights between the original and the treated to calculate the purity of the original sample.

Both of these methods require careful calculation by weighing. The necessary balance technology was available via a simple balance scales and these could be very accurate at this time. However the necessary exactness to be achieved via standard weights to balance the newly discovered mass was problematic.

c. Touch Testing

Within the notes above the description of the operating mint the words “to reduce them to the assay touch” were used. Touch assaying was an ancient method of testing the fineness of precious metals by comparing the colour of the streak left by a metal object when drawn across a hard black or dark coloured stone with that of a known standard. The standard was a series of previously prepared specimens of known fineness and the streak produced by the known specimens would be compared to the streak of the item for testing.

Co-author Arthur Needham in preparation for extensive XRF testing (non-destructive) of coins under quality controlled conditions ran a series of field tests on touch testing (non-chemical). Prepared samples of gold and silver of varying fineness were taken into the field in various parts of Asia to be tested by local experts in touch testing. The following results were recorded (simplified version)

A. Experts could easily distinguish silver percentages that varied by 2% in content.
B. The same experts could easily distinguish gold percentages that varied by 1% in content.
C. Experts could rapidly advise silver content plus or minus 1%
D. Experts could rapidly advise gold content plus or minus 0.5%

Several of those chose to do the testing advised that with care and time they could increase their accuracy. Various methods of deception by the tester were

discussed. The key to an accurate test seemed to be that the sample and the tester should be drawn across the testing stone with the same “force”. However acts of deception from the long established experts appeared to be very few because of the legal basis of their work and pride within their chosen work that was often passed through many generations. The ability to “shop” items from one dealer to another may be somewhat restricted in rural areas however within larger towns and cities it would become obvious to those within trades and controlling bodies if a dealer was acting in a manner not conducive to fair trading.

Technically there was still a specific problem in that touch testing only tested the surface of the coin (or material) being tested. For coins the simple application of a punch driven into the coin to test if the silver was consistent within the coin. In markets where the coin types were known and could easily be checked by even a handheld balance as to weight accuracy the punch or Shroff (Saraf) mark became a frequent item seen on coins.

Badshah Ghazi Shah Alam Bahadur Sikkah 1122

Zarb Narnol Sanah 4 Jalus Manus Maimanat

The above is an illustration taken from our book on the Coins of Shah Alam I. It clearly shows a number of such Shroff marks on both the obverse and reverse of the coin. The coin is from the mint of Narnol. The dates can be clearly seen on this coin.

From here we now clearly have the methods for testing the genuineness of a coin in the marketplace.

Within the marketplace we have the issuing of coins by the method of free minting, the quality of the coins including especially the fineness of the metal was carefully controlled and could be checked with relative ease and simplicity.

The marketplace itself was controlled by rules and regulations that were jealously guarded. Coins themselves whether in gold, silver or copper were utilised in everyday trade but there was also, as previously noted, the use of humble money. There was therefore the need to exchange humble money into coin (and vice versa) at the marketplace. Moneychangers took up that role and negotiated the smaller transactions. The Shroffs negotiated the larger deals and exchange, worked through in conjunction with the mints and became the intermediaries and bankers to all. There is evidence to note that in at least a number of mints the Shroff while not the mint owner or master was called upon to test the fineness of the product produced at the mint.

It can be clearly seen that a number of mints at least were large and complex operations. Some Mughal rulers had over 80 different mints issuing coins in their name. Not all of these mints would have been large but there was still the need for a substantial operating site and for quality control to be at a high standard.

Clearly, following the field testing of touch methods there was a necessity to test coins by a non-destructive method to check on the quality standards of the coin production during Mughal times as a starter for a more intensive study and that study should be extended to as many coins from as many dynasties as possible.

Although trained in the use of modern XRF equipment it was thought necessary to engage a third-party expert in all further trials. The initial trials were conducted by Olympus Innov-X in late 2010 and early 2011. The results were in line with expectations for coins that had been fully authenticated and attributed.

This research project suffered a major setback when Arthur Needham was seriously injured in an accident and it was not until 2013 that plans for a much larger testing by XRF of the metal composition was planned. The world's leading producer of XRF technology Bruker Elemental agreed to conduct on behalf of Arthur Needham a major controlled test of coins. The location finally agreed upon

was the prestigious Ashmolean Museum at Oxford University and Dr Bruce Kaiser from Bruker and other expert staff formed a consultative group that was to complete the experiment.

On announcing the project several numismatists arranged to test certain coins. The results for some reason were apparently not in accordance with known figures and the theory was dismissed in some circles. Here there was a fundamental failure to understand correct procedures. These apparent failures highlighted the procedural course taken by Arthur Needham to ensure that only the best equipment and high-level equipment operators and result analysts were engaged.

The end result was that the testing was a great success with a number of important finds. Later it was recognised in at least one presentation as “Arthur Needham from Australia who initiated the whole project.”

For the purpose of this presentation the results of the rupee coins from the reign of Shah Alam I are shown below (Our first book was on the silver coins of Shah Alam I). This is a copy of the data presented by Dr Bruce Kaiser. The results are refined to show silver (Ag), lead (Pb), gold (Au), zinc (Zn) and copper (Cu). The obverse and reverse of each coin was tested and the results displayed. For those who had researched the effectiveness of the procedures used in Mughal mints the results came as no surprise. However many were surprised by the stability of the silver content from coins across a number of reign dates and from mints spread across the whole empire. The efficiency of the system was clearly shown in the results. Note where, for example, silver is recorded as .956 this represents silver at 95.6% of the total metal.

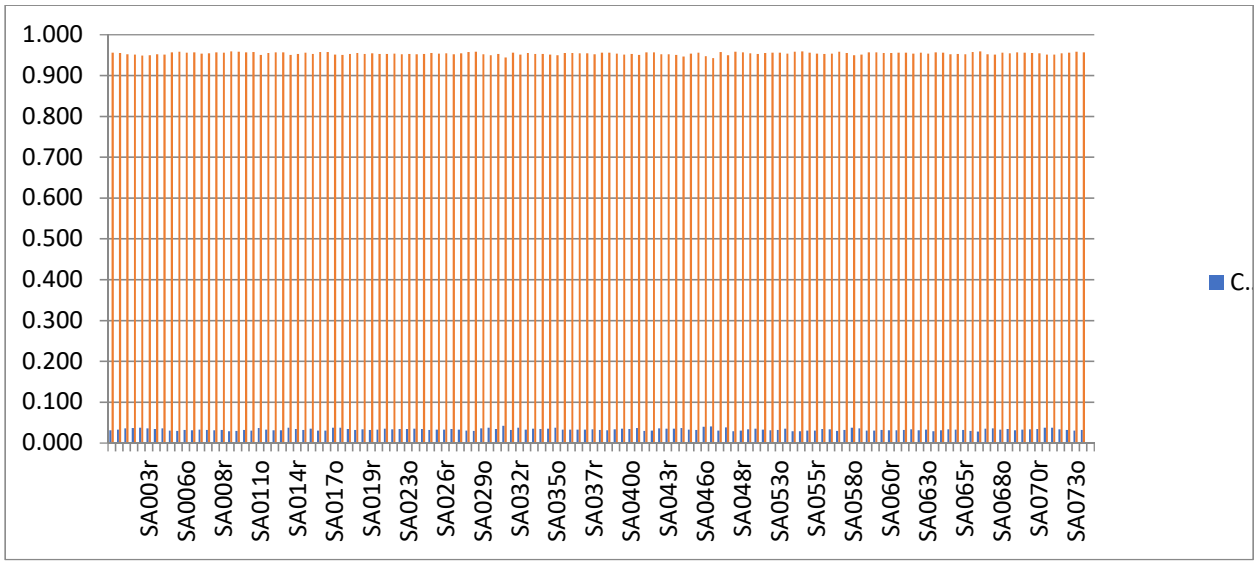
Mint and Date	Sample	Copper	Zinc	Gold	Lead	Silver	Total
		CuKa1	ZnKa1	AuLa1	PbLa1	AgKa1	Sum
Ahmadabad 1119/1		0.031	0.000	0.001	0.010	0.956	1.00
		0.032	0.000	0.001	0.007	0.955	0.99
Ahmadabad 1120/2	**SA002o**	0.036	0.000	0.001	0.010	0.951	1.00
	SA002r	0.036	0.000	0.001	0.011	0.951	1.00
Ahmadnagar 1122/4	**SA003o**	0.037	0.000	0.002	0.012	0.949	1.00
	SA003r	0.035	0.000	0.002	0.010	0.950	1.00
Ajmir xxxx/3	**SA004o**	0.034	0.000	0.001	0.013	0.952	1.00
	SA004r	0.035	0.000	0.001	0.010	0.951	1.00
Akbarabad	**SA005o**	0.030	0.000	0.002	0.008	0.957	1.00
Aurangzeb RY3	**SA005r**	0.029	0.000	0.001	0.005	0.958	0.99
Akbarabad RY2	**SA006o**	0.032	0.000	0.000	0.008	0.955	1.00
	SA006r	0.031	0.001	0.001	0.006	0.956	0.99
Akbarabad 1121/3	**SA007o**	0.032	0.000	0.001	0.016	0.953	1.00
	SA007r	0.032	0.000	0.001	0.013	0.954	1.00
Akbarabad xxxx/4	**SA008o**	0.031	0.000	0.000	0.006	0.956	0.99
	SA008r	0.031	0.000	0.001	0.009	0.956	1.00
Akbarnagar 1119/1	**SA009o**	0.029	0.000	0.000	0.003	0.959	0.99
	SA009r	0.029	0.000	0.000	0.002	0.958	0.99
Akbarnagar 112x/4	**SA010o**	0.031	0.000	0.000	0.004	0.957	0.99
	SA010r	0.030	0.000	0.000	0.008	0.957	0.99
Alamgirpur 1122/4	**SA011o**	0.036	0.000	0.001	0.010	0.951	1.00
	SA011r	0.032	0.000	0.001	0.006	0.955	0.99
Azimabad 1119/1	**SA013o**	0.031	0.000	0.000	0.007	0.956	0.99
	SA013r	0.030	0.000	0.001	0.009	0.956	1.00
Azimabad 1120/2	**SA014o**	0.037	0.000	0.001	0.008	0.950	1.00
	SA014r	0.034	0.000	0.001	0.010	0.952	1.00
Azimabad 1120/3	**SA015o**	0.031	0.000	0.001	0.007	0.956	0.99
	SA015r	0.035	0.000	0.001	0.008	0.953	1.00
Azimabad 1121/3	**SA016o**	0.030	0.000	0.000	0.004	0.958	0.99
	SA016r	0.030	0.000	0.000	0.005	0.957	0.99
Azimabad 1123/5	**SA017o**	0.037	0.000	0.000	0.006	0.951	0.99
	SA017r	0.037	0.000	0.001	0.012	0.950	1.00
Bareilly 1120/2	**SA018o**	0.034	0.000	0.001	0.013	0.953	1.00
	SA018r	0.032	0.000	0.001	0.011	0.955	1.00
Bareilly 1121/3	**SA019o**	0.033	0.000	0.001	0.012	0.953	1.00

	SA019r	0.032	0.000	0.001	0.013	0.954	1.00
Bareilly 1122/4	**SA020o**	0.033	0.001	0.001	0.013	0.953	1.00
	SA020r	0.034	0.000	0.001	0.010	0.953	1.00
Bareilly 1123/4	**SA021o**	0.033	0.000	0.001	0.012	0.953	1.00
	SA021r	0.034	0.000	0.001	0.013	0.952	1.00
Burhanpur 1119/1	**SA023o**	0.034	0.000	0.002	0.011	0.953	1.00
	SA023r	0.035	0.000	0.001	0.010	0.952	1.00
Itawa 1119/1	**SA025o**	0.034	0.000	0.001	0.013	0.952	1.00
	SA025r	0.032	0.000	0.001	0.010	0.955	1.00
Itawa 1119/1	**SA026o**	0.032	0.000	0.001	0.013	0.953	1.00
	SA026r	0.032	0.000	0.001	0.009	0.954	1.00
Itawa 112x/2	**SA027o**	0.034	0.000	0.001	0.012	0.952	1.00
	SA027r	0.032	0.000	0.001	0.011	0.955	1.00
Itawa 1121/3	**SA028o**	0.030	0.000	0.001	0.006	0.957	0.99
	SA028r	0.029	0.000	0.001	0.004	0.958	0.99
Itawa 1122/4	**SA029o**	0.036	0.000	0.001	0.009	0.952	1.00
	SA029r	0.037	0.000	0.001	0.012	0.950	1.00
Jahangirnagar RY4	**SA030o**	0.034	0.000	0.001	0.009	0.953	1.00
	SA030r	0.042	0.000	0.002	0.019	0.944	1.01
Kabul 1122/4	**SA032o**	0.032	0.000	0.001	0.003	0.956	0.99
	SA032r	0.037	0.000	0.001	0.007	0.951	1.00
Karimabad RY5	**SA033o**	0.033	0.000	0.000	0.005	0.955	0.99
	SA033r	0.035	0.000	0.001	0.010	0.952	1.00
Kashmir RY1	**SA034o**	0.034	0.000	0.003	0.010	0.952	1.00
	SA034r	0.034	0.000	0.003	0.011	0.951	1.00
Kashmir RY2	**SA035o**	0.037	0.000	0.001	0.015	0.949	1.00
	SA035r	0.033	0.000	0.000	0.007	0.955	0.99
Kashmir 1120/2	**SA036o**	0.032	0.000	0.001	0.009	0.955	1.00
	SA036r	0.032	0.000	0.002	0.012	0.954	1.00
Kashmir 1122/4	**SA037o**	0.032	0.000	0.001	0.010	0.954	1.00
	SA037r	0.033	0.000	0.002	0.013	0.952	1.00
Kashmir 1123/5	**SA038o**	0.031	0.000	0.000	0.013	0.955	1.00
	SA038r	0.030	0.000	0.001	0.011	0.956	1.00
Katak 1120/2	**SA039o**	0.033	0.000	0.001	0.010	0.953	1.00
	SA039r	0.035	0.000	0.001	0.013	0.951	1.00
Khanbayat RY1	**SA040o**	0.034	0.000	0.001	0.013	0.952	1.00
	SA040r	0.036	0.000	0.002	0.013	0.950	1.00
Khujista Bunyad 1121/3	**SA042o**	0.029	0.000	0.001	0.011	0.957	1.00

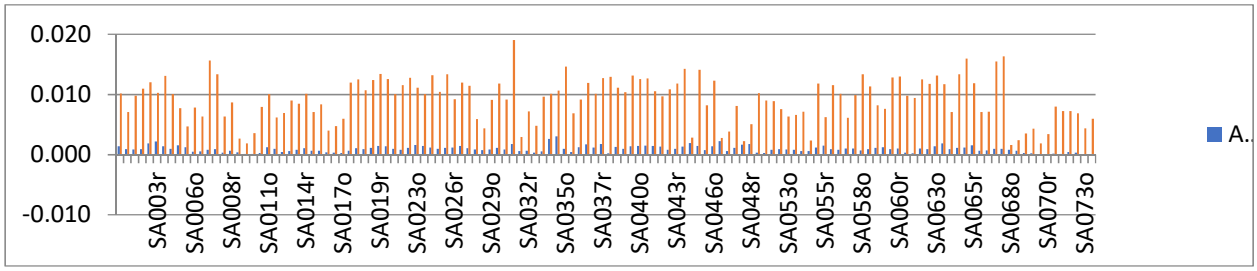
	SA042r	0.030	0.000	0.001	0.010	0.956	1.00
Lahore 1119/1	**SA043o**	0.035	0.000	0.001	0.011	0.952	1.00
	SA043r	0.035	0.000	0.001	0.012	0.952	1.00
Lahore 1120/2	**SA044o**	0.035	0.000	0.001	0.014	0.950	1.00
	SA044r	0.036	0.000	0.002	0.003	0.946	0.99
Lahore 1121/4	**SA045o**	0.032	0.000	0.001	0.014	0.953	1.00
	SA045r	0.031	0.000	0.001	0.008	0.956	1.00
Lucknow RY2	**SA046o**	0.039	0.000	0.001	0.012	0.947	1.00
	SA046r	0.040	0.001	0.002	0.003	0.943	0.99
Lucknow RY3	**SA047o**	0.030	0.000	0.001	0.004	0.958	0.99
	SA047r	0.038	0.000	0.001	0.008	0.950	1.00
Muhammadabad	**SA048o**	0.028	0.001	0.002	0.002	0.958	0.99
(Bidar) 1120/2	**SA048r**	0.030	0.000	0.002	0.005	0.957	0.99
Murshidabad 1120/2	**SA050o**	0.033	0.000	0.000	0.010	0.954	1.00
	SA050r	0.035	0.000	0.000	0.009	0.953	1.00
Narnol 1121/3	**SA051o**	0.032	0.000	0.001	0.009	0.955	1.00
	SA051r	0.031	0.000	0.001	0.008	0.956	1.00
Shahjahanabad							
1119/1	**SA053o**	0.031	0.000	0.001	0.006	0.956	0.99
	SA053r	0.034	0.000	0.001	0.007	0.953	0.99
Shahjahanabad							
1119/2	**SA054o**	0.029	0.000	0.001	0.007	0.958	0.99
	SA054r	0.029	0.000	0.001	0.002	0.959	0.99
Shahjahanabad							
1120/2	**SA055o**	0.030	0.000	0.001	0.012	0.955	1.00
	SA055r	0.030	0.000	0.001	0.006	0.953	0.99
Shahjahanabad							
1121/3	**SA056o**	0.034	0.000	0.001	0.012	0.952	1.00
	SA056r	0.033	0.000	0.001	0.010	0.953	1.00
Shahjahanabad RY3	**SA057o**	0.029	0.000	0.001	0.006	0.958	0.99
	SA057r	0.032	0.000	0.001	0.010	0.955	1.00
Shahjahanabad RY3	**SA058o**	0.037	0.001	0.001	0.013	0.949	1.00
	SA058r	0.035	0.001	0.001	0.011	0.951	1.00
Shahjahanabad							
1123/5	**SA059o**	0.030	0.001	0.001	0.008	0.956	1.00
	SA059r	0.030	0.001	0.001	0.008	0.956	1.00
Surat RY3	**SA060o**	0.031	0.000	0.001	0.013	0.955	1.00
	SA060r	0.031	0.000	0.001	0.013	0.955	1.00
Surat 1120	**SA061o**	0.031	0.000	0.000	0.010	0.956	1.00
	SA061r	0.031	0.000	0.000	0.009	0.956	1.00

Surat 112x/5	**SA062o**	0.033	0.000	0.001	0.013	0.953	1.00
	SA062r	0.031	0.000	0.001	0.012	0.956	1.00
Surat RY6	**SA063o**	0.032	0.000	0.001	0.013	0.954	1.00
	SA063r	0.029	0.000	0.002	0.012	0.957	1.00
Surat No date visible	**SA064o**	0.031	0.002	0.001	0.007	0.956	1.00
	SA064r	0.033	0.002	0.001	0.013	0.952	1.00
Surat 1/2 rupee RY6	**SA065o**	0.032	0.000	0.001	0.016	0.953	1.00
	SA065r	0.032	0.000	0.002	0.012	0.952	1.00
Tatta RY2	**SA066o**	0.029	0.000	0.001	0.007	0.958	0.99
	SA066r	0.028	0.000	0.001	0.007	0.959	0.99
Tatta 1120/2	**SA067o**	0.035	0.000	0.001	0.015	0.952	1.00
	SA067r	0.035	0.000	0.001	0.016	0.951	1.00
Chinapatam RY1	**SA068o**	0.032	0.000	0.001	0.002	0.956	0.99
	SA068r	0.034	0.000	0.001	0.002	0.954	0.99
Chinapatam RY2	**SA069o**	0.031	0.000	0.000	0.004	0.957	0.99
	SA069r	0.032	0.000	0.000	0.004	0.956	0.99
Chinapatam RY3	**SA070o**	0.033	0.000	0.000	0.002	0.955	0.99
	SA070r	0.034	0.000	0.000	0.003	0.954	0.99
Chinapatam 1122/4	**SA071o**	0.037	0.000	0.000	0.008	0.951	1.00
	SA071r	0.037	0.000	0.000	0.007	0.951	0.99
Chinapatam 1123/5	**SA072o**	0.033	0.000	0.000	0.007	0.954	0.99
	SA072r	0.032	0.000	0.000	0.007	0.956	0.99
Chinapatam 1123/5	**SA073o**	0.030	0.000	0.000	0.004	0.958	0.99
	SA073r	0.031	0.000	0.000	0.006	0.956	0.99

Graph of the Silver Content by Sample



Graph of the Copper Content



The key is the stability of the silver content.

Some years ago an independent researcher visited the site of Daulatabad Fort mint near Aurangabad. His name is Barry Tabor and he published a short narrative with photographs. Recently further photographs were published by a local group showing recent photographs that, alas, show some decay and rubbish.

Although Tabor's paper has been available for some time this recent visit prompted negative comments from an acknowledged expert in Indian numismatics. The comment were somewhat vague in nature however and perhaps were driven by popularist drawings of what are possibly mints in Europe from the Middle Ages.

The report on the visit is presented as written.