

BELL METAL OBJECT MAKING

In Satyendra Pakhalé's view, industrial design products, with their built-in obsolescence, lack 'symbolic content and cultural significance.' In an attempt to find alternatives to this sterility in mass manufactured goods, he aims to create 'sensorial qualities in industrial design – such as the texture and warmth we recognize in age-old objects, yet without passively accepting traditions.'

Pakhalé believes that 'manual work is an integral part of every design process, in industrial design just as much as craft. Working with the hands is a way of thinking and keeping in touch with the kind of making that expresses universal values that are understandable everywhere.'

As a means of reclaiming sensoriality, Pakhalé cast a fresh eye on a technique that has been practiced for many hundreds of years in central India: the art of *cire perdue* - lost wax metal casting. Once ubiquitous, the ancient craft is still practiced in bell metal by the Muria community in the Bastar region of central India. Pakhalé first visited this area in 1996 and recalls being 'captivated by the Muria people and their ancient yet progressive system of living. Their process of making lost-wax cast objects is completely pre-industrial and was rooted in their way of living.'

The Muria are one of India's oldest indigenous peoples. Pakhalé was 'fascinated by their democratic social structure and the dance-loving socio-ethical educational system of Ghotul: a social institution, a training resource centre and recreational club for young people based on equality, simplicity and freedom.'

He also admired their 'homes that are wonderful examples of earth architecture, and a way of life in harmony with nature that rests on sharing resources democratically. The Muria afford the same rights to women as to men. Every Muria individual wears different clothing, and an amazing level of creativity seems to go into their dress and other everyday items. The culture of object-making is at the heart of their way of life.'

Pakhalé makes it a basic principle to avoid 'the codified forms and style of traditional craftsmanship, along with the works of traditional artisans that have no practical utility.' Nevertheless, he strives to 'observe traditional cultures objectively, reflecting on their meaning and relevance in the contemporary context.' His objective is always to create contemporary works with universal reach and the sensorial qualities that he so values. The Muria craft techniques that he discovered in the 1990s offered the perfect opportunity to do exactly that. Working together with Muria craftsmen, Pakhalé's early experiments evolved into the first generation of Bell Metal objects.



A



B



C



D



E

A Traditionally rough moulds are made. Pakhalé suggested having a potter make them instead, that is not the practice as the two communities usually do not work together, but he convinced them of the benefit of collaboration.

B The dried clay mould is rubbed with local tree leaves to make the surface smooth and clean. The craftsmen have developed a refined sensitivity to objects created with ecological means.

C–E Natural wax is collected from trees, melted and strained through a fine cloth, keeping it clean and free of impurities. Then it is squeezed through a sieve to create wax wires.



Three periods of lost-wax casting experimentation in bell metal can be identified in Pakhalé's studio practice. Spanning over fifteen years and resulting in the family of the first, second and third generations of the B.M. Objects ❶. The three phases date from 1996–1998; 2006–2008; and 2010–2012 respectively. Each generation has its own distinct identity.

They are differentiated not only by the objects' sizes, proportions and formal language, but also the object-making process and technique that evolved with each generation of B.M. Objects.

By training Indian craftsmen in new design approaches, by creating bigger, more complex objects using this technique, and by mixing craftsmanship, industrial technique, engineering and material research, Pakhalé pushed the boundaries, resulting in the biggest B.M. Object so far: the totemic B.M. Horse ❷. By refining and renewing a traditional process, he created truly contemporary design objects.

The Muria Lost-Wax Process

First, the Muria make a core with a mixture of fine clean sand and clay. Traditionally, goat's dung is then soaked in water, ground and mixed with clay in equal proportions. This soft mixture forms the base mould. Once dried, it forms the basis for the wax pattern. A specially filtered natural beeswax is melted over an open fire and strained through a fine cloth into a basin of cold water where it becomes solid. Care has to be taken to keep the wax absolutely clean and free of impurities. Next, it is squeezed through a sieve and recovered in the form of wax 'wires' (as thick or thin as desired). Each of these wires is wrapped around the core, one after another, until the whole surface is covered. Originally, the artisan would have sat in the sun to let the clay core and the wax coating warm up uniformly. The whole form is finally covered in a mixture of clay, sand and cow dung in equal parts, and then fired. Base metals – brass, bronze, copper, tin – are melted together and poured into the fired-clay mould to form the metal object, the wax being lost in the process. Pakhalé applied this process to the first generation B.M. Objects while refining it. Later, he developed a unique updated process by making a PVC cord of special density and flexibility and using silicone moulds to achieve results which are refined and more challenging to cast in a seamless manner.

B.M. Objects – First Generation 1996–1998

These are the first B.M. Objects made with the traditional lost-wax technique practiced by the Muria community in central India with its long tradition of making ritual figurative objects and a specific culture

❶, ❷ Each wax thread is wound once around the core, one after another, until the whole surface is covered. The craftsman sits in the sun to let the clay core and wax coating warm up uniformly.

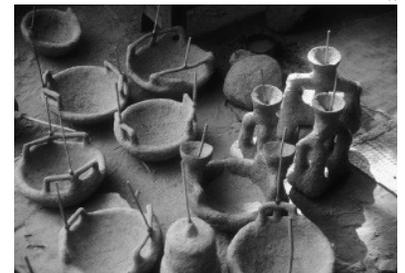
❸ After carefully doing the wax thread work, a handle pattern is cut out with the help of a simple template, improving the quality of the final cast object. Such basic techniques are hardly Used due to the limited educational possibilities.

of creation. The first generation of objects was made using natural beeswax and a mould made of fine clay that is broken after casting. That means a new beeswax model has to be made for each casting. The forms are relatively small in size at around 10 x 15 x 25 cm. All share a central departure point and are symmetrical in shape. These are totally handmade objects, meaning each step of the process has to be repeated from the beginning if something goes wrong or if the results are not as expected. The process is perhaps the total opposite of industrial or semi-industrial ways of making an object. ³

B.M. Objects – Second Generation 2006–2008
 Between 2006–2008, Pakhalé developed a second generation of objects in Europe using an evolved version of the lost-wax method. The second generation of B.M. Objects benefit from the development of a special, spaghetti-like, flexible PVC cord with a specific flexibility and density. This replaces the traditional beeswax spaghetti. In various diameters, the new PVC cord was used for all the objects of the second and third generation. In addition, Pakhalé further developed the traditional process by making a silicone mould to replace the clay mould, therefore allowing for serial production. The second generation objects are bigger in form than the earlier versions, although still made with a central departure point and a symmetrical shape. The second generation of B.M. Objects was produced in a small series. ⁴

B.M. Objects – Third Generation 2010–2012
 The most recent series of B.M. Objects was developed in a similar manner to the second generation using silicone moulds, but with greater formal complexity owing to the off-centre starting point. This asymmetrical departure point results in two types, one that keeps the form symmetrical on both axes, and another with an asymmetrical form on at least one axis. This process leads to a unique opening at the top of the object which has a distinct form, creating an effect that makes us think about how this object was made.

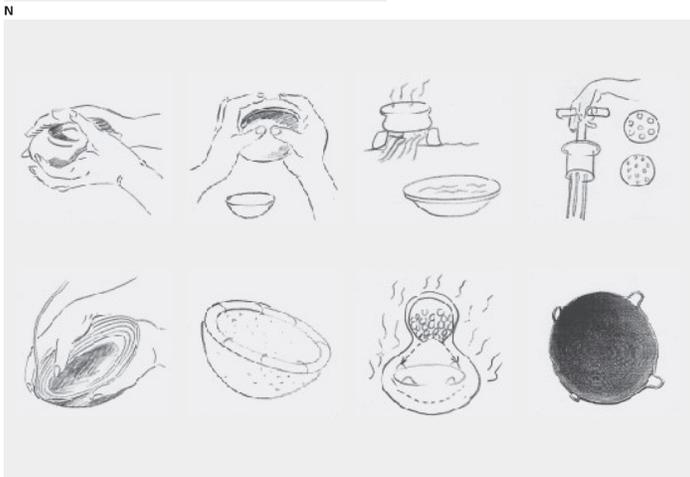
This very specific process results in a new language for the third generation of B.M. Objects, with their controlled geometric forms and strong totemic presence. Despite the advanced-level application of current state-of-the-art software at Pakhalés studio, such geometry resulting in a distinct opening form at the top of the object could not have been achieved without the continuous evolution of B.M. Objects making process over the extended period of time. Pakhalé recalls, ‘we could not achieve the desired results by modeling these objects with 3D CAD; they



J A Muria craftsman works on a scale model of the B.M. Horse Chaise.

K,L After being covered with a thick layer of a mixture of clay, sand and cow dung, the model is ready for firing.

M,N Pieces of scrap brass, bronze and copper are melted together and poured into the fired clay mould to form the first generation One-Off Bell Metal Objects, the result of a sustainable process of making.



o Drawing illustrating the bell metal making process described above.

can be remodelled after making them with the high level of craftsmanship that we evolved over the years, but that does not help design the objects, it is simply redrawing them in three dimensions.' He therefore calls these pieces 'post-3D CAD objects'. The third-generation objects are all relatively larger in size than their predecessors, at around 30 x 35 x 45 cm. All of them were produced in limited editions. ⑤

The Steps of the Bell Metal Making Process

Making the clay mould: Traditionally Muria craftsmen make moulds by hand. However, Pakhalé could convince the craftsmen to make articulate clay moulds on a potter's wheel.

Refining the clay mould: After drying, the clay mould is rubbed with local tree leaves to make the surface smooth and even out the roughness of the mould. The craftsmen have developed a refined sensitivity to objects created with ecological means. Subsequently, when the mould is dried, it becomes a base for the wax pattern.

Making wax wires: A natural wax collected from trees in abundant quantity on jungle terrain is melted over an open fire and strained through a fine cloth into a basin of cold water, where it becomes solid. Great care is taken to keep the wax absolutely clean and free of impurities. Then it is squeezed through a sieve syringe and formed into thick or thin wax wires.

Wax work: Each wax thread is wound once around the core, one after another, until the whole surface is covered. The highly skilled craftsman sits in the sun to let the clay core and wax coating warm up uniformly to avoid uneven deformation.

Covering with clay: Once the entire model is covered with a thick layer of a mixture of equal parts of clay, sand and cow dung the model becomes ready for firing.

Lost-wax casting: The clay covered models are then fired in an open pit oven until the wax is burned and the clay mould becomes a mould cavity. Then, pieces of scrap brass, bronze, and copper are melted together and poured into the fired clay mould to form the bell metal object.

Mould opening and finishing: After the casting, as the temperature of the mould falls to room temperature, it is broken open to access the bell metal object. The entire process is carried out diligently. If all stages went well the object does not have any holes or air gaps. The object is then brushed to take off the burrs. The Muria people metaphorically associate this entire bell metal making process with life.