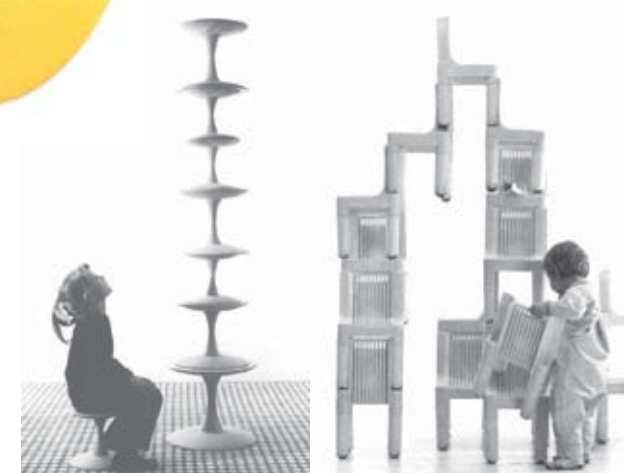
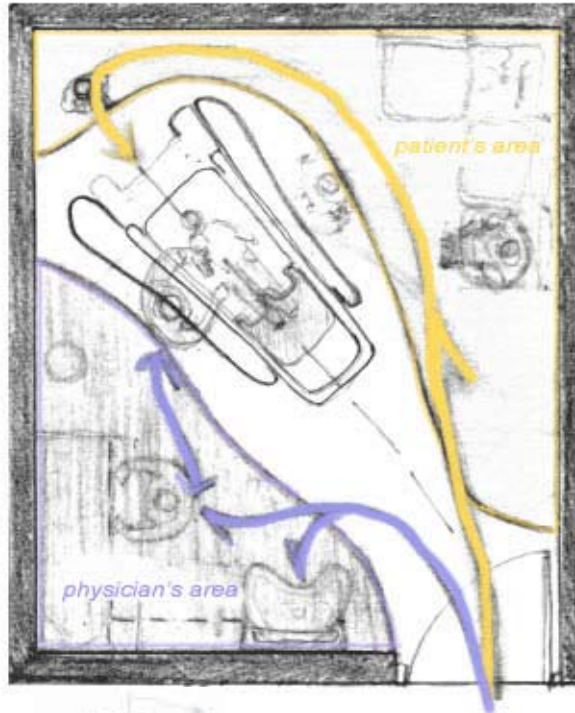


Design concept development

Form Color Human Factors



18

- Zocker chair for children designed by Luigi Colani, 1972 polyethylene, stackable. [An integral seat-desk ergonomically designed] makes a statement on classroom equipment
- Filius seating, designed by Gunter Beltzig, 1974 polyester, stackable. [Integral seat-table can be used in a variety of environments: children's rooms, nurseries, gardens...]
- Mane rocking chair designed by IKEA, 1996 foam with removable cotton cover. [This abstract, sculptural form combines two functions in one, being both comfortable to sit in as a chair and inviting to play with as a toy helping to develop a child's sense of balance.]**
- Trisserne children's stools by Nanna Ditzel, 1962 [Designed as a toy that rolls and stacks. The Danish designer does not feel that a child's chair should be a copy of a chair for adults "children do not sit still, they move and run around" and accordingly the stool is intended for active use in play with sitting as an option.]** When children are older it serves as a useful table or seat.
- Stacking chairs for children by Kartell, 1964. [Was toylike to spark a child's fantasy.]* Kartell established in Milan, 1949 pioneered the manufacture of quality household objects in plastic.

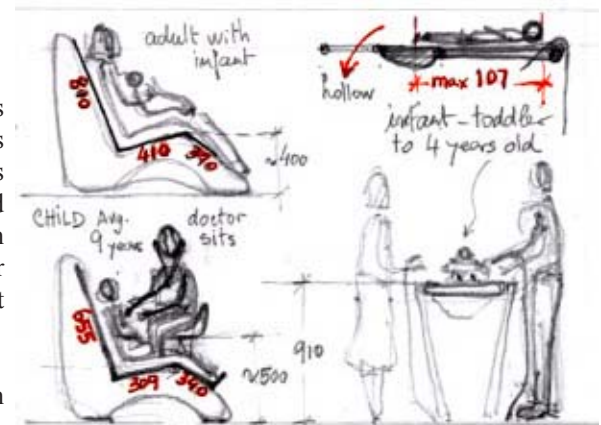
Children's world is about moving and exploring, about dynamic environments; paradoxically, in typical pediatric exam rooms the prismatic equipment elements are laid against the walls. The proposed PET is a spatial reference and therefore adopts a central position. As the generating element of a modular equipment line, it helps zoning the room into the physician's and patient's areas. It "calls" the patient to take its place as soon as he enters the room; it is as well an aesthetic reference to the childhood world.

Assuring the clinical functionality inherent to an exam table the PET is also conceived as a toy, a playing structure where children feel comfortable and enjoy during waiting time and where they can demonstrate motor skills to the pediatrician during check-up procedures.

Within this concept that balances physical needs and functionality with emotional needs and familiarity, plus a desire of innovation, color is evaluated. Healthcare design guidelines suggest that greens and blues should be used because they are reported of having a calming effect, while yellows and oranges should be avoided because they can affect the skin tone. Studies on the effect of color put it as a basic design element contributing to the psychological and physical well being of users, and show that intense colors are stimulating while subdued ones have the opposite effect. The studies also establish that the relationship between color and emotional comfort is not static, but rather one that should be evaluated within the cultural context. Besides, color is a well-defined design element

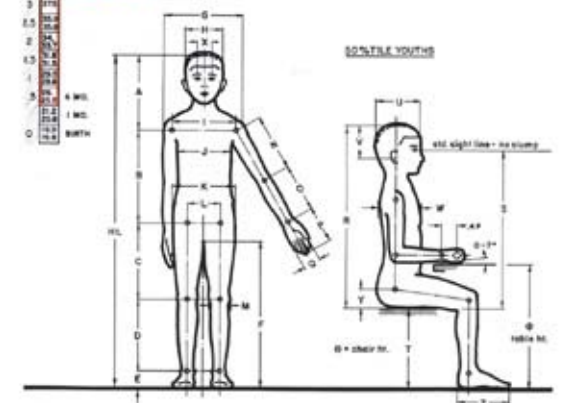
within the children's cultural background and has stimulating and reassuring powers. "Only things unusual, bright, curious and loud will get the child's attention. Strong colours, contrasts in colour, and colours that interact with each other prompt children into action"⁵. So as children experience color differently, in this particular way, bright colors are part of the PET in both "warm" and "cold" manner.

Color and form determine the overall gestalt of an object. Yet the form ponders the users' ergonomics, meaning in this case to contemplate not only caregivers' comfort but also complex patient's anthropometrics. The age of pediatric patients ranges from infants to young adults, posing a scale problem. While infants lay down during a medical routine procedure, four-years old to teen-agers usually sit down. Moreover, many times an infant or a toddler is examined on her mother's lap. Two alternative positions and differently sized users lead to a flexible form for a transformable structure.



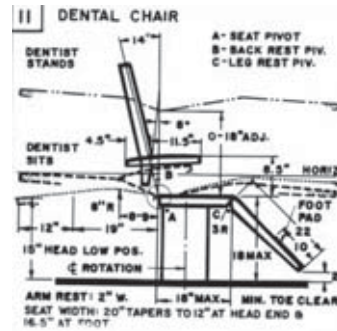
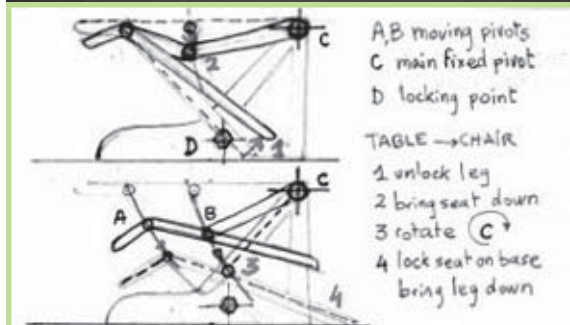
ANTHROPOMETRIC DATA - MALE AND FEMALE CHILDREN
 Top figure in box is data for boys, lower figure for girls, and one figure applies to both.

Age	HL	HT	Wt.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	SH
17	164.0	174.0	68.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
16	158.0	168.0	62.0	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
15	152.0	162.0	56.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
14	146.0	156.0	50.0	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
13	140.0	150.0	44.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
12	134.0	144.0	38.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
11	128.0	138.0	32.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
10	122.0	132.0	26.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
9	116.0	126.0	20.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
8	110.0	120.0	14.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
7	104.0	114.0	8.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
6	98.0	108.0	2.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
5	92.0	102.0	0.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
4	86.0	96.0	0.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
3	80.0	90.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2	74.0	84.0	0.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
1	68.0	78.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0



Multi-Chair designed by Cesare Colombo, 1969. [The Multi-Chair as its name suggests, can assume multiple positions and shapes, from upright sitting to horizontal reclining, with many intermediate positions to suit varied needs and personal physical styles. The user merely moves the metal hooks and leather fastenings on both sides of the two stuffed cushions to connect them in any of the eight arrangements illustrated by the designer's diagram.] *

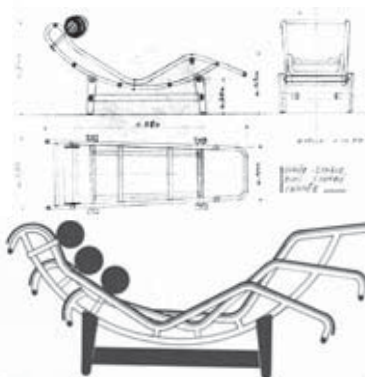
⁵ Gunter Beltzig. "Child-like, childish, child-friendly: is there such a thing as children's aesthetics?". from *Kid size The material world of childhood*. Vitra Design Museum, Skira editore: Milan, 1997



* The brightly upholstered legless chair with separating and ingenious details (mechanical rotation on one of the most creative of suspension systems and elegant design) in the 1980s. The form is idealistic.

The position of the seat and seat can be adjusted by a knob at the base, like the seat in a car. The footrest when unfolded turns the chair into a chaise longue. The two-part headrest can be bent back for reclining or forward to a "winking" position for more upright support. The headrest parts also resemble ears, and this together with the various Pop colors of the zip-on upholstery and sleepcovers, earned the chair the nickname "Mickey Mouse"*. Beyond the ingenious transformability Kita creates a particular language for this brightly upholstered, legless chair allowing a connection between a Post-Modern piece of furniture and Pop aesthetics and icons like Disney's cartoon.

In addition to creating a Pop language, the seat design in designing introduced elements present in mass and in early industrial design: a tall, narrow back to support the shoulders and lower back, a curved shape to support the feet, and a curved shape to support the feet. The headrest parts also resemble ears, and this together with the various Pop colors of the zip-on upholstery and sleepcovers, earned the chair the nickname "Mickey Mouse"*. Beyond the ingenious transformability Kita creates a particular language for this brightly upholstered, legless chair allowing a connection between a Post-Modern piece of furniture and Pop aesthetics and icons like Disney's cartoon.



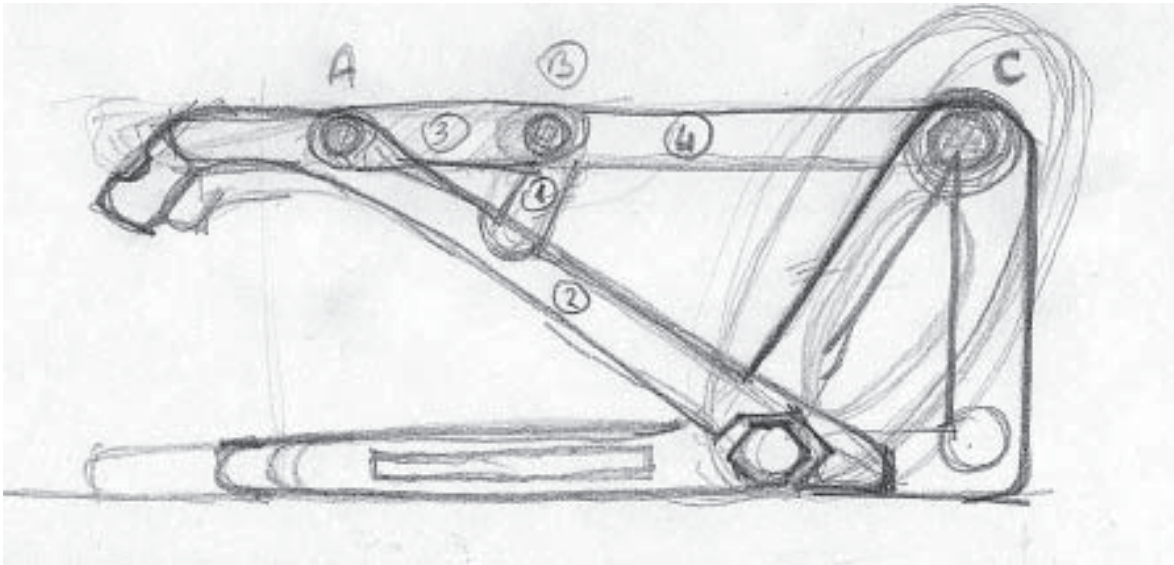
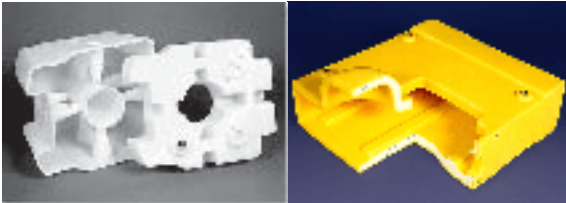
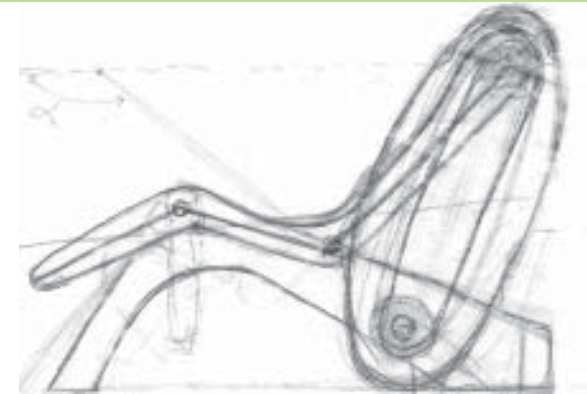
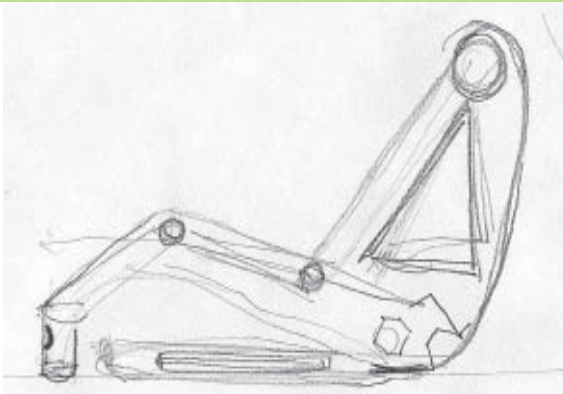
To evaluate what a transformable structure implies, a simple inexpensive mechanical system of intuitive use is simulated on a two-dimensional study model. A fixed main pivot and two other moving pivots, plus a locking point (pins on the model) allow the user to change the PET from table to chair position in three steps: first unlock the leg and the seat, second let the seat go down and rotate the backrest piece around the main pivot, and third let the seat rest upon the base and the leg on the floor. To bring back from chair to table position: pull up the leg piece, rotate it and lock the leg piece on the locking point and the seat to the leg piece.

Consisting of only pivots this mechanical system is of simple assembly. In addition, beyond the mechanism in itself, like in Kita's Postmodernist Wink armchair, there is a concern for a design language for the PET where the mechanics contribute to the playing structure image.

Plastic, ensures an aesthetic familiarity of bright colors and warmth in addition to meeting durability and low maintenance criteria. It is relatively soft yet rarely broken and it never absorbs liquids. It allows repeated cleanings (such as every time a patient leaves the room) and extra protection against microbes is possible by incorporating chemicals during the manufacturing process. Regarding the manufacturing process, rotational molding offers design advantages. As far as they are hollow, large pieces can be molded as one part eliminating expensive fabrication costs. They have a consistent wall thickness and strong outside corners that are virtually stress free and if additional strength

- Dental chair, Technical data diagram.
- Wink armchair, designed by T. Kita, 1980 steel, foam, ABS plastic, cotton fabric. * [The position of the chair seat can be adjusted by a knob at the base, like the seat in a car. The footrest when unfolded turn the chair into a chaise longue. The two-part headrest can be bent back for reclining or forward to a "winking" position for more upright support. The headrest parts also resemble ears, and this together with the various Pop colors of the zip-on upholstery and sleepcovers, earned the chair the nickname "Mickey Mouse"*. Beyond the ingenious transformability Kita creates a particular language for this brightly upholstered, legless chair allowing a connection between a Post-Modern piece of furniture and Pop aesthetics and icons like Disney's cartoon.
- Chaise Longue, Technical drawings: an interpretation in bended wood by Thonet 1933. (below) Scheme by Le Corbusier, Perriand, 1928: main three positions of the chair: to sit down, to rest, and to relax.
- The Zero gravity contemporary recliner

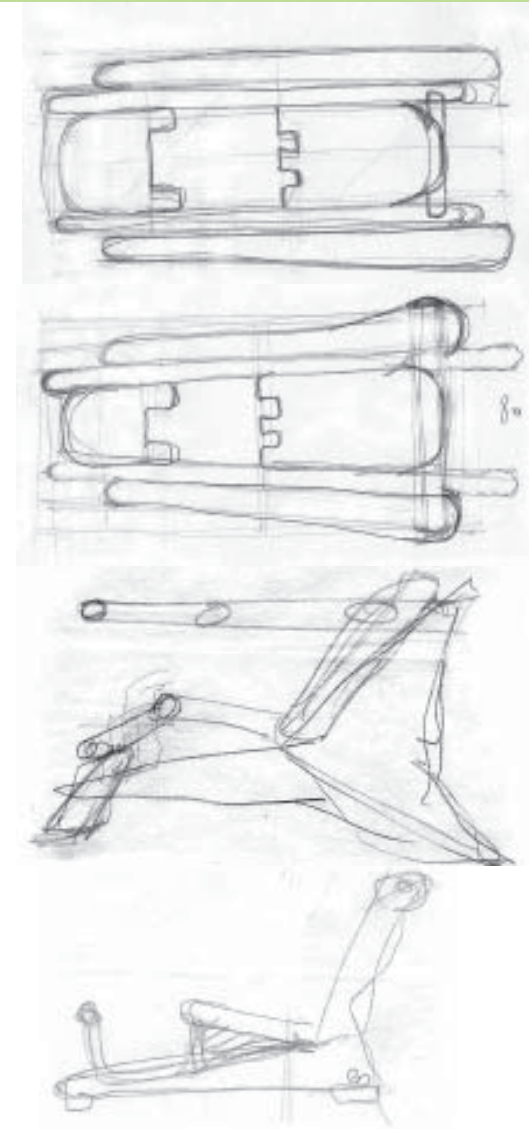
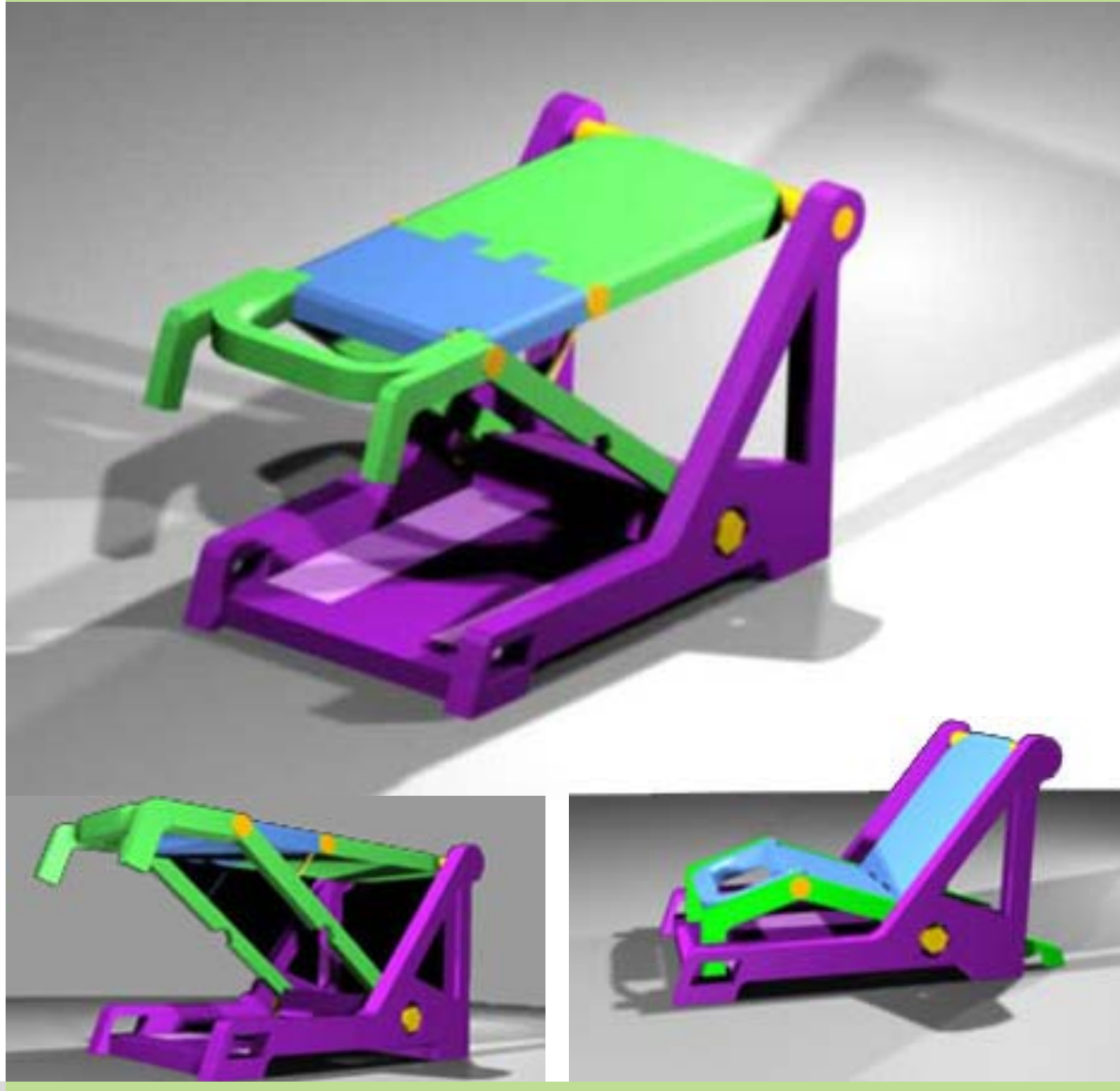
is required, reinforcing ribs can be designed into the part. In comparison to injection and blow molding, rotational molding can easily produce large and small parts in a cost-effective manner. Cooling is less expensive because there is no internal core to manufacture, so minor changes can be easily made to an existing mold. And because parts are formed with heat and rotation, rather than pressure, molds don't need to be engineered to withstand the high pressure.



Rotomolded parts:
Little Tikes's Hide & Slide Climber (Playing structure Lt-4837-1, 2001 Oppenheim Best Toys Book finalist)

* Anne Hoy. *Design for living Catalogue*. Flammarion Paris, 2000

**Curators of Vitra Design Museum. *Kid Size the material world of childhood*. Vitra Design Museum Skira editore. Milan, 1997



First model approach

Design criteria matrix

	PET characteristics	how they keep children in mind?	how they answer to functionality?	how they reduce the cost?	how they contribute to innovation?
form	<ul style="list-style-type: none"> • has an intuitive shape • is colorful • is not representative • is freestanding • has rounded edges • has no storage compartments 	<ul style="list-style-type: none"> • looks familiar • is aesthetically adequate for toddlers and teenagers • is a spatial reference • considers children's safety • holds no medical supplies at children's reach 	<ul style="list-style-type: none"> • is intuitively used • is modular • can be in a central position to allow going around and to help zoning the exam room 	<ul style="list-style-type: none"> • eliminates non-essential features like drawers 	<p>existing pediatric exam tables</p> <ul style="list-style-type: none"> • are figurative with animals, vehicles, crayons etc. • can be inscribe in a prism
mechanics	<ul style="list-style-type: none"> • adopts two positions 	<ul style="list-style-type: none"> • has a simple mechanism and no breakable controls • reminds a playing structure 	<ul style="list-style-type: none"> • requires no electric power • needs no technical service • is easily assembled 	<ul style="list-style-type: none"> • uses very low technology • uses only pivots • may be packed unassembled 	<ul style="list-style-type: none"> • only the powered exam tables change from table to chair
material	<ul style="list-style-type: none"> • is made out of plastic 	<ul style="list-style-type: none"> • has a familiar warmth and a familiar texture • allows bright colors • is unbreakable 	<ul style="list-style-type: none"> • is durable • is easy to clean • needs no maintenance 	<ul style="list-style-type: none"> • allows a low cost manufacturing process • Is light in weight 	<ul style="list-style-type: none"> • although plastic is a widely used material in healthcare no exam table is entirely made of plastic
human factors	<ul style="list-style-type: none"> • is for pediatric use • is an exam table and • an exam chair 	<ul style="list-style-type: none"> • contemplates a wide range of ages from infants to teenagers • responds to the fact that, most of the time, older patients are sitting down during the exam and while waiting. • allows infants or toddlers to be examined on their mother's lap 	<ul style="list-style-type: none"> • considers children's ergonomics • adjusts to the physician's physical needs 		<ul style="list-style-type: none"> • adresses the children's emotional needs • considers the fact that the patient's parents are possible users

Study sketches

