Materialise Forum at the Royal College of Art

26 September 2006

Report by Hugh Aldersey-Williams

This, the second Materialise Forum organised by the Royal College of Art (RCA) and the Institute of Materials, Minerals & Mining (IOM3), was also the first event presented by Materials and Design Exchange, the newly established design node of the UK Materials Knowledge Transfer Network. While last year's forum revealed inspiring glimpses into some of the creative possibilities when designers experiment with materials, this event, held at the RCA on 26 September 2006, and sponsored by the Audi Design Foundation and the Materials and Design Exchange, showed a commitment to deepen the discussion.

This dialogue of designers and materials scientists is now supported by the Design Council, the Institute of Engineering Designers and the Engineering Employers Federation. The thrust now is on building a framework of resources, both physical and virtual, and promoting a range of exchange activities between the two communities over the next three years. Bernie Rickinson, chief executive of IOM3 announced that, under the banner Design Sparks, a regular flow of short, focused, practical projects will bring together suppliers of competence with the originators of promising business ideas.

Clare Johnston, the RCA head of textiles, co-chairing the forum with Rickinson, explained that she had approached the designer Ron Arad to speak at the forum by suggesting he discuss his problems with materials. Arad replied: 'I don't have problems with materials. I like materials.' And so it appeared, as the audience sat back to watch how he had taken one supremely simple idea and explored its execution in every feasible material as well as a few that probably weren't.

Arad's idea began with a simple doodle of two elliptical loops touching one another. These were to become the seat and back of a rocking chaise longue – the curves of the two ellipses blending into a single curve on the bottom to provide a smooth rocking action, and on the top forming two discrete cushioning surfaces for the back and bottom of the sitter.

In this case, it was an idea looking for a material, but equally it can be the case that the material comes first and prompts an idea. 'It's a two-way process,' said Arad. One material that had interested Arad was the special paper used in making the lightweight composites for aircraft floor panels. Drawn to it initially for the visual interest of the honeycomb patterns it makes, Arad nevertheless appreciated that it had useful properties such as fire retardance as well as its high strength-to-weight ratio, and thought that it might be suitable for designing furniture. At first, it was vital for aesthetic

Clare Johnston, Head of Textiles, Royal College of Art

Bernie Rickinson, Chief Executive, Institute of Materials, Minerals & Mining

Ron Arad, Head of Design Products, Royal College of Art

reasons that the paper structure be visible, but in later versions of the chaise longue Arad decided this no longer mattered. In later versions still, the paper structure was covered with a carbon-fibre skin. By then it was felt that what had been the essential material to start with had become superfluous not only visually but even structurally, and it was omitted from later designs in the series. 'It turned out the paper in the early models was unnecessary,' said Arad. 'It was pure decoration – it was removed.'

But the material was too good to drop completely. Arad wanted to take it to the limit of its structural possibilities. 'You immediately want to do a table that's very, very long. It's light and you can dance on it, and yet it's made of paper.'

Meanwhile, there were other materials to consider in relation to the chaise longue. Dupont asked Arad to design something using their Corian material. The manufacturers were especially proud of the fact that, because the acrylic adhesive used to bond pieces together is essentially the same as the resin in the bulk material, pieces can be joined seamlessly to make large constructions. Many designers would doubtless appreciate this and dutifully rush off to produce work making use of the property. But not Arad. 'So I thought, I want to see the seams. I want dirty glue!' The result was a series of prototypes revealing the laminations as contour stripes which seemed to celebrate the looping organic shape of Arad's design.

This was not the end of the designer's exercise in theme and variations. He went on to show explorations of the same basic form in materials from aluminium mesh to silicone.

The forum rapporteur, Hugh Aldersey-Williams tried to pin down some creative rules behind Arad's riotous creativity that might help other designers inspired to work with materials. He noted the designer's urge to take materials to the limit and to explore at idea from every angle with every imaginable material. He also identified a certain cussedness in Arad's determination to do the opposite of what a material or its manufacturer suggested – if you're going to vacuum-form something, what happens if you blow rather than suck the material?

The nanotechnologist Alan Smith followed Arad with an introduction to materials of the future whose exceptional properties arise from their design at the molecular scale of nanometres – and the sort of materials likely to find favour with future Ron Arads. Nanotechnology is about controlling and manipulating the properties of materials at the molecular level. If you can make sure every chemical bond is linked to another in a fibre for example, that fibre will be far stronger than one with the usual flaws. Spider silk comes closer to achieving this perfection than manmade materials and is thus far stronger than the equivalent steel cable, for example. 'Always copy nature,' Smith advised. Materials become more powerful in a range of properties when this bonding potential is made available, for example when their surfaces are suitably prepared. This is how the gecko is able not only to stick to the ceiling but to support 200 times its own weight in this way. A grain of sand would take millions of years to dissolve in water, but broken up into nanoparticle size pieces its surface area is hugely increased and it would dissolve in seconds.

Smith then showed the audience a wide range of products that benefit from nanotechnological advances – most spectacularly in sports equipment from bicycle frames to tennis racquets

Hugh Aldersey-Williams, writer and curator

Al Rees, research tutor, Communicaiton Art & Design, Royal College of Art

Alan Smith, nanotechnologist

and golf clubs to fishing rods. Car panels in polypropylene and montmorillonite clay save weight compared to pressed steel and can be produced with a smoother finish, thus needing less paint – both giving significant environmental benefits. It was a timely reminder that solutions to our environmental crisis are likely to be technological rather than the return to a more primitive lifestyle advocated by radical environmentalists. In future, we're likely to be using better materials as well as less material. The gains are perhaps not always clear-cut, however. Smith also cited plastic beer bottles with five laminated layers to produce the necessary robustness, imperviousness, hygiene and so on. Separating these layers for recycling may be impossible, but then the bottles do at least weigh less than alternatives.

The catalogue of marvels ran on: antimicrobial coatings in fridges, hydrophobic surfaces for self-cleaning windows, boats that do not need anti-fouling paint, aircraft that do not suffer icing, clothing where spills run like water off a duck's back. ('Always copy nature' again.) There were also paints, polishes, cosmetics, energy-saving fuel additives and more. It was clear that nanomaterials are quickly finding their way into many aspects of our lives.

Smith's list of nanomaterial-based products prompted Hugh Aldersey-Williams to wonder whether some subtle rebranding wasn't going on. Is nanotechnology the new chemistry? Certainly, it seems that the answer to the question: When is a chemical not a chemical? is now: When it's a nanomaterial. Is our aversion to 'chemicals' being replaced by the glamour of nanomaterials? Many of the claimed nanomaterials in existing products seem to be little more than conventional chemicals. This raises the thought that the dialogue between design and materials science should be extended to certain kinds of chemist too. Smith's examples also revealed that manufacturers regard the nano- prefix as a marketing advantage. So while people like Prince Charles fret about the invasion of 'grey goo' depicted in Michael Crichton's thriller Prey, where the self-assembly processes that nanotechnologists dream of perfecting have run amok, others are sold on it. Perhaps surprisingly, we are still prepared to love the new.

The forum concluded with some film excerpts selected by Al Rees. They provided a reminder of why nanotechnological self-assembly is so appealing. The way materials are celebrated in film, from Len Lye's advertisement, 'Rhythm' for Chrysler in 1957 to the avant garde GPO documentary 'Coalface' with music by Benjamin Britten and words by W.H. Auden in 1935, reminds us of the sheer scale of the whole business – their bulk, their mass, the vast quantities of energy and suffering required to extract them and then work them for use. If only we could save ourselves the bother and let nature do the work as well as give us the ideas.

For the core of the forum, the 80 attendees were divided among nine tables with a mix of designers and materials experts at each. All had previously been asked to name a material that had excited them during the past year. The submissions were printed on cards, which were now drawn at random for discussion at each table. Having reviewed a number of them, the tables were then asked to vote for a favourite, which they more or less did as follows. (The names of those who submitted the chosen material in each case are given in parentheses.)

Table 1 plumped for eco-intelligent polyester (Kate Goldsworthy), feeling it could over products that would 'age beautifully, encouraging longevity in consumerism and educating people towards an awareness about product cycles and processes'.







Table 2 refused to pick a favourite material, preferring to discuss how emotions can affect our perception of materials, and 'to celebrate the old along with the new and enjoy the patina of age as well as the smoothness of the new'.

Table 4 delighted in the prospect of electrochromic materials which could be used as low-temperature surface coatings, for example in yarns and fabrics (Stan Swallow, Intelligent Textiles Ltd), foreseeing lots of applications in furnishings and interior decoration.

Table 5 expressed 'general scepticism and cynicism' about overuse of the terms 'nano-' and 'smart' in relation to materials and was more interested in the 'emotional resonance' that could come from more basic materials, such as the 'cry' emitted when you bend a rod of zinc or tin and disrupt its crystal structure (Zoe Laughlin, King's College London)

Table 3 disagreed, seeing a bright future for nanomaterials (Stephen Frazer, Frazer Designers). They would bring 'endless possibilities', combining the functional with fun and fashion in many markets, as well as promising to benefit consumers' wellbeing.

Table 6 embraced biomimetics, not so much for the fact that it might bring advances such as photosynthetic materials for electronics (David Coates, Innovaro), but because it would 'bring other disciplines to the table such as biology and botany'.

Table 7 favoured the combination of selective laser melting (SLM) with 24-carat gold (Frank Cooper), also chosen by Table 6. The excitement was in old meeting new, bringing a technology generally used for forming plastic objects to one of the very first materials to be worked by humankind. This marriage might find serious applications, for example in gold dental implants shaped by scanning a removed tooth, but also purely decorative ones enabling the manufacture of very novel jewellery on the one hand or the modern recreation of ancient jewellery by scanning its details from ancient art works.

Table 8 was excited by electronic paper technology (Adrian Berry, Factory esign) which would enable flexible surfaces to display digital images. This would work not only for solid surfaces of paper or textile but also for liquid surfaces. More importantly, it offered the prospect of 'extending the life of products such as clothes and furnishings because the consumer can update them by changing the surface aesthetics.'

Table 9 classified the ideas they looked at into 'emotive' (tin cry again); 'simple but clever' innovations such as concrete that reveals a pattern on its surface when it becomes wet (Sue Chorley) – if only that had been thought of in British cities during the 1970s – and ones that were 'scary' either because it was hard to imagine them – biomimetic photosynthetic materials, for example – or perhaps all too easy, as in the case of a composite of human hair bound with resin (Paul Pankhurst, PDD Group).

Many other material ideas were offered for consideration, ranging from rubber impregnated with the fragrance of strawberries to a horse's nose. We thought we should preserve the anonymity of these particular fetishists, but we will explore some of these materials in future Materialise newsletters.

Hugh Aldersey-Williams is a writer and curator in design and science. He was the design critic of the New Statesman for five years before curating the exhibitions Zoomorphic and Touch Me at the Victoria and Albert Museum. He is presently at work for Penguin on Panicology, a feelgood book about the global disasters we supposedly face.