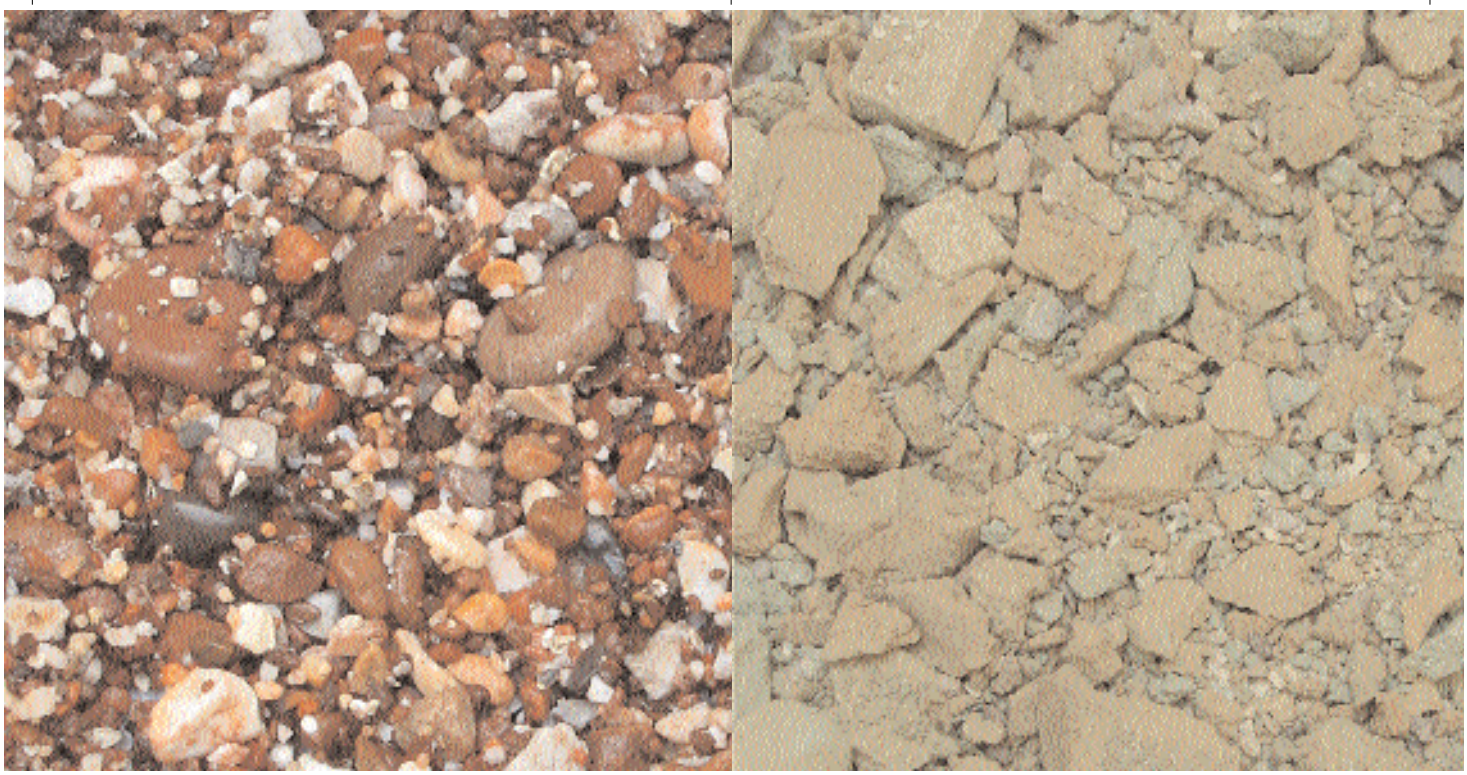


Aggregates in Clay Bodies A Research Project

David Binns describes the development of his polished aggregate bearing ceramic work through combining his professional experiences with academic research

David Binns dries out stained clay in readiness to fire for making grog while on a residency at the ceramic studio, Keskemet, Hungry.

Adding molochite aggregate to a batch of porcelain.

Hand mixing aggregates into a batch of porcelain.

As an artist it is often difficult to clearly identify and articulate exactly how and why one first discovers and adopts a particular process or series of working practices. More often than not it seems an evolutionary process, arrived at through a complex blend of experience and emotional responses. My current work started life this way but, over time, evolved into a planned research project.

Like so often, the work originated partly through accident, response to observed phenomena and a desire to 'say something new'. Fairly rapidly, however, I grew to realise the potential of the process and this combined with an opportunity to dedicate time to the project, led to a fully fledged research project, involving considerable systematic testing and analysis. Ultimately however, whether undertaken haphazardly or systematically, developing a new body of work for me is about the enjoyment of creating and solving problems.

Accident, Observation & Response

For some time I had been working on a body of work, involving shallow curved slabs of clay, pierced with varying configurations of holes. Initially using a smooth unglazed terracotta body, I gradually became interested in using coarser textured brick clays. In order to refine the surface, I started sanding the fired clay with fine abrasive paper. When sanding the fired surface of these clays, I began noticing that the particles of coarse grog were revealed more clearly, producing a far richer surface quality, reminding me of polished beach pebbles. This was an exciting discovery as it introduced a completely new ingredient; my work has always been inspired by architectural or mechanical form, but had never revealed anything of my love of the natural environment. The pieces for the first time embraced this plurality of influences – the man made, combined with the natural world.

Having made this discovery, I started considering how I might capitalise on this further, seeking greater control of the colour and texture. It then struck me that I could adapt the base clay through adding further grog material. I

began exploring the possibility of gaining total control through preparing unique bodies, starting with a smooth, neutral base clay and adding whatever colour and textural material I desired. Commercially available grogs while differing in grain size, are similar in colour, being usually made from crushed buff coloured firebrick or kiln furniture. Considering how a wider palette of colour might be achieved, I added stains to a small batch of porcelain. Initially I thought of adding small broken pieces of stained, unfired clay to the base clay body, but then realised they would re-soften and the colour would merge into the base clay during preparation, not giving me distinct suspended particles of colour I desired. I therefore broke the plastic stained clay into small lumps and fired it too around 900'C. Once fired, the pieces could then be crushed easily to whatever grain size I required.

I went on to prepare three different batches of coloured grogs, crushed them to varying particle sizes and wedged them into 10 kg of porcelain. Porcelain seemed the most appropriate base clay, because the coloured grogs would stand out distinctively. I proceeded to make a piece similar to previous work – rolled out slab, pierced with a grid of holes, then draped the slab in fabric to give a shallow dish form. Following slow drying, the piece was fired to around 1200'C, recognising that fired any higher, it might be difficult to sand the surface.

Following firing, there was only a slight indication of what lay below the surface. During the forming process the finer particles of clay seemed to migrate to the surface, hiding the coarser particles of grog within the fired form. I started sanding back the surface with wet & dry abrasive paper to reveal my added coloured grogs. The particles started emerging, but it soon became clear that to reveal the true extent of the grog additions would require many hours of hard labour, hand sanding the surface. Alternatively I could attempt to find some form of mechanical device to assist the process.

Having created the problem of wanting to sand (or now grind) back the top surface layer of the fired clay – how could this be resolved efficiently? Working in a university design department that includes other craft disciplines, I sought the advice of colleague in the glass department, knowing that many glass-finishing processes involve hours of grinding and polishing. He suggested using a large flat bed grinding machine. This was fine for grinding flat surfaces, but of no use for curved or concave surfaces. Seeking advice from a local granite finishing company offered a more appropriate solution – a hand held power grinder, similar to a builder's regular angle grinder, but with a water feed to prevent dust and wash away waste material.

The tool in question a Flex Angle Grinder, supplied by DK Holdings Ltd in the UK, uses a series of velcro backed diamond pads, from coarse to ultra fine. The particular advantage this tool has for me is that the grinding face is small – 10 cm diameter grinding face, with a sponged backing. While it is not possible to grind complex, deeply concave openings, it allows me to grind shallow concave surfaces – the perfect tool for the purpose.

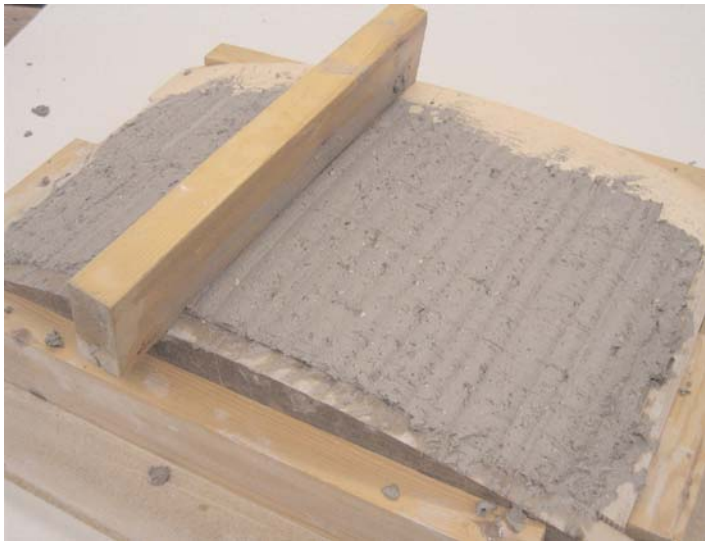
Using a series of six grades of abrasive pad, I found I could quickly cut through the rough fired surface, gradually achieving a silky smooth finish that revealed the rich texture of the added grogs. The only negative side to the process is that the power tool throws off considerable amounts of water when operating, so realistically can not be used in my studio. When grinding, I need therefore to work outside, getting soaked through, at the mercy of Welsh weather – why is it I always seem to have exhibition deadlines in January?

While the process was successful, I started to feel that maybe the piercings were no longer relevant or important – the piece conveyed all I was hoping to

Filling a long boat mould with stained, aggregate bearing porcelain.

Pressing and shaping of corrugated edged standing form – adjustable wood and plaster mould, with corrugated insert.

Once the process was fully proven, giving me the surface qualities I desired, I began understanding the immense potential of the process and saw two particular issues emerging:
1. What other materials might possibly be added to clay and what new aesthetic qualities might be achieved through the process – the need to start a process of systematic research into the range of surfaces that might be achieved – types of clay bodies and granular materials that might be added.
2. The development of a range of new forms. Pieces that both harmonised with the surfaces I was now achieving and yet were simple enough to be ground back, using the power grinder.



Pressing and shaping of corrugated edged standing form – adjustable wood and plaster mould, with corrugated insert.

Pressed and shaped corrugated edged standing form.

Work awaiting slow firing in large flat bed kiln.

say, through the simple, angular and clean lined form (mechanical) and contrasting with the geological textured surface (natural).

Furthermore, I was particularly excited by the fact that what was seen on the surface of the form, was not an added decorative 'skin', as in glazed ware, but passed through the solid core of the piece. This conveniently connected with my long standing philosophy with the 'truth to materials' tenet of modernism, stating that the natural or inherent nature of material should not be hidden.

I continued making batches of different stained grogs and embarked on developing a series of forms, relatively simple in shape, that could accommodate the grinding of all faces – shallow curved boat like forms seemed most appropriate. The surfaces I was achieving were not dissimilar to terrazzo and I started considering the granular material I was adding as 'aggregate' – the term used for the stones or chippings added to cement in the making of concrete.

Systematic Research

Having a full time teaching post at the University of Central Lancashire (in Preston, UK), meant little time was available for a major research investigation. Fortunately around this time research was emerging as a major issue within UK universities and a new Research Board had been established to fund research within Art & Design – The Arts & Humanities Research Board (AHRB). I prepared a proposal and was fortunate to be awarded a period of leave, enabling me to spend time developing the project. I embarked on developing a substantial series of tests, exploring different base clay bodies, a wide range of stained aggregate additions and varying the percentage amounts of added material. I also started exploring what other materials might be appropriate for adding to clay bodies.

One particularly interesting discovery was adding copper stained grog. Unlike grog coloured with commercial stains, the copper grog bled slightly into the surrounding clay, giving a halo of green colour, fading out from the each granule. Altering the percentage amount of copper pigment in the grog, affected the amount of bleed.

In considering other materials appropriate for adding to clay, I fell upon using ceramic-based refractory materials, used within the refractory industry. These materials are generally less familiar to studio-based ceramic makers, being used in the making of high temperature furnace linings

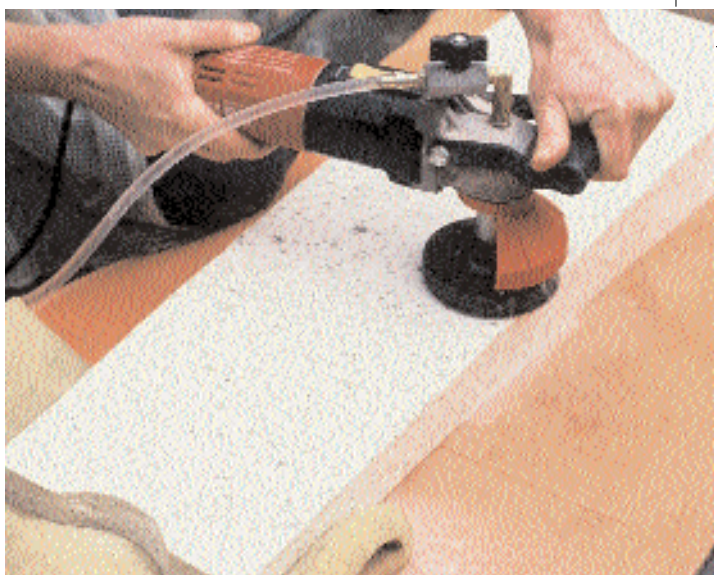
for the metal and chemical industries. I contacted refractory materials manufacturers. and tested many previously unknown materials such as Sintered Mullite, Granular Zircon, Mulcoa, Dense Fused Mullite. The advantage of these particular materialss (apart from their aesthetiic appearance), is that during their manufaacturing, they arrre fired too temperatures in excess of 1400°C, making them totally stable at any temperature I was likely to be firing. The companies found it amusing that I intended using their materials for their 'decorative' qualities, rather than their sciienntifically calculated technical properties. Another interesting development was the realisation that I might be able to include found materials such as fine pebbles or rock chippings.

In my enthusiasm to develop new surfaces, I gathered an amount of fine beach shingle – tiny pebbles ground and polished by the action of the sea. Having picked out any obvious pieces of shell and seaweed, I prepared a batch of porcelain and pebbles and made a large boat-like form. The piece fired perfectly and when ground back, revealed the most astonishingly array of coloured fragments of rock, inlaid into the white fired body. The piece sat pride of place in my next exhibition, but fortunately failed to sell.

A few weeks after returning from the show, I discovered to my dismay, the piece in numerous broken fragments. It was then I realised the shingle must have included fragments of calcium bearing rock such as limestone. The stones had calcined and then slowly absorbed atmospheric moisture, creating a monumental case of 'lime spit'.

This proved a valuable lesson in over-eagerness and another problem to solve – how to ensure stability when adding found materials. The simple solution turned out to be pre-firing and washing all found mineral material. Any calcium material turned to soluble quick lime, leaving the remaining material stable and inert.

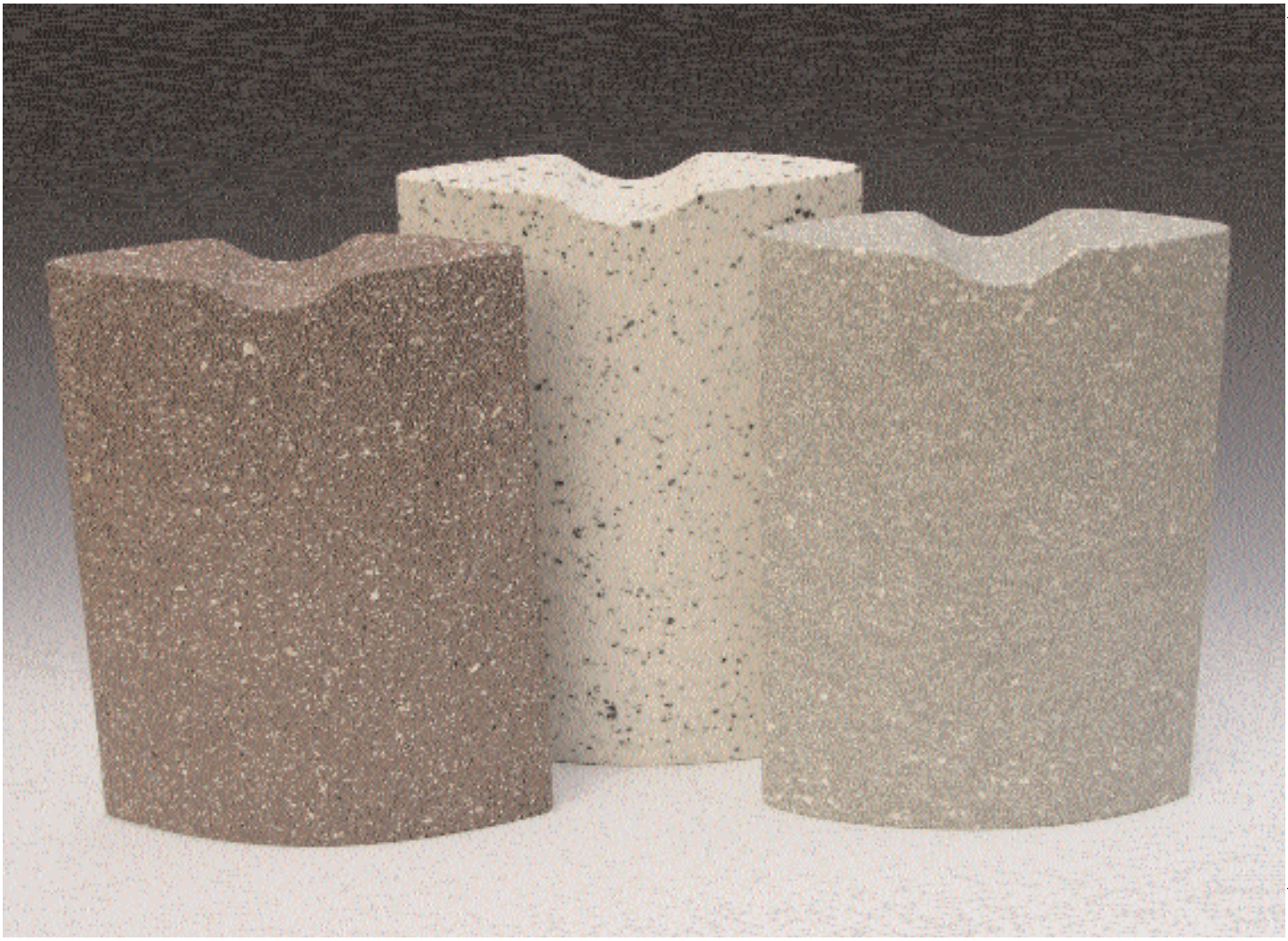
Since then I have continued researching and testing many found materials. I have become particularly interested in the idea of making pieces from collected granular mineral material, giving each piece of work a sense of place or belonging. I have made pieces including grey granite from the mountains of North Wales, beach shingle from the east coast of England and even pink granite gathered during a visit to Tasmania. I now never travel without my collecting bags, always looking for interesting granular material.



Grinding tall standing form, using Electra-Flex angle grinder.

Grinding fired form at International Ceramics Studio, Kecskemét, Hungary.

Test samples of varying clay bodies and aggregate additions.



Group of 3 Standing Forms. *Left to right Manganese stained terracotta with mixed aggregate additions, Porcelain with copper aggregate, Copper stained porcelain with sintered mullite & molochite aggregate Max height 40 cms.*

As the grinding process has determined to an extent the shape of the pieces, I have developed a repertoire of bold, simple forms – my aesthetic inclination has always lent towards a simplicity of form. Because the making process seemed to lend itself to pressing, I have developed a range of simple wooden and plaster moulds. In a number of instances, I have developed moulds that can be adapted to give different sizes from the same basic mould.

Ironically, the creative element of my making, apart from the clay preparation, now mostly occurs at the model and mould-making stage, exploiting my original interest in woodwork and cabinet-making. The actual making involves little more than 'throwing' the clay mix into the mould.

Unlike more conventional ceramic processes, where the final firing reveals the glory (or otherwise) of the finished piece, it is at this point for me, that the real work begins. Grinding may take many hours, particularly if the piece has slightly distorted in the firing. As the pieces are clean lined and precise in form, it is crucial there are no unseemly changes in surface configuration. Therean almost infinite variety of materials that might be added to clay; the amount of each material to be added can be varied, materials may be combined and the base clay may itself be coloured and the research is ongoing and in reality, the aesthetic and creative possibilities are endless.

David Binns is Reader in Contemporary Ceramics in the Department of Design at the University of Central Lancashire, Preston, UK. He is currently writing a book, titled *Additions to Clay Bodies* for publishers A&C Black (London). Caption title page clockwise: *Tasmanian pink granite. Copper stained grog (pre-fired fired to 850˚C). Dense Fused Mullite. Crushed flint pebbles.*