

Calcutta Mint – Introduction of Steam

Summary

By 1818 it had become clear that the Calcutta mint could not keep up with the work that was expected of it. The Calcutta mint master, Saunders, and the assay master, Wilson, were asked to prepare a report on the necessary steps to improve the situation, and in 1819 they recommended that a steam-driven mint should be obtained from England. A Lieutenant Forbes was selected to go to England and work with the supplier to ensure that local Bengal requirements would be met, and he duly arrived in England in 1820. The new mint was supplied by Boulton & Watt and was built and sent to Calcutta in pieces, arriving in October 1823. A number of experienced workmen were sent to Calcutta with the mint, and they were largely responsible for reconstructing it locally. It was completed in 1829 or 1830 and began production of copper pice in the summer of 1830. Silver rupees of the 19 sun sicca style and gold mohurs of the same style, as well as Farrukhābād rupees were produced; also Arkot rupees for use at Madras. In 1831 a new style of copper anna and pie was produced, but the debate about the style of the coins, and the introduction of one uniform coinage for the whole of India had by then reached a point at which it could become reality, and no further changes were made to the Bengal coins. In 1835, the new Calcutta mint led the way in producing this new uniform coinage.

Detailed Discussion

The Inadequacy of the Calcutta Mint

The mint master, Saunders, had begun discussing necessary improvements to the Calcutta mint in early 1818 1:

...The Vice President in Council entirely approves the attention paid by the Mint Master to the improvement of the machinery of the mint, and if it shall appear from the result of the further enquiries which that officer proposes to institute, that the steam engine may with advantage be there employed, Government will expect to receive a further communication from your Committee on the subject.

but at that time he did not have access to a written account of the processes used in the European mints. However, a description must have arrived by 1819, because this was when Saunders and the assay master, Wilson, were asked to prepare a report on the Calcutta mint and to suggest recommended ways of improving it. The report includes references to a printed account of the London mint 2:

...[The mint] can only be improved by the introduction of that improved machinery, which has of late years been invented, and from which every branch of British manufacture has profited in so great a degree. To persist then in a system of acknowledged error when the means of improvement are attainable, would be inconsistent with every principle of sound policy and would betray a culpable indifference to the real interests of Government, in a very important part of the service.

We think we cannot better give effect to the order contained in Mr Secretary Mackenzie's letter requiring a detail of the particular sort of machinery proposed to be introduced here, than by submitting a printed account of that now in use at the London mint together with the descriptive drawings of it, as well as of the newly invented furnaces, and apparatus used for fusing and pouring the metals there. It is fortunate that such an account should have reached us at this time, as it clearly shews that most of the inconveniences incidental to our rude and imperfect system of proceeding, may be remedied. We propose to call your attention to the several departments described, commencing with

The Melting Furnaces

Page 22 of the printed account

We were so forcibly struck with the superiority and simplicity of these furnaces, over those in use here, that we caused one to be constructed of common fire brick, with a view of ascertaining whether the fuel most readily procured here would answer for fusing a large body of metal. Complete success attended the experiment as far as regarded that object. We failed however in our attempt to imitate the machinery for pouring the metal and guiding the ingot moulds etc etc, so that we could not form a correct idea of the lowest form of wastage at which the melting might be conducted. As a large body of metal can however be fused with less wastage than the same quantity divided into ten or twelve pots, such as we have now in use here, we have reason to believe that a saving equal to one third of what now arises from wastage on that process, might be effected, if we were in possession of the requisite machinery and crucibles.

The easy supervision of these furnaces is also an important thing, but a paramount advantage would be that the Assay Master might then take samples for separate assays from each pot melted, and so effectually check the fraudulent attempt to alloy any one pot.

We are strongly disposed to recommend that the furnaces of the new mint should be constructed after this improved plan, and that the requisite sets of machinery for working them should be procured from England.

Laminating Machinery

Described page 26 of the printed account

Amongst the numerous uses to which the power of the steam engine has been directed, there is none perhaps of more importance than its application to the coinage in all its branches, which requires that motion shall be steady, and that force should be uniformly and properly proportioned. We recommend therefore that complete

Bengal Presidency, Introduction of steam

laminating machinery, such as is described to be in use at the Royal Mint, with a steam engine of sufficient force to work it, be procured from England, by which we should get rid of the serious expence attending our present very precarious mode of working the rollers by hired coolies. We also recommend that Mr Barton's newly invented drawing machine should be procured. The equality in thickness which this is described as giving to the slips, or planchets, is quite unattainable by common rollers, even when working by a steam engine. This machine would render the blanks when cut so near to their standard weight as to supercede the employment of probably two thirds of our present establishment of adjusters, and it would also lessen the wastage from this unmechanical operation.

Cutting and Milling Machines

Described in page 32 and 33 of the printed account

The cutting out and milling machines form connected parts of the general improvements adopted at the Royal Mint, and therefore it would be desirable to introduce them also, otherwise we experience less inconvenience in these than in any other departments of our mint.

Stamping Machines

Described in page 34 of the printed account

We conceive that at any rate it would be highly advisable to have the coining presses worked by a separate steam engine, as the present mode of raising the impression by the force of a man's arm, leaves it quite uncertain whether it be properly raised or not, and consequently whether the coin be fit and creditable to circulate. When this is not the case, the wastage and expense, as before noticed from the intermediate processes of melting, laminating, adjusting and milling, will have been uselessly incurred, and disappointment ensue in the amount of coin remittable to the General Treasury. We think however that this process might be conducted on a more simple principle than that described in the printed account.

Having discussed the various machines that they considered necessary for the new mint, Saunders and Wilson drew attention to the fact that, prior to 1818, the Calcutta sicca coins had been of a higher fineness and this had made the coins softer and easier to strike:

The beauty of our Indian coins has been often and justly extolled, but it should be recollected that they were formerly composed of purer and softer metal, which could with comparative ease, receive any impression from the dies. It is from experience that we can now speak to the defects of the present system when applied to the new coinage, and it is only from what we conceive and read of the new system of coinage, that we recommend its general introduction at the mint, the expediency of which our observations are intended to illustrate.

They went on to discuss the means by which a new mint might be obtained:

As immediately connected with this subject and pursuant to Mr secretary McKenzie's directions, we proceed to offer our opinion as to the manner in which it may be most desirable that the whole, or any part of the new machinery should be procured.

There appear to us but two modes of effecting this:

Either by a special indent being transmitted to the Honble Court of Directors for machinery constructed after that used in the Royal Mint, with such alterations as experience there may have suggested, or by some person well acquainted with the defects arising from our rude and imperfect system of coinage, being deputed to superintend its preparation, and to whom some discretionary latitude might be given in his selection of the most simple and best adapted sort of machinery for this country. Much superfluous expence might thus be saved, and greater certainty attained of the speedy and full accomplishment of the object proposed.

The first mode would probably lead to considerable delay, or disappointment, or both, in the end, by a further reference to Government being deemed necessary, or by the imperfect execution of a commission, with the precise nature of which the Honble Court might not be well acquainted.

Our observations regarding the introduction of new machinery have been principally confined to the facility and superior excellence it would give to the fabrication of the coins. Hence the possibility of counterfeiting them would be lessened, and no pains or penalties hitherto devised have been found powerful enough to overcome this temptation, as daily experience will have shown. The most skilfull workmanship can alone prevent this evil by taking away the temptation, and the very power of offending.

Next they discussed the cost of a new mint or, more particularly, the savings that might be made after a new mint had been installed:

We regret we have no accurate data on which to estimate the first possible expence of the machinery, but we can with more certainty enumerate sundry permanent savings, exclusive of all other advantages, which it would occasion. We estimate them as follows, on a coinage at the rate only of one lac pieces for all the working days at the mint in one year:

<i>Saved 1/3rd wastage or 2as per cent on sicca weight 38,400,000 of bullion required to be melted to produce</i>	
<i>Sicca rupees 26,700,000</i>	<i>48,000</i>
<i>Hire of lever men estimated at 40 men</i>	
<i>to each of six mills relieved 4 times</i>	
<i>in 24 hours at 5 rupees per man</i>	<i>57,600</i>

(From www.psindiancoins.com)

adjusters less one half	8,400
Stampers etc etc	4,000
Total	Rs 118,000

Proper machinery once procured would afford the power of extending the operations of the mint to a coinage of upwards of 300,000 pieces, with the trifling additional expense for fuel etc per day, and would render the Calcutta mint equal to the demands of the whole of the provinces under the Presidency of Bengal. In that case it might eventually be found unnecessary to retain the provincial mints, and their discontinuance would be attended by a further saving of more than a lac of rupees per annum, making in the aggregate, such an arrangement taking effect, an estimated saving of 218,000 rupees per annum. We notice this to do away any objection arising from the first expense of the machinery, which could bear no proportion to the permanent advantages to be derived from it, and if these be not overrated, we conceive the same arrangement might be beneficially extended to the Presidencies of Madras and Bombay.

A new mint was constructed at the former place a few years ago, which doubtless may be easily adapted for the reception of improved machinery. That now in use there was prepared at this mint and must be equally imperfect with our own.

At Bombay we understand, it is proposed to erect a new mint, the present building and machinery being found totally inadequate for all purposes required of them.

The working wastage of precious metals and the expense of the establishments of the above mentioned mints are not less, we imagine, than they are here, and they might be proportionably reduced by the introduction of the imported system of coinage, the result of which, in the aggregate, would probably be a saving to Government in the mint departments under the three Presidencies, of 4 lacs per annum, and would be attended with the further advantage of their being all placed in a more efficient state than has hitherto been the case. We have been led to these observations from conviction that the subject is in every way worthy of the serious consideration of Government.

They submitted plans for a new mint building:

We have herewith the honor to submit an elevation and plan for the proposed new mint, made out by the assistant Assay Master, with due attention to that systematic arrangement which it is highly necessary to observe in constructing a building of such magnitude, and for such a purpose. Care has been taken to allow space for the building required for the steam engines and boilers. Our object has been to form a plan which would answer equally well for the new or the old system of coinage. The building might be therefore speedily commenced upon, and far advanced before the machinery could arrive from England. No time would thus be lost in carrying the whole arrangement into effect.

We requested the Superintendent of Public building to furnish the accompanying estimate of the probable expense that would attend the erection of this building and likewise to state for the information of your committee what he considered might be a fair valuation to affix to the present mint, as in case of its removal and the premises being sold or transferred to any other department for public purposes, the real or estimated amount of their value should be considered as a set off against the outlay for the new mint.

There are [many] obvious reasons why it would be preferable that the mint should be erected near the river, tho' this is not indispensibly necessary. Its being placed however at any considerable distance from the General Treasury, and the vicinity of the merchantile houses in Calcutta, would be very objectionable, but we are not aware that the decision of this question need delay the consideration of the other arrangements we have the honor to propose.

and discussed a proposed establishment:

The remaining part of Mr Secretary McKenzie's letter to be noticed, is that which relates to the general revision of the mint establishment. No distinct proposition on this subject can be submitted by us until we ascertain the sentiments of Government in regard to our present suggestions, though we may mention as the basis of any arrangement to be hereafter made, that we conceive it indispensable that instead of the undefined duties discharged by the different assistants in the mint, distinct departments should be placed under their superintendance severally and exclusively, to effect which their numbers must be increased.

It may be well to observe that the 21st page of the printed account, relates to the constitution of the Royal Mint, details the number of officers there employed, and the distinct duties to be performed by them, and also shows the forms observed in conducting the business of that institution. Many useful hints may hereafter be taken from this account.

The View of the Mint Committee on a New Calcutta Mint

The Mint Committee agreed with this proposal and added their own comments. They pointed out that in Europe, dealers preferred to keep their gold and silver as bullion, whereas in India they preferred to have it turned into coin, and this meant that the Calcutta mint had a very high throughput 3:

The extension of the powers of the Calcutta mint has already shown to be a matter of the most urgent necessity, by the correspondence between the Mint Master and the Accountant General, forwarded to us by Mr Secretary McKenzie's letter above mentioned, and the utter impossibility of coining the amount of bullion

Bengal Presidency, Introduction of steam

brought for coinage during the present year, has been attended with much private and public embarrassment and loss. There is therefore no doubt as to the general expediency of the measure, especially as during seasons of tranquility the perpetual recurrence of these evils may be expected.

The mint committee drew attention to the fact that the Calcutta mint was in an unusual position when compared to the mints of Europe, particularly in regard to the incessant need for recoinage because of the low amount of wear allowed on the coins:

The mint of Calcutta is peculiarly situated. In most European kingdoms mints are employed directly by the Government only, and their occupation, being confined to the maintenance or removal of such a currency as the internal commerce of the state requires, is limited and occasional again. Dealers in bullion mostly prefer keeping that article uncoined, as legal obstacles are often opposed, as in England, to the fusion or exportation of the coins of the realm, and large quantities of the precious metals are to be found in the market, in foreign coin, or ingots, which never find their way to the mint. There are few markets also in the commerce between civilised states, amongst whom uniformity of manners and parity of culture had generally established a regular and extensive inter-change of their respective productions or manufactures, in which, except under extraordinary circumstances, bullion performs any very important part. The very reverse of this state of things happens in Calcutta.

The coinage of the Calcutta mint, like that of the mints of South America, is incessant. The Government here has never allowed an interval of many years to elapse, without supplying the community with a renewed currency, but having fixed a low rate of allowance for wear, withdraws through the local treasuries the coin from circulation, as fast as it passes those limits of loss and sends it to be re coined. This alone would furnish a constant though not very heavy occupation to a mint establishment, but it forms a very considerable portion of the permanent duties of the Calcutta mint.

In addition, the fact that private individuals were allowed to have their bullion coined meant even more work for the mint:

The facilities granted to individual proprietors of bullion, and the habits of the people, attract to one or other of the Indian mints perhaps all the bullion that is imported. There is no public depository like the Bank of England for a large capital of unwrought bullion, whose abstraction from the circulation is supplied by a proper currency, nor are the native merchants or capitalists addicted to the hoarding unmanufactured metal. Coin, in India, very naturally has the preference over bullion, from its greater portability, its more convenient application to objects of expenditure, and its better recognised, if not better ascertained, value, and there are no unnecessary obstructions to its application to any purpose to which its proprietor chooses to appropriate it, which should force him to a preferable accumulation of the precious metals in any other form. All the transactions of the bullion market in Calcutta, therefore, are conducted with a view to its being remitted to the mint, and a native banker no sooner purchases a quantity of silver or gold, than he sends it to be converted into mohurs or rupees. The moderate duty levied at the mint forming no counterpose to the advantages attending actual coinage.

Public regulations and private feelings thus cooperating to keep the mint employed, it follows that employment will be limited only by the amount of the bullion tendered for coinage. The Asiatic absorption of the precious metals was a subject of complaint to the ancient, and the complaint has been repeated in modern times. There is in fact little else that the European trader can be certain of a demand for, in the East, and until the Asiatic modes of living and thinking have undergone very important modifications, the profitable trade in Indian articles must be chiefly maintained in the European part, by the importation of the precious [metals].

The Mint Committee went on to discuss how big the total output of the mint had been, and included figures for the mints at Benares and Farrukhabad for the previous several years and they stated that, for the previous three years, the importation of bullion had amounted to the equivalent of 30 million rupees. The Calcutta mint could not cope with this volume of coinage:

With regard to the extent of that importation it is impossible to form any positive conjecture, although we may confidently anticipate its being considerable. We find from official documents that during 15 years of war, the Calcutta mint coined, chiefly on account of individuals, and from bullion brought by sea, an average sum of twelve millions of rupees.

1802/3-1806/7	55,135,556
7/8	18,288,162
8/9	11,943,192
9/10	8,787,054
10/11	17,005,490
11/12	10,212,633
12/13	8,774,002
13/14	3,839,578
14/15	8,091,661
15/16	14,675,881*
16/17	23,570,889*

(From www.psindiancoins.com)

That for the last six years, ending with 1818, the mints of Calcutta, Benares and Farrukhabad have coined annually more than 23 millions.

Calcutta

1813/14	3,839,578
14/15	8,081,661
15/16	14,475,881*
16/17	23,370,884*
17/18	11,453,489
1818	16,880,416

*NB slight differences from above

	Benares	Farrukhabad
1813	3,358,216	6,807,150
1814	4,033,162	3,033,694
1815	6,221,817	2,694,464
1816	7,172,241	3,420,301
1817	7,320,959	7,818,455
1818	5,340,212	5,080,377

That the custom house returns of bullion imported by sea, during the three last years average 37 millions and that in the seven first months of this year, from January to July, the value of the bullion sent to the mint by individual proprietors alone amounts to two crore and eighteen lacs, nearly twenty two millions of rupees. The amount of these remittances during so long a period of which the greater proportion was so unpropitious to foreign intercourse and the necessity for such supplies during a condition of the market here which time alone can materially alter, sanction the expectation that we shall continue to receive large supplies of precious metals for some time to come, but the Calcutta mint is not competent to this probable demand for coinage.

The fact that the mint could not cope with the amount of bullion delivered to it, meant that the Government was obliged to issue notes for the outstanding amount, and pay interest on these notes:

The inadequacy of the present establishment has been proved by the statement of the Mint Master and the extent of this incompetency may be further estimated by the returns of the coinage this year compared with the amount of bullion received. The latter on public and private account exceeds 22,800,000 or twenty two millions. The former amounts to but 12,600,000 or little more than half the first, compelling the Government to grant notes payable at a distant period and therefore bearing interest for the uncoined balance, and consequently entailing an extra expense for the preservation of public good faith and private accomodation.

The mint committee considered that, although the new mint might require a few more people to run it, eventually this would prove to be financially justified:

The heaviest part of the mint expenditure we have on a former occasion observed is necessarily that of a fixed establishment to which however the advantage is annexed of not augmenting with increase of work. Now, although in placing the Calcutta mint on an improved footing, some additions must be made to this important department, yet the additions will bear no proportion to the increased receipts arising from the mint duty on the largest possible coinage. To give the mint therefore greater efficiency will not only be attended with great public benefit but it will further prevent the incurring of any extra expence, and it will finally prove a source of positive profit.

The Mint Committee then went on to discuss what should be done, recommending that equipment should be obtained from England:

To qualify the Calcutta mint to meet a reasonably high demand, it is unquestionably necessary to construct it on a new and systematic plan, to provide it with additional and improved machinery, and to extend and reorganise some branches of its establishment, objects we shall now proceed to consider.

The construction of the present mint as opportunity afforded and chance directed is too notoriously defective to require any explanation. It is quite sufficient to go through it to see that there can be no methodical arrangement of successive issue and delivery through the different departments in the order of their work, that the offices generally are deficient in space and accomodation, and that their confined limits, their want of light and air, their detached situation and exposed and inconvenient access, present insurmountable obstacles to the very essential exercise of that personal superintendance which the Mint Master and his assistants are expected to bestow. The loss of time and want of control thus induced are sufficient arguments for an entirely new plan of these buildings. But such a measure becomes in fact unavoidable when we find that besides their unfitness for the objects of their construction and the impossibility of adapting them to the introduction of improved mechanical means, they are reported by the Superintendent of the Public Buildings to be in a condition which requires extensive and chargeable repairs.

The absolute necessity of a new mint is therefore, we conceive, fully established and it only remains to determine upon the plan and the situation of the mint and the probable expense of its erection. The plan and

Bengal Presidency, Introduction of steam

estimate, it appears from the report of the officers of the mint, have been prepared, but as some difficulty occurs with respect to the situation of the mint, by which the plan and estimate must be finally modified, it has been necessary to retain them for some time longer. We have in the meantime considered it expedient to forward the accompanying report and to express our sentiments on the general question.

It seemed obvious to the mint committee, from the report of the mint and assay masters, that a new mint was necessary and that the best way of getting it would be to send someone to England:

The advantages of improved means of coining can scarcely need to be pointed out when they are evidently and urgently required in the Calcutta mint, whose manifold and serious imperfections are specified in the report accompanying. The detail of these improvements is contained in a printed account of the Royal Mint, elucidated by engravings and which accompanies the report. The particular machines wanted here are stated in the report. We have only to express our conviction that the supply is highly necessary and will be productive of great advantage to the coinage of the country. The best and most expeditious mode of procuring it from England appears to us to be the dispatch of some qualified person from hence who could personally accelerate its preparation and whose local knowledge might in the course of its fabrication suggest such modifications as may be required by the country for which it is designed, the people who are to be employed in working it or other circumstances affecting its agency when erected. The expediency of this measure however, the Government must be better able to determine. Should it be written for, at least two or three intelligent mechanics trained either in the manufactories of Birmingham or in the Royal Mint should accompany it, to superintend not only its erection, but its application to the coinage and it would be expedient to secure their permanent services in the mint by allowances proportioned to their skill and respectability.

They also considered the cost of obtaining spare parts from England, hoping that, in time, the necessary skills to manufacture these parts would be developed locally:

The expense of a new set of machinery must be heavy and its being kept up by supplies from Europe as in the case of the cast iron materials especially, will entail a further charge. It is to be hoped however that the progress of scientific research in this country will at no distant period discover means of melting and casting iron, and we shall then be able to repair and renew, as heretofore, all the apparatus of the mint within its walls. The first expense therefore is the only object of any magnitude and this will very soon be covered by the large savings which it must enable the mint to realize, amounting as particularized in the accompanying report to an estimated annual retrenchment of rupees 118,000, on a coinage which the mint will easily effect, and consequently to more than 3½ lacs, if the power is as it is proposed to be, tripled in extent. That the up-country mints may in that case be finally dispensed with, admits of little doubt, and their abolition will effect a further saving of more than one lac of rupees per year, making a total annual reduction that must very soon repay any cost incurred in the erection of the mint and its full equipment with the most effective machinery.

Finally they discussed the management structure that they might put in place for the new mint:

The establishment that may be required for such a mint as we hope the Calcutta mint may be rendered, is a subject on which we are scarcely prepared to enter, especially as the officers of the mint have hesitated to proceed at present into the necessary detail. As far as we are acquainted with the constitution of this mint however, and by comparing it with the mint of Great Britain, as detailed in the printed pages accompanying, we are led to conclude that the responsible officers of the Calcutta mint are too few in number, and discharge duties much too general and undefined. With the exception of the mint and assay departments and the English account office, we believe no persons employed in the Calcutta mint besides the inferior native officers have a charge of any particular division of labour but exercise merely general superintendence or occasionally assume such a function as circumstances may demand, an arrangement which is fatal to all attempts at systematic regularity, individual responsibility and even to the degree of skill which experience in any particular branch would infallibly attain in the Royal Mint, as appears from the printed account. The principle officers are five, the subordinate, but still for the most part independent officers, twelve, and none of these pretend to any interference with the mechanical operations of the coinage, which are entirely under the charge of the provost and company of moneyers, consisting usually of five or six members, men of property and respectability, with young men of their families and connections, educated as apprentices and employed under them in the mint. It would be very unnecessary to adopt this complicated system to its whole extent, nor is it practicable in the present state of the Calcutta mint to institute with much advantage any essential change in this respect. In the event however of the erection of a regular mint with improved means of work, and with the accession of two or three skillful men from Europe acquainted with the processes of coining, we should earnestly recommend that over and above his personal duties, the business of general superintendance should be confined to the Mint Master with the help of an assistant from some branch of the Company's service, which latter should also conduct the general receipts and deliveries. We should suggest further that the valuation and calculation of the produce of bullion now prepared by the Assay Master should be transferred to the mint office and be guaranteed by the signature of the Mint Master, and the assay office remain one of practical science, not of account. That the foreman of the mint should take the place of the superintendent of the machinery and clerk of the iron at home, and that the assistant should be severally attached and for the time being at least restricted

to particular departments. A system of progression from one department to another might be established which would extend their knowledge and reward the exertions of these officers. We must also strenuously recommend the employment of a European dye engraver of ability and character. These arrangements we think might very easily be introduced were the bulidings so constructed as to admit of them and they could not fail to promote regularity, dispatch and accuracy. We are disposed also to doubt whether they would not ultimately prove economical and by the better and more systematic execution of work, obviate many of the present causes of waste and expence. It is probable also that the more precise division of labour would render that labour lighter and consequently fewer workmen would be required for its performance, presenting in this manner a source of retrenchment which would be an equivalent for many additional charges first incurred by the employment of more and abler officers. However, as already observed, we are not yet prepared to enter fully into the subject of a revised establishment for the new Calcutta mint.

The Governor General's View of the Proposed New Mint

The Governor General agreed with the views of the mint and assay masters, and with the mint committee, in a letter sent in September 1819 4:

...His Lordship in Council fully concurs with your committee in regard to the necessity of constructing a new mint, with machinery of much more extensive powers than that of the present Calcutta mint, and considers the suggestions submitted by you in regard to the future management of the mint to be generally judicious.

Your committee will however, of course, submit to Government a further report in regard to the establishment to be entertained when you shall have matured your deliberations on that subject.

With respect to the nature of the machinery to be used, His Lordship in Council presumes that generally speaking, the most expedient course will be to be guided by the practice of the London mint, and the object of preventing the loss and inconvenience, which must result from any delay or interruption in the coinage is so important as greatly to outweigh the original charges that will attend the procuring of the most efficient machinery.

His Lordship in Council therefore desires that your committee should consider and report the extent to which you may deem it necessary that the powers of the mint should be carried so as to be calculated to meet the utmost probable demands of Government and individuals for coinage, and to afford the means of occasionally suspending the mint operations as circumstances may suggest.

It will likewise belong to your committee in communication with the officers of the mint to consider particularly how far it may be necessary to introduce any and what special modifications in the machinery in use at home in order to its better application to the local circumstances of the Calcutta mint.

Selection of Lieutenant Forbes to go to England

The Governor General also discussed the possibility of finding a suitable person to go to England and ensure that the new machinery would meet the local requirements of Calcutta:

In considering this subject it would apparently be very useful to seek the aid of some gentleman conversant in practical mechanics, and at the same time acquainted with the operation of the mint, and Government will be fully prepared to receive favourably any suggestion from your committee on the means of securing to you this advantage.

His Lordship in Council also concurs in the opinion expressed by your committee that advantage would result from the deputation of some person to England to superintend the preparation of the machinery required.

But in order to attain the full benefit of such an arrangement, it appears essential that the person deputed should possess the qualifications above indicated, and the object does not appear to Government to be of sufficient importance to justify the incurring of any large expense in attaining it.

Should however your committee meet with any person so qualified willing to undertake the duty on an allowance not exceeding 5 or 6 hundred rupees pr month, His Lordship in Council will be disposed to avail himself of his services on such terms as your committee may recommend under the above restriction.

In the event of no such person being found, it may be hoped that your committee will still be able with the aid of professional advice to furnish such information in regard to the peculiar fashion of the machinery, which local circumstances may suggest with such models as may enable the mechanics in England readily to understand and execute what is wanted.

You are requested to proceed in your enquiries on the above points and to submit the result of them to Government at your earliest convenience.

By November, the Governor General had identified an officer whom he considered suitable for the post 5:

Reviewing the consideration of the arrangements to be adopted for providing the new machinery for the Calcutta mint, the Governor General in Council deems it advisable to avail himself for that purpose of the services of Lieutenant W Forbes of the engineers, who now holds the situation of surveyor of Embankment.

It is understood that the health of Lieutenant Forbes is likely at no distant period to compel him to solicit a temporary relief, at least, from the duties of the last mentioned situation, if not to seek permission to proceed to Europe for the restoration of his health. As far therefore as the embankment department is concerned the arrangement now proposed will only anticipate an inconvenience, which is in all likelihood unavoidable, while

Bengal Presidency, Introduction of steam

at the same time the professional skill of Mr Forbes may, the Governor General is assured, be most beneficially employed in superintending the preparation of the machinery required for the Calcutta mint...

Forbes' first task would be to learn all about the operation of the present Calcutta mint:

...In the meantime Lieutenant Forbes will be instructed to give his particular attention to the system followed in the Calcutta mint, so as to make himself fully master of all the peculiarities attending the operations there conducted, in order that he may distinctly perceive how far these peculiarities arise merely out of defects, which an improved machinery and establishment will remedy, or have their origin in the character of the workmen or other local circumstances which cannot be controlled and to which the machinery and establishment must be accommodated.

He was to be ready to depart for England by the end of the year or soon after:

For the above purpose, Mr Forbes will put himself in immediate communication with the members of the Mint Committee and the officers of the Calcutta mint. It is the intention of Government that his departure for England should not be delayed beyond the expiration of the present year or at least that he should leave Bengal early in January next. This it is conceived will afford him sufficient time for every necessary enquiry in regard to the operation of the Calcutta mint.

The experience he has already had will have sufficiently apprized him of the general state of practical mechanics in this country, by which of course the nature of the machinery to be provided for the mint must in some degree be regulated.

Once Forbes arrived in England he was to receive his instructions directly from the Court of Directors:

In superintending the preparation of the machinery in England, Mr Forbes will of course act under the immediate orders of the Honble Court of Directors, to whom consequently he shall be referred for detailed instructions in regard to the execution of that duty.

The new mint building would not be started until plans had been sent back to Calcutta by Forbes:

Although construction of that portion of the new mint which comprises the houses of the mint officers and the places designed for the receipt and custody of the bullion may probably [be] commenced whenever the site of the new mint shall be fixed, it will apparently be necessary to postpone the erection of the building designed for the reception of the machinery until the nature and extent of that machinery shall have been fully ascertained and when the Honble Court shall have finally determined that point, Mr Forbes will doubtless be instructed by that authority to prepare for transmission to this country, plans of the machinery and of the buildings in which it is to be put. For this duty likewise Lieutenant Forbes possesses every necessary qualification, and by adopting the above course a considerable portion of the building in question may with advantage be constructed previously to the arrival of the machinery, and the final completion of the work will thus be greatly expedited.

The plan was that Lieutenant Forbes would return to his old job once he returned to India. This did not happen, and Forbes eventually became mint master at Calcutta:

It is understood that Mr Fitzgerald, assistant to the surveyor of embankments, is fully competent to the executive part of the duty of surveying and the Governor General in Council accordingly proposes that that officer should still proceed with the survey as assistant surveyor. The situation of surveyor of embankments will be kept open and will be resumed by Lieutenant Forbes on his return. He will before his departure issue such general instructions to Mr Fitzgerald as may appear calculated to assist his progress and he will likewise submit to Government a report on the operations which have been already completed in the district of Burdwan.

Mr Forbes will during his absence cease to draw the allowance attached to the situation of surveyor of embankments and the Governor General in Council resolves to him in addition to his military pay and allowances, the sum of sicca rupees 600 per mensem to cover all expenses incident to his deputation.

The Calcutta mint master provided Lieutenant Forbes with all the information he could about the existing Calcutta mint 6:

I have the honor to receive your secretary's letter of the 12th ultimo transmitting for my information and guidance an extract from the resolutions of Government in the financial department relative to the proposed departure for England of lieutenant Forbes of the Engineers for the purpose of superintending the preparation of the machinery required for the new Calcutta mint, and directing me to communicate with him on such points of local consideration as are immediately connected with that object.

In order to give Lieutenant Forbes a general idea of the defects which pervade the system of coining now in practice at the Calcutta mint, I have furnished him with extracts from my address to your committee under date the 7th March 1818, and from the joint letter from Mr Wilson and myself dated the 11th August 1819, which gave rise to the determination of Government to erect a new mint with improved machinery to procure which is the special object of his mission.

The perusal of these documents will enable Lieutenant Forbes to direct his observation in the course of his attendance at the mint to each department separately, and to distinguish between defects which are

susceptible of remedy by improved machinery, and those which arise out of the nature of the materials we are obliged to work with, and other peculiarities which may be supposed to affect the agency of the machinery when obtained.

The character and habits of the native workmen, and the fuel obtainable here, come under the latter description, and should not of course be lost sight of by him when in England. His personal attention will likewise be directed to the degree of skill which the mechanics of the mint have attained to in casting and preparing different sorts of metals which will be required for keeping in order or making trifling alterations in the new machinery, which tho' principally of cast iron, may have some of its parts composed of other metals. He will thus be able in some measure to adapt his selection of machinery to the means we possess in this country of keeping it in order.

The Governor General wanted a knowledgeable person to be sent out with the new mint not only to oversee the construction but with a view to continued employment. Also he considered that a die sinker should be sent from England:

It will of course be considered necessary that some skillful person should be sent out with the machinery to superintend its first erection, and instruct the mechanics here how to keep it in order. The propriety of retaining his services for a continuance at this mint may hereafter be determined upon. I strongly recommend that a skillful die sinker be also sent out who might instruct a certain number of boys from the orphan or free school in the art of die sinking. This important department of the mint should be taken out of the hands of native engravers and the dies should be of such superior workmanship as to render it impossible for common artists to counterfeit the coins.

Apparently there had been some agreement to change the design of the coins, though no other records referring to this have been found. To start with, the Governor General thought it best that dies should also be sent from England:

As it has been determined that a change should be made in the superscription of the coins, and as it is impossible for a considerable length of time to prepare a sufficient stock of dies here for the new coinage, I submit whether it would not be expedient in the first instance to have them sent out from England, where they might be prepared by an artist of eminent taste and skill under the inspection of Lieutenant Forbes. A letter legend or chain milling would better secure the edges of the coin against drilling, which is a common practice in this country. It is here noticed as I believe by the new machinery the coins are stamped and milled at the same time. If these suggestions meet the approbation of your committee, Lieut Forbes may be instructed accordingly. My communications with him have been confined to the points I was directed to draw his attention to.

The machinery should be capable of producing 400,000 coins per day:

As it is highly important that the new mint should be rendered equal to the utmost probable demands on it as well from the General Treasury as from individuals, for halves and quarters rupees, I recommend that the machinery be ordered for a coinage of 400,000 pieces per day (of 12 hours). A coinage of copper might then be conducted when required without interfering with that of gold and silver. The system of working at the mint during the night should certainly be put a stop to, as it involves considerable risk and requires such extra attendance on the part of the officers of the mint as it cannot be expected they should give for a constancy, tho' in times of emergency such as the past 15 months have been, they have done so cheerfully. It is likewise expedient that there should be some cessation to the operations of the mint in order that due attention may be paid to economy. At His Majesty's mint the coinage is principally conducted by contract. Here, the Mint Master makes the best arrangements he can for the interests of Government, with the native workmen, who are ever ready to take advantage in time of emergency.

Finally, the Governor General considered that certain other equipment and raw materials should be sent from England until the required capabilities had been developed in India:

Whatever be the amount determined for the extent of the daily coinage at the new mint, arrangements should be made for ensuring a suitable annual supply of cast iron, crucibles and ingot moulds, until we may have the means of casting them ourselves, or procuring them in this country. They might be brought out as ballast, I imagine, at a moderate expense. A quantity of firebricks for constructing the new furnaces, and occasional supplies of them might be sent out in the same way, as it is the opinion of Lieutenant Forbes that the proper description of fire bricks are not easily procurable in the country.

Forbes planned to leave for England on about 27th December 1819 and sent a letter to the Mint Committee summarising everything that he had learnt about the existing Calcutta mint, and this is a summary of what has been discussed above and in chapter 7.7. He does add some interesting observations of his own. For instance, the coinage of a lac of rupees requires 236 people just to adjust the weight of the blanks. The Mint Committee added a covering letter to Forbes' as they passed it on to the Calcutta Government. This includes the following:

Bengal Presidency, Introduction of steam

We further recommend the adoption of Mr Saunder's suggestion for postponing the proposed change in the impression of the coin until a supply of dies can be procured from England. We need not state the advantages of securing the most perfect workmanship.

We think it advisable that the denomination of the coin should be impressed on it and it will be proper we think, to avoid any reference to dates.

In other respects we attach little importance to the nature of the device or legend. The Musselman prejudice against representations of animals is of course known to Government, but we imagine from the impression chosen by the Nawab Vizier, now King of Oude, that it is of little weight.

Forbes received his final instructions on 24th December 1819, and set out for England 8.

The Steam-Driven Mint

Doty has presented an excellent account of the events surrounding the building of the steam-driven mint, supplied by Boulton, Watt & Co during the 1820s 9.

Matthew Boulton was first approached about the possibility of building a mint for the East India Company as early as 1808. The initial discussion revolved around the possibility of building two mints, one at Calcutta and one at Madras, but this changed to building just one at Madras and then again to building just one at Calcutta, but smaller than previously planned, having five coining presses instead of the original eight. Sometime during 1809, this project was dropped for reasons that are not entirely clear.

Forbes arrived in England in 1820, and by the end of that year agreement had been reached that Boulton, Watt & Co. would act as the main contractors for the construction of the mint and would provide not only the steam engines but also the coining and cutting-out presses. John and George Rennie would act as sub-contractors, supplying the rolling mill, whilst Henry Maudsley would provide other parts such as the draw bench, lathes and melting furnaces.

Plans for the new mint were drawn early in 1821 and approved on 2nd April, and during that year Forbes learnt more about the science of coining when he helped produce a copper coinage for St. Helena at the Soho mint.

By March 1823 the equipment was ready for shipping to India. It was sent out on three separate ships, and had arrived by 21st October 1823, when Forbes himself arrived back in Calcutta. No time was lost in selecting a suitable site for the new mint on the banks of the Hoogley and work began on draining the site and establishing the foundations.

Design for the New Coins

Once the machinery had arrived in Calcutta and work had started on building the mint, thoughts turned to the design of the coins to be produced. Various people expressed their views. For instance, in 1824, H. Wilson put forward his view that the arms of the Company should be engraved on one side and an emblematic device '*applicable to local peculiarities*' on the other. This latter was to be surrounded by an English legend specifying the name of the coin, the sphere of its circulation and the date of its first issue. Around the edge would be the weight and the fineness of the coin.

A Mr Wood believed that the coin should have the weight and fineness in English and Nagari on one side, and on the other should have the word *Sonnat* and *Sicca* or the words *16 annas* or *15 annas* in '*English, Persian, Nagree, Bengallee, Tillughee, Malabar and the other native characters*'.

Forbes himself believed that letters around the edge, or milling, would be unnecessary and that counterfeiting was better prevented by a perfect artistic design. He discussed the coat of arms as a possible device and dismissed it. He then suggested a solitary lion associated with a palm, and asked the committee to look at a model of the device executed by Rouw after a drawing by Flaxman. This seems to be the first mention of this design, which, though not used immediately, was later adopted for the gold coins of 1835.

Mr Mackenzie initially thought that the design should be left to someone in England, but then agreed with the proposal made by Forbes of a lion and palm on one side with the value in a well executed wreath on the other.

A Mr Money agreed about the lion and palm but suggested that the other side of the coin should have the head of "*our noble King, George IV*", the first mention of the adoption of the British monarch as a design for the coins of India.

The views of several political Residents were collected concerning the acceptability of a European device on the coins of India, and a report was sent to the Court of Directors on 26th July 1826 suggesting that a European device would be acceptable, and requesting that a die engraver should be sent to India. It is interesting to note that a die with the design of a wreath was sent from Soho to Calcutta in 1827 and it is difficult not to jump to the conclusion that this event was related to the forgoing discussion. Of course, silver and gold coins with a European device were not minted until the introduction of the uniform coinage in 1835.

Building the New Mint

As well as providing the machinery, it was necessary for Boulton & Watt to recruit a number of trained mechanics to go to India to help build the mint. The names of the men recruited for the project, and their fates, are shown in the table below 10.

Name	Date started in India	Fate
Thomas Hughes	1823	Died in India 1824
Edward Gozzard	1823	Survived
Joseph Mears	1823	Died in India 1824
Gregory Wilkinson	1823	Died in India 1826
Josiah Stratford	1823	Took to drink. Sent home 1825
William Lewellyn	1823	Died in India 1825
Thomas Pigg	1823?	?
Richard Burley	1823	Died in India 1824
John Rose	1823?	?

Continued on next page

William Dunn	1823?	?
Thomas O'Brien	1825	Fell ill and was sent home in 1826
Henry Daniels	1825	Fell ill, sent home, 1826. Returned 1827.
George Hudson	1827	?
Charles Cashmore	1827	?
Taylor	1827	?

Europeans who helped build the new mint

It is immediately apparent that many of the men sent out to provide the necessary mechanical expertise did not survive very long in the pestilential climate of Calcutta. Forbes did his best to get new recruits trained and sent out from England, and to redeploy those who survived.

The new mint did not come into operation in one go, but over a period of time. For instance laminating of silver began in 1827 and the first coins were produced in 1830 11:

...The committee are aware that the copper coinage in all its branches is now conducted at the new mint, that since June 1827 the silver laminating business has been carried on there, and that in April last I was directed to commence upon a series of experimental meltings and to report the result at the end of three months. These meltings have latterly turned out so well that I do not anticipate any impediment to the early transfer of this part of the business to the new mint...

Doty suggests that the coins struck in 1830 would have been the one pie coins authorised for circulation in 1831. He argues that the coins could have been prepared in advance of being put into circulation. This seems to open an unnecessary complication. Pridmore has recorded that the mint master proposed making changes to the copper pice in 1829, and that specimens were submitted to the Mint Committee on 26th August 1830. It is therefore much more likely that any coins struck in advance of the necessary legal bureaucracy authorising their issue, would have been these pice and not the one pie coins whose design was not agreed until 1831.

In his account, Doty notes interesting information about the huge numbers of blank dies that were shipped out to Calcutta from Soho. For instance in 1827, 2000 blank dies for rupees were shipped out, and in 1830, 14,500 dies for rupees, half rupees and quarter rupees were ordered.

By 1830, the new mint was also cutting out the blanks for the silver coins and these were then struck in the old mint 12

...15th Apart from time occupied in superintending or practically directing work (which defying further classification, as progress has been affixed in the form of an inventory) the committee are aware that in the course of the past year much of the time of the new mint establishment has been taken up on experimental coinages and meltings, in effecting the copper coinage alluded [to], in managing the machinery for the laminating of heavy slab copper for a coinage still in progress, in rolling the silver and gold (and recently in cutting out the rupee blanks) struck at the old mint...

Gold Coins

Despite the extensive discussion of a new design for the coins, the new steam-driven mint actually continued to issue gold and silver coins of the old 19 sun sicca design. A pattern for the new gold coinage was prepared in about 1830 and the gold coinage itself began in 1831. The coins can be distinguished from earlier issues by the presence of a tiny crescent at the top left of the reverse.



Crescent on reverse of gold coins

Silver Coins

Like the gold coins, the silver coins continued with the same design as those issued from the old Calcutta mint. All three denominations, rupee, half and quarter have plain edges. The rupee and half rupee can also be distinguished from earlier issues by the presence of a tiny crescent at the top left of the reverse. The coins were approved on 13th July 1830 and issued into circulation from January 1831.

In 1833 a change in the weight of the rupee from 191.916 grains to 192 grains was introduced. This difference is too small to detect, and no other distinguishing marks have been noted.

Both the Calcutta sicca and the Farrukhābād rupees were issued during this time. Apart from the different mint names, Murshīdābād for Calcutta and Farrukhābād for the eponymous place, the coins can be distinguished by weight.

Copper Coins



9.28

Half anna issued from the new mint

At first, the copper coins continued in the style that had been issued since the 1790s, but a new design was approved in 1831 and this differed from all previous coins issued from the Calcutta mint in that it had an English legend, as well as inscriptions in local languages.

Statement of Copper Pice Coined and Issued from December 1832 to January 1836 inclusive 13

		Double Pice		Single Pice		Pie Pieces	
		Sicca	Company's	Sicca	Company's	Sicca	Company's
1832	December			1,384,000		48,515	
1833	January			228,302			
	August			1,984,000			
	September & October						
	November			3,546,000			
	December			4,066,000			
1834	January			2,502,000			
	February			892,000			
	March			1,104,000			
	April	39,334		628,000			
	May			1,190,000			
	June	225,000		382,000		444,000	
	July	93,000		170,000		252,000	
	August	375,000		822,000		1,176,000	
	September	66,000		28,741		36,000	
	October	69,275				357,107	
	November	243,000		318,000		519,112	
	December	292,000		1,172,000		966,000	
1835	January	40,145		1,074,000		2,406,702	
	February			1,250,000			
	March			1,742,000			
	April			758,076		306,000	
	May					1,597,276	
	June			4,454,000			
	July			156,000			
	September			503,478			

The output of copper coins was also discussed in 1836 14:

I have the honor to acknowledge receipt of your letter of the 25th ultimo with its enclosures from the secretary to the Government of India Finance department directing that I should forward musters of each description

of copper coin of this Presidency, including Trisoolies, for transmission to the Government of Fort St George, and in compliance with this order, I have now the honor of forwarding 6 specimens of the copper currency of Bengal, which may be classified as follows:

A – Double pice with raised edge, first struck in the new mint in the year 1831/82.

There were 3,506,447 of these coined and coinage was discontinued, January 1835

B – Single pice with raised rim first struck at the new mint in 1831/32

There were 98,701,953 of these coined and the coinage was discontinued September 1835

C – Pie pieces or 1/3 of a pice with raised rim, first struck at the new mint in 1831/32

There were 21193436 of these coined. The coinage was discontinued in May 1835

...

Mint Masters of the Calcutta Mint

Name	Date Started
Mr Frankland & Mr Boddam	Sep 1757
Mr Frankland	Oct 1757
Mr Beaumont	Mar 1761
Mr Middleton	Early 1764
Mr Marriot (never took up position)	Oct 1764
Mr Leycester	Nov 1764
Mr Campbell	Nov 1764
Mr Alexander	Dec 1767
Mr Floyer	Before May 1769
Mr Herbert Harris	Feb 1771
Mr Lloyd	Before Sep 1773
Mr Paxton	Before Jul 1778
Mr Herbert Harris	Feb 1785
Mr James Miller	Aug 1792
Mr Frank Mure	July 1799
Mr Plowden	Jul 1802
Mr Forster	Aug 1802
Dr Davidson	1810
Mr H. Wilson (acting)	1813
Mr Malcolm McLeod	1814
Mr Robert Saunders	1815
Mr J.M. McNabb (Acting)	1820
Mr Robert Saunders	1820
William Nairn Forbes	1836-1855

Mint masters of the Calcutta Mint

Reverences

- 1 Bengal Mint Committee Proceedings. IOR P/162/70, No. 68. Letter from Government to the Mint Committee, dated 23rd January 1818.
- 2 Bengal Mint Committee Proceedings. IOR P/162/70, No. 82. Letter from the mint master to the Mint Committee, dated 26th March 1818.
- 3 Bengal Mint Committee Proceedings. IOR P/162/71, No. 25. Letter from The mint master (Saunders) and assay master (Wilson) to the Mint Committee, dated 11th August 1819.
- 4 Bengal Mint Committee Proceedings. IOR P/162/71, No. 26. From Calcutta Mint Committee to Government, dated 16th August 1819.
- 5 Bengal Mint Committee Proceedings. IOR P/162/71, No. 29. From Government to the Calcutta Mint Committee, dated 17th September 1819.
- 6 Bengal Mint Committee Proceedings. IOR P/162/71, No. 49. From Government to the Calcutta Mint Committee, dated 5th November 1819.
- 7 Bengal Mint Committee Proceedings. IOR P/162/71, No. 55. From Calcutta mint master to the Mint Committee, dated 12th December 1819.
- 8 Bengal Mint Committee Proceedings. IOR P/162/71, No. 56. From Lieutenant Forbes to the Mint Committee, dated 20th December 1819.
- 9 Bengal Mint Committee Proceedings. IOR P/162/71, No. 60. From Calcutta Government to Lieutenant Forbes, dated 24th December 1819.
- 9 Doty R, (1998), The Soho Mint & the Industrialisation of Money, British Numismatic Society Special Publication No. 2, pp. 190-205. Published by the National Museum of American History in association with Spink and the British Numismatic Society.

Bengal Presidency, Introduction of steam

- 10 As well as Doty's book cited above, see Bengal New Mint Committee Proceedings. IOR P/162/84, No. 719. Letter from Forbes to the New Mint Committee, dated 20th October 1830.
- 11 Bengal New Mint Committee Proceedings. IOR P/162/84, No. 681. Letter from R Saunders (mint master) to the New Mint Committee, dated 28th June 1830.
- 12 Bengal New Mint Committee Proceedings. IOR P/162/84, No. 719. Letter from Forbes to the New Mint Committee, dated 20th October 1830.
- 13 Bengal Consultations. IOR P/162/87, April 1836 No3
- 14 Bengal Consultations. IOR P/162/87, July 1836 No 1. Letter to The Mint Committee from the Calcutta Mint Master (Forbes) dated 1st July 1836