

PROCESS 50 PRODUCT DESIGNS FROM CONCEPT TO MANUFACTURE

Second edition



Jennifer Hudson

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Jennifer Hudson is an author, editor and researcher in the fields of contemporary design and architecture, and was the general editor of *The International Design Yearbook* for fifteen years. She is the author of *1000 Designs and Where to Find Them Volumes 1 & 2*, *Interior Architecture Now*, *Restroom: Contemporary Design* and *Interior Architecture: From Brief to Build*.

'This is an excellent showcase of a broad range of products through their development. Fantastically illustrated, the works highlight the various techniques employed throughout design and provide information and inspiration to student designers.'

Dr Russell Marshall, Senior Lecturer in Product Design & Technology, Loughborough University, UK

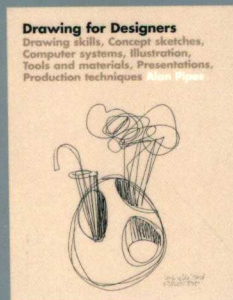
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P.6 /... Introduction

P.10 /... Bodyguards /...Ron Arad Associates

P.16 /... Sculpt furniture /...Maarten Baas

P.20 /... Lum lamp /...Emmanuel Babled

P.24 /... Units /...Emmanuel Babled

P.28 /... The De La Warr Pavilion chair /...Edward Barber & Jay Osgerby

P.34 /... Jawbone Bluetooth headset /...Yves Béhar/fuseproject

P.38 /... Leaf light /...Yves Béhar /fuseproject

P.42 /... One Laptop Per Child XO Computer /...Yves Béhar/fuseproject

P.46 /... Steelwood chair /...Ronan & Erwan Bouroullec

P.50 /... Viagem tableware /...Fernando Brizio

P.54 /... Part tables / Handmade furniture /...Stephen Burks

P.58 /... Light as Air lamps /...Paul Cocksedge

P.62 /... OnlyOne bathroom mixer /...Lorenzo Damiani

P.66 /... Entropia light /...Lionel T. Dean

P.70 /... Holy Ghost chair /...Lionel T. Dean

P.74 /... EPS Chair /...Tom Dixon

P.80 /... Karbon articulating kitchen faucet /...Niels J. Eilmus

P.86 /... Speedglas 9100 welding helmet /...Ergonomidesign

P.90 /... Chair First /...Stefano Giovannoni

P.94 /... The Long 8 Chair /...Natanel Gluska

P.98 /... Miura stool /...Konstantin Grcic

P.102 /... Segesta chair /...Alfredo Häberli

P.106 /... Spun chair /...Heatherwick Studio

P.110 /... 3D Knit /...Yoshiki Hishinuma

P.114 /.. Stardust vases /...Setsu & Shinobu Ito

P.118 /.. One Liner bowls /...Tavs Jørgensen

P.122 /.. Breeding Tables / My Private Sky plates /... Reed Kram & Clemens Weisshaar

P.128 /.. Bone chaise / Bone chair /...Joris Laarman

P.134 /.. Pewter Stool /...Max Lamb

P.138 /.. Amphora / Made by Bees Honeycomb Vases /...Tomáš Gabzdil Libertiny

P.144 /.. S Table /...Xavier Lust

P.150 /.. X3 chair /...Marco Maran

P.154 /.. Micarta chair /...Marc Newson

P.158 /.. B.M. Horse Chair /...Satyendra Pakhalé

P.164 /.. Cobi™ chair /...PearsonLloyd in conjunction with Steelcase Design Studio

P.168 /.. DBO Commode /...PearsonLloyd

P.172 /.. Tavolone table /...Gaetano Pesce

P.176 /.. Talak light /...Neil Poulton

P.180 /.. Kapsel Media Center /...Propeller

P.184 /.. Digital projects /...rAndom International

P.190 /.. Bokka lamp /...Karim Rashid

P.194 /.. BODiBEAT MP3 player /...Toshihiko Sakai

P.198 /.. Spider 1 & 2 hard-disk DVD recorders /...Toshihiko Sakai

P.204 /.. Sonic Fabric /...Alyce Santoro

P.208 /.. Halley light /...Richard Sapper

P.214 /.. Bellflower lamp /...Wieki Somers

P.218 /.. Chasen lamp /...Patricia Urquiola

P.222 /.. Orchid 5 fabric /...Eugène van Veldhoven

P.226 /.. Mandala light /...Alessandro Mendini / Pirouette lamp /...Guido Venturini

P.230 /.. Pane chair /...Tokujin Yoshioka

P.236 /.. Glossary

P.239 /.. Index

PROCESS

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Author's acknowledgements

Process is inscribed to my son Willoughby, but is dedicated to the designers in the book, all of whom I admire greatly for making our immediate environment, in turn, so comfortable, interesting, entertaining and practical.

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PROCESS 50 PRODUCT DESIGNS FROM CONCEPT TO MANUFACTURE

Second edition

CONTENTS

P.6 /... Introduction

P.10 /... Bodyguards /...Ron Arad Associates

P.16 /... Sculpt furniture /...Maarten Baas

P.20 /... Lum lamp /...Emmanuel Babled

P.24 /... Units /...Emmanuel Babled

P.28 /... The De La Warr Pavilion chair /...Edward Barber & Jay Osgerby

P.34 /... Jawbone Bluetooth headset /...Yves Béhar/fuseproject

P.38 /... Leaf light /...Yves Béhar /fuseproject

P.42 /... One Laptop Per Child XO Computer /...Yves Béhar/fuseproject

P.46 /... Steelwood chair /...Ronan & Erwan Bouroullec

P.50 /... Viagem tableware /...Fernando Brizio

P.54 /... Part tables / Handmade furniture /...Stephen Burks

P.58 /... Light as Air lamps /...Paul Cocksedge

P.62 /... OnlyOne bathroom mixer /...Lorenzo Damiani

P.66 /... Entropia light /...Lionel T. Dean

P.70 /... Holy Ghost chair /...Lionel T. Dean

P.74 /... EPS Chair /...Tom Dixon

P.80 /... Karbon articulating kitchen faucet /...Niels J. Eilmus

P.86 /... Speedglas 9100 welding helmet /...Ergonomidesign

P.90 /... Chair First /...Stefano Giovannoni

P.94 /... The Long 8 Chair /...Natanel Gluska

P.98 /... Miura stool /...Konstantin Grcic

P.102 /... Segesta chair /...Alfredo Häberli

P.106 /... Spun chair /...Heatherwick Studio

P.110 /... 3D Knit /...Yoshiki Hishinuma

P.114 /.. Stardust vases /...Setsu & Shinobu Ito

P.118 /.. One Liner bowls /...Tavs Jørgensen

P.122 /.. Breeding Tables / My Private Sky plates /... Reed Kram & Clemens Weisshaar

P.128 /.. Bone chaise / Bone chair /...Joris Laarman

P.134 /.. Pewter Stool /...Max Lamb

P.138 /.. Amphora / Made by Bees Honeycomb Vases /...Tomáš Gabzdil Libertiny

P.144 /.. S Table /...Xavier Lust

P.150 /.. X3 chair /...Marco Maran

P.154 /.. Micarta chair /...Marc Newson

P.158 /.. B.M. Horse Chair /...Satyendra Pakhalé

P.164 /.. Cobi™ chair /...PearsonLloyd in conjunction with Steelcase Design Studio

P.168 /.. DBO Commode /...PearsonLloyd

P.172 /.. Tavolone table /...Gaetano Pesce

P.176 /.. Talak light /...Neil Poulton

P.180 /.. Kapsel Media Center /...Propeller

P.184 /.. Digital projects /...rAndom International

P.190 /.. Bokka lamp /...Karim Rashid

P.194 /.. BODiBEAT MP3 player /...Toshihiko Sakai

P.198 /.. Spider 1 & 2 hard-disk DVD recorders /...Toshihiko Sakai

P.204 /.. Sonic Fabric /...Alyce Santoro

P.208 /.. Halley light /...Richard Sapper

P.214 /.. Bellflower lamp /...Wieki Somers

P.218 /.. Chasen lamp /...Patricia Urquiola

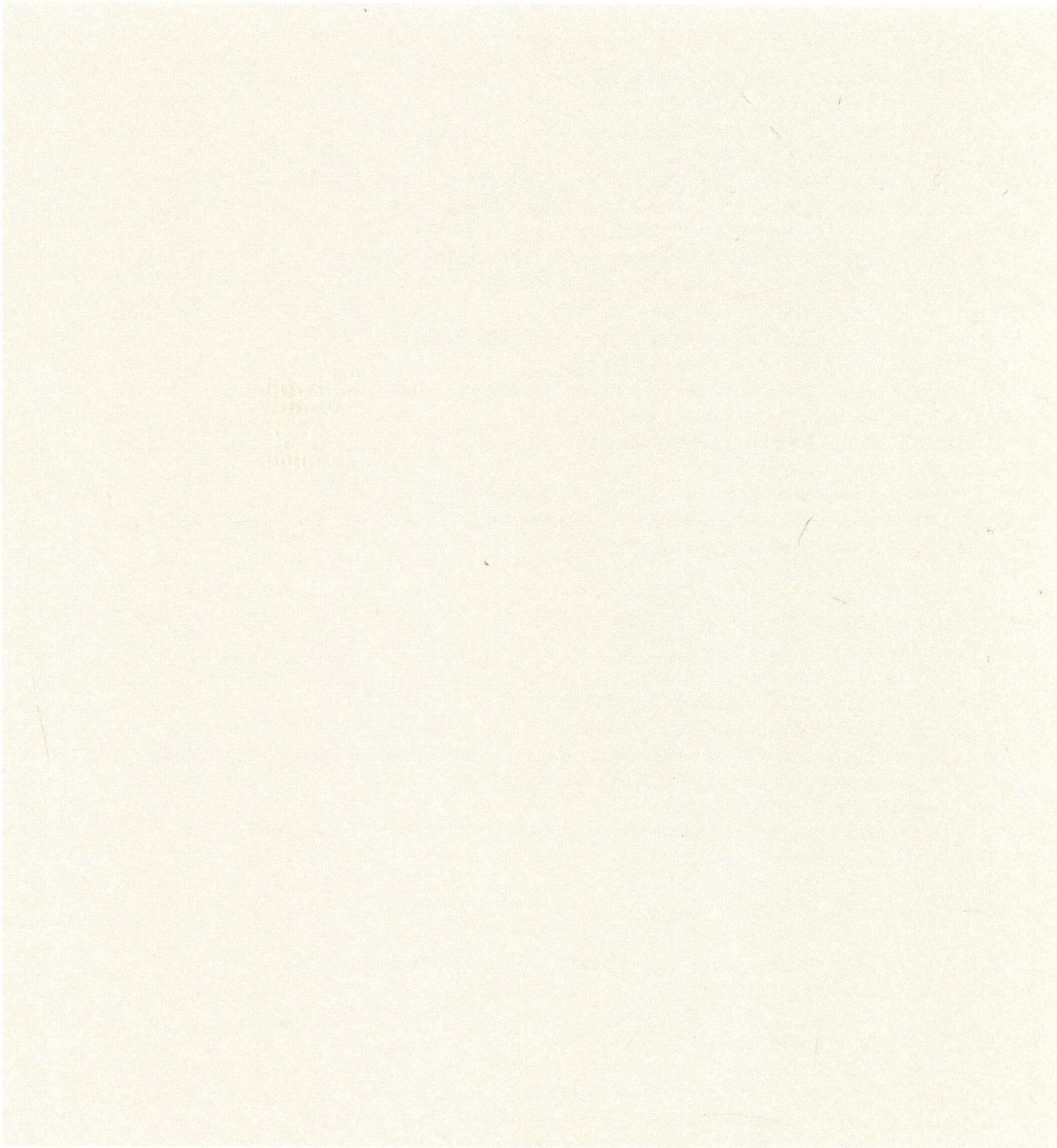
P.222 /.. Orchid 5 fabric /...Eugène van Veldhoven

P.226 /.. Mandala light /...Alessandro Mendini / Pirouette lamp /...Guido Venturini

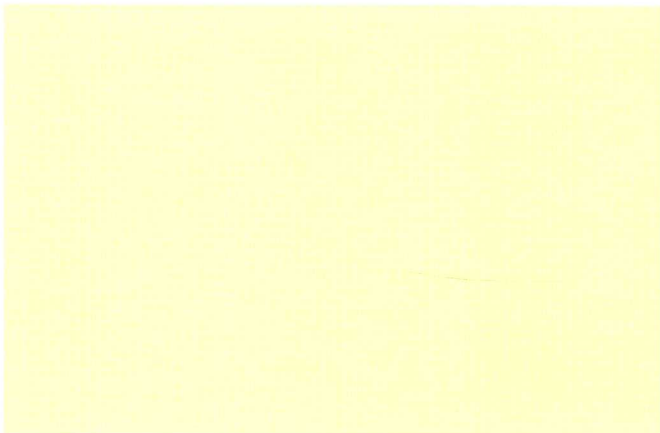
P.230 /.. Pane chair /...Tokujin Yoshioka

P.236 /.. Glossary

P.239 /.. Index



INTRODUCTION



The following pages describe the sometimes long, and often arduous, journeys that over 40 designers have undertaken to bring their very varied work to the marketplace. With the proliferation of glossy lifestyle magazines and the publication of bumper compendiums of product design, it is all too easy to believe that the objects of desire with which we seek to surround ourselves are produced virtually overnight: the consumer and aspiring young designer are given little idea of the complexities, trials and tribulations that have gone into their creation. Not only is this misinterpretation and lack of understanding intellectually limiting, it is also dangerous in today's design climate, when courses in some leading schools place an increasing emphasis on the creation of the personal voice to the detriment of a sound grounding in technique and commerciality. Upon completing their studies, graduates of these schools are suddenly faced with having to design something for the real market and real people. Charles Eames famously responded, when asked if he designed for pleasure or function: 'What works good is better than what looks good. Because, what works good lasts.'

For nearly a decade, the design world has been liberated by a pluralistic attitude towards what is permissible, with no single style or trend predominating. Mass-produced and high-tech products sit comfortably with craft-based low tech, along with the individualistic, conceptual approach and the limited-edition design piece sold in galleries and collected by the connoisseur. Modern technology and the increased use of computer-aided design in both the development and manufacture of products have resulted in the research of new and super-pliable materials. These lend themselves to advanced processes such as rapid prototyping, creating complex, organic forms that were unrealizable until recently.

Aaron Betsky, a leading critic and proponent of architectural and design discourse, and current Director of Cincinnati Art Museum,

asserts, 'Design should do the same thing in everyday life that art does when encountered: amaze us, scare us or delight us, but certainly open us up to new worlds within our daily existence.' The downside to the current 'anything goes' attitude, however, is the rise of the specious designer and the overabundance of fashionable and ill-conceived pieces, devised to look good in the media but with little technical integrity.

The designs that follow (from the highly conceptual one-offs, through craft-based pieces to the limited-edition collector's item and the commercially mass-produced) cover the major typologies: furniture, lighting, tableware, textiles and products. They represent the above-mentioned trends but, most importantly, all have been carefully selected to demonstrate their creators' thorough knowledge of design processes, whether they be methodical, research-led, scientific, accidental or even, in some cases, inspirational to the final product. Examining all stages from initial concept, through design and development to production, the work featured proves that design can 'look good and work good'.

Above all, the designs shown here emphasize that the development of a lasting product is 5% inspiration and 95% hard work. To design an object involves problem-solving and creativity, but to produce that object, no matter how innovative, involves a routine or pre-planned process. Having a revolutionary idea is not enough and in many ways is an ego-driven indulgence of the designer. Finding a way to realize a concept through evolutionary solutions is key, as is consideration of the client's brief, consumer needs, market demands, function and practicality. To design in a vacuum with the emphasis on expression would result in ill-thought-out products. For the most part, the stories in this book accentuate the collaborative way in which designers work with manufacturers and, above all, technicians and craftspeople, to develop and produce their initial ideas. In an interview with Fortune Magazine, Steve Jobs, co-founder

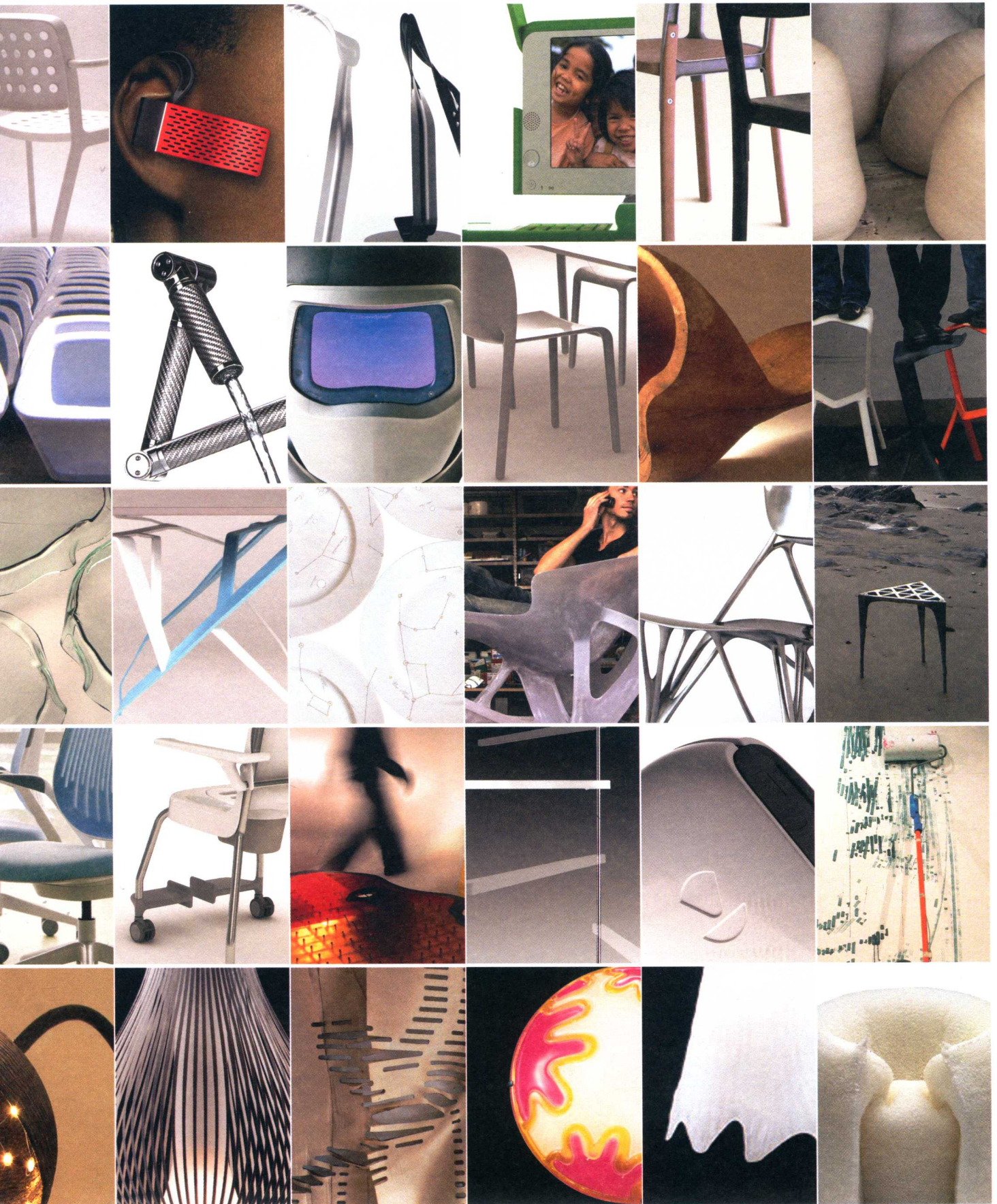
and CEO of Apple said: 'Design is the fundamental soul of a human-made creation that ends up expressing itself in successive outer layers of the product...it is a synthesis of the visual and emotional with the functional; it is emotion wrapped within a purpose...an object of desire equipped with a sense of mission.'

Process looks not only at production but seeks to marry the technical with the inspirational; to see into the minds of those we read about in design magazines (plus a few new faces) and examine their design philosophy and modus operandi in order to expose the unknown behind the objects they create. To go deeper into some of the manufacturing techniques mentioned, Chris Lefteri's comprehensive book Making It – Manufacturing Techniques for Product Design (Laurence King, 2007) is a useful companion publication.

The designs featured in this book all stand up to judicious appraisal. They include Stefano Giovannoni's Chair First (which uses an innovative form of gas injection to create an organic form without the structure being visible); Joris Laarman's Bone furniture (a hybrid of creativity and computer software that imitates the precise growth patterns of bones); Reed Kram and Clemens Weisshaar's Breeding Tables (infinite three-dimensional structures generated by algorithmic applications); Satyendra Pakhalé's B.M. Horse Chair (eight years in the making and combining ancient technique with technological innovation); Yves Béhar's Leaf light (whose expressive form is justified by mechanical requirements); and Lionel T. Dean's Entropia light (a milestone in digital manufacturing). This second edition features six new projects.

Since the millennium, design society has witnessed its own revolution in what is accepted both inspirationally and technically. As the following pages demonstrate, however, it is only with a sound understanding of the importance of rigorous method that a wannabe designer will be able to translate his or her flights of fancy into objects that will stand evaluation and the test of time.





Ron Arad was born in Tel Aviv, Israel, in 1951 and studied fine art at Bezalel Academy in Jerusalem before moving to the UK tempted by the anti-establishment, youth-fuelled punk years of the 1970s. He trained at the Architectural Association and worked for a short time in a small architectural practice before forming his own company, One-Off, producing individual, streetwise and rugged pieces. Teaching himself to weld and beat steel, he produced a series of volumetric chairs that brought him worldwide fame.

Mixing high-tech with low, the Bodyguard series sees a return to those early days. Shaped by the pioneering technique of thermo-forming highly plastic aluminium, the chairs are cut and welded, incorporating the idiosyncrasies of the personal touch, and then hand-finished to achieve brilliant mirror surfaces.

These sculptural objects are not the first time that Arad has experimented with forming aluminium. During 1997 *Domus* magazine commissioned Arad to produce a temporary landmark for the Milan Furniture Fair (Salone Internazionale del Mobile). Arad responded with the idea of a 10m (32ft) column, the Totem, made from stacking chairs, each cast in one piece. For reasons of time and budget plastic couldn't be used for the installation (although it was later employed when Vitra put the chair into production) and Arad was introduced to Superform Aluminium, a specialist manufacturer of precision-

engineered components for the automobile and aeronautical industries. The company had never worked on furniture before but saw no reason why a chair could not be made in formed aluminium. This offered Arad the opportunity of casting the complex shape of the chair in one mould and relatively inexpensively. What was later to be known as the Tom Vac chair was born, along with a collaboration that would see a series of objects produced over the next ten years. These include the B.O.O.P giant vases, the Blo-Void chaise and Bodyguards, which push the innovative process to the limit.

To form convoluted shapes in aluminium, without undue stress being placed on the material, the usual method would be to press it in sequence. This would involve the creation of a number of dies. Vacuum-forming needs just one tool, offering the possibility of producing reasonable-sized runs of rapidly formed objects. The basic technique is to take a sheet of steel into which profiles have been cut. This is lowered on to hot aluminium that has been heated to 400–600°C (752–1112°F) and has the consistency of rubber. Air pressure is then used to force the aluminium through the holes.

Three blowing techniques have been developed to cover the large range of sizes and shapes applicable to the process. All of these were used at times for the various depths of the intricate, organic forms of the Bodyguard pieces. In the cavity method, air pressure and tool movement forces

the sheet up into the mould; in bubble-forming, the air pressure forms the material into a bubble, the mould is forced up into it and then air pressure is applied to the top making the aluminium take on the form of the tool; and in back-pressure-forming, pressure is applied by a male and female mould from both top and bottom.

The Bodyguards were developed using freehand sketches that were translated into 3D computer geometry to work out the detailing. Once the definitive shape was created, foam models were produced and then tested for comfort. Adjustments were made and the 3D files, now containing all the information to create the mould, were sent to the tool-makers. A poly-tool model was machined combining Arad Associates' 3D computer geometry and engineering details such as clamp lines. A process of investment-casting was used to make the tools in iron, which were five-axis-machined with a cutting tool to create a good finish. The aluminium was blown, parts ejected from the mould and the flanges trimmed back to achieve the required form. They were then welded. Finally, Arad painted rough forms to determine the positions of the cuts, which were incised by hand. The pieces are finished to create ultrasmooth, shiny surfaces.

BODYGUARDS

RON ARAD ASSOCIATES

Production: Ron Arad Associates

Aluminium

Various dimensions

Design to manufacture: 5 months

Limited edition

www.ronarad.com

The Bodyguard series is the latest in Arad's experiments in forming aluminium. It was launched at Dolce & Gabbana's showroom during the Milan Furniture Fair, 2007, along with other pieces (including Southern Hemisphere and Afterthought) produced using the same technique.



1-4. Arad's sketches work out the forms of the series.

5-9. 3D computer geometry is used by Arad's studio to refine the shapes. The results are passed back to Arad, who sketches amendments. This ongoing process results in the final form, from which 3D files are created to send to the tool-makers.

10. CAD drawing working out the number of parts needed to cast Bodyguard. Originally it was intended to have only two parts but this put undue stress on the aluminium. In the end, four parts were needed.

11. Renderings of the final form of a Bodyguard.

