

# Product Design & Development

## Industrial Design

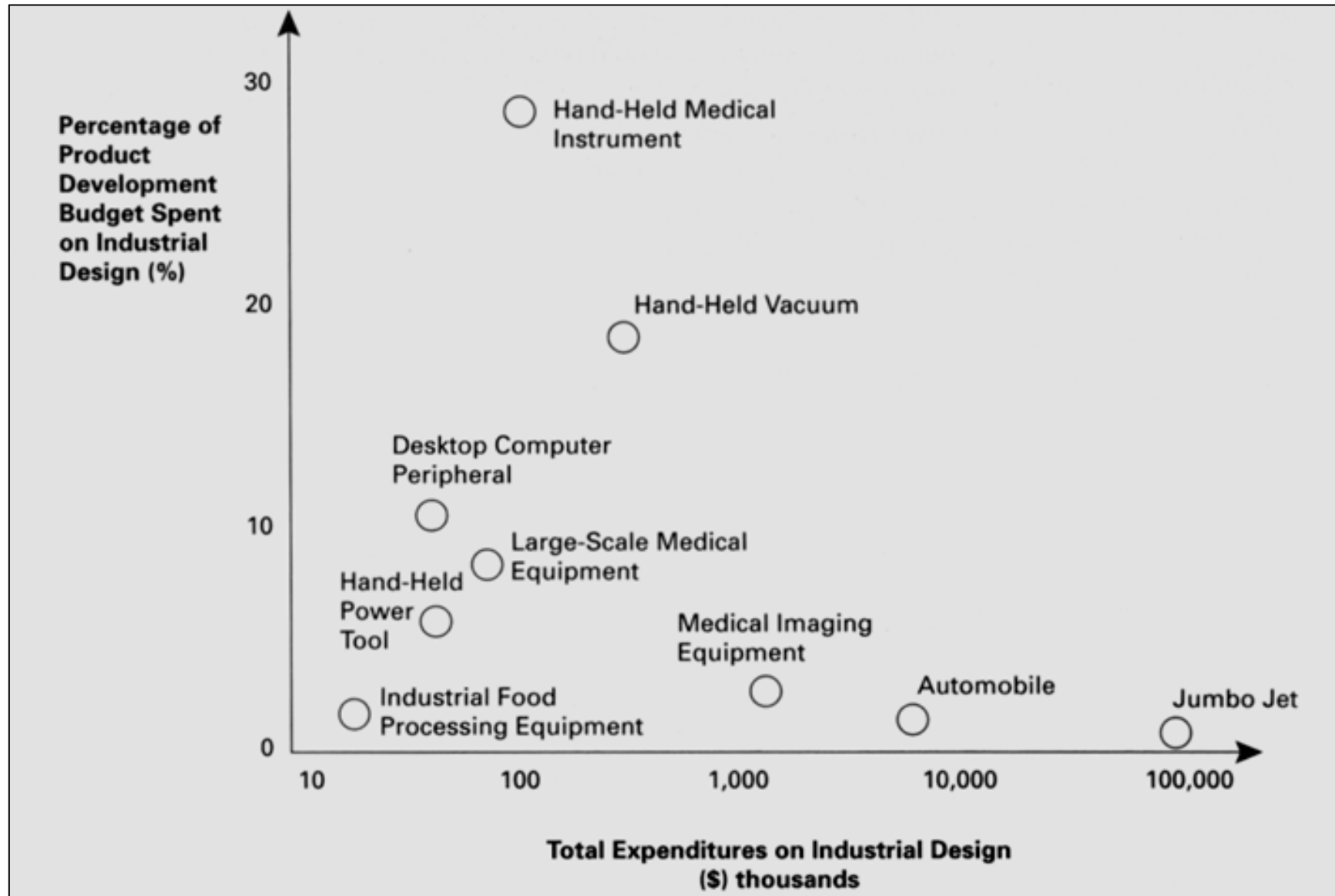
# What is Industrial Design?

- According to the Industrial Designers Society of America:
  - “(...) the professional service of creating and developing concepts and specifications that optimize the function, value, and appearance of products and systems for the mutual benefit of both user and manufacturer.”

# 5 critical goals of ID

- Utility
- Appearance
- Ease of maintenance
- Low costs
- Communication

# Assessing the need of ID

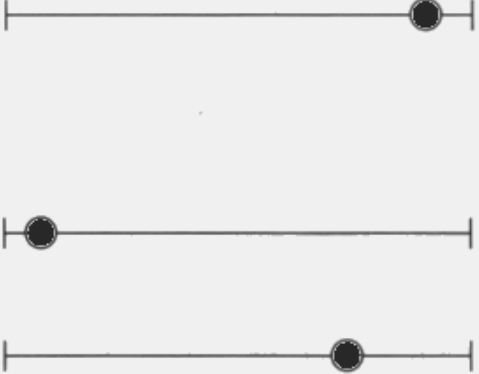
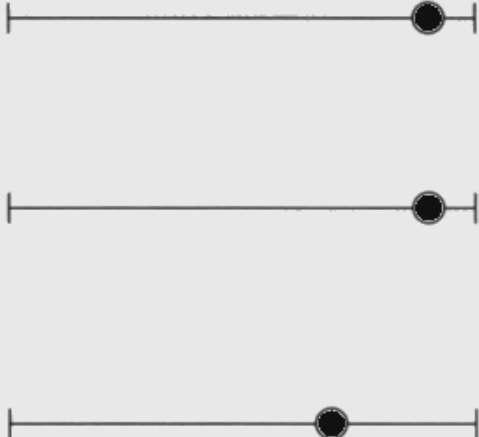


# How important is ID to a product?

- Ergonomic needs
  - How important is ease of use?
  - How important is ease of maintenance?
  - How many user interactions are required?
  - How novel are the user interaction needs?
  - What are the safety issues?

# How important is ID to a product?

- Aesthetic needs
  - Is visual differentiation required?
  - How important are pride of ownership, image and fashion?
  - Will an aesthetic product motivate the team?

Needs	Level of Importance	Explanation of Rating
<p><b>Ergonomics</b></p> <p>Ease of use</p> <p>Ease of maintenance</p> <p>Quantity of user interactions</p>	<p>Low                      Medium                      High</p> 	<p>Critical for a portable telephone since it may be used frequently, may be needed in emergency situations, and can be operated by motorists while driving. The product's function must be communicated through its design.</p> <p>As with many integrated electronics products there is very little maintenance required.</p> <p>There are many important user interactions such as: changing the battery, dialing, programming the features, sending and receiving calls.</p>
<p><b>Aesthetics</b></p> <p>Product differentiation</p> <p>Pride of ownership, fashion, or image</p> <p>Team motivation</p>		<p>There were hundreds of models of cellular phones on the market when the StarTAC was introduced. Its appearance (including its size and shape) was essential for differentiation.</p> <p>The StarTAC was intended to be a highly visible product used by people for business and personal communication in public areas. It had to be physically attractive for everyday use.</p> <p>The StarTAC's novel form turned out to be an important inspiration to the development team and selling point for senior management.</p>

# The impact of ID

- Is ID worth the investment?
  - Direct cost
  - Manufacturing cost
  - Time cost
- How does ID establish a corporate identity?
  - Apple Computer, Inc.
  - Rolex Watch Co.
  - Braun AG
  - Bang & Olufsen
  - Motorola, Inc.

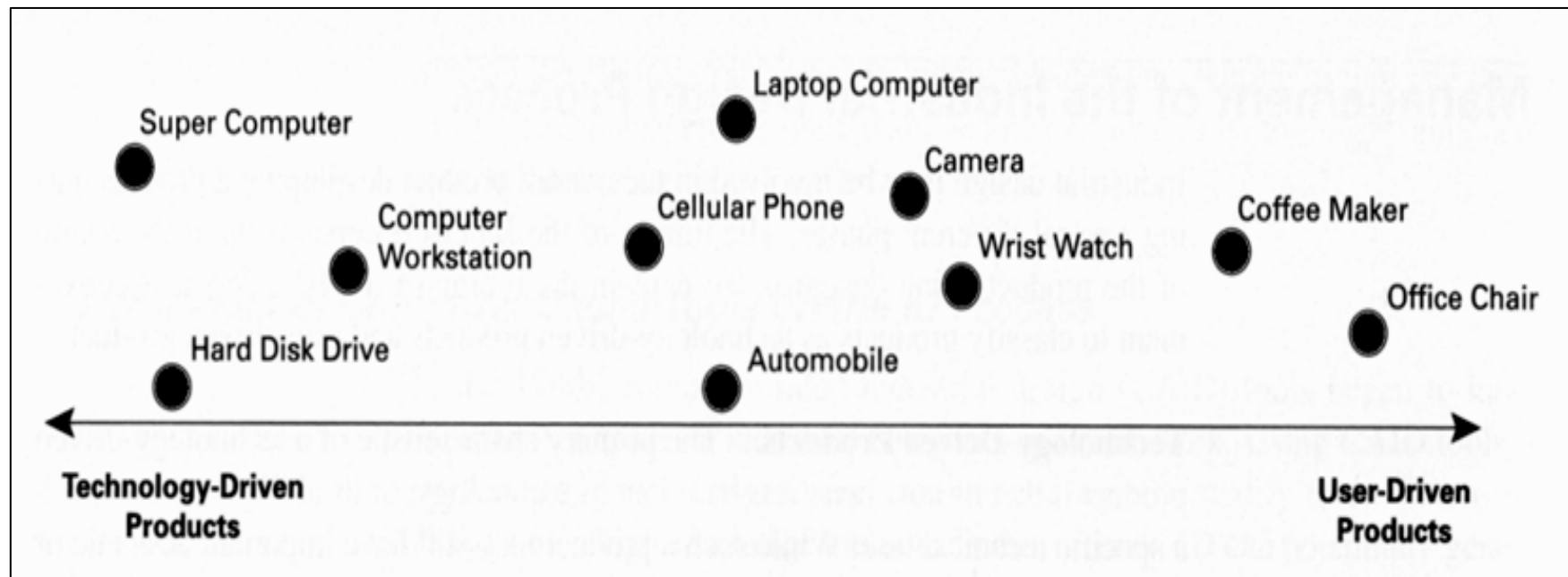


# The ID process

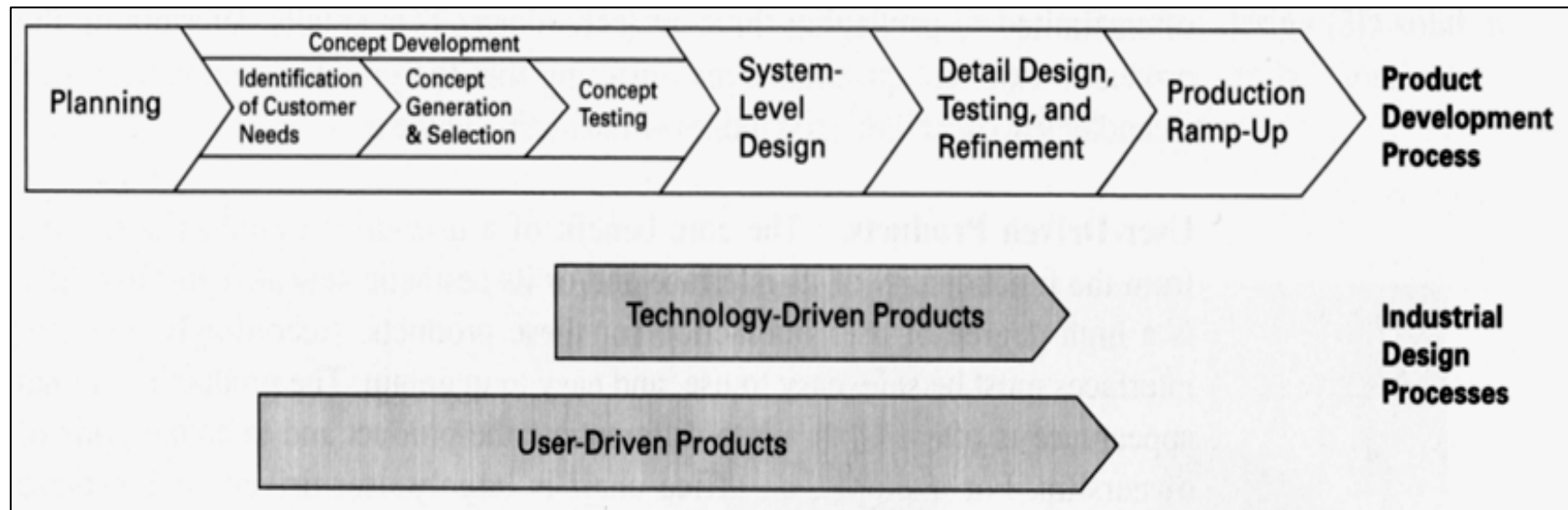
1. Investigation of customer needs
2. Conceptualization
3. Preliminary refinement
4. Further refinement and final concept selection
5. Control drawings
6. Coordination with engineering, manufacturing and vendors

# Management of ID process

- Technology-driven products
- User-driven products








# Management of ID process (cont)



Product Development Activity	Type of Product	
	Technology-Driven	User-Driven
<b>Identification of Customer Needs</b>	ID typically has no involvement	ID works closely with marketing to identify customer needs. Industrial designers participate in focus groups or one-on-one customer interviews
<b>Concept Generation and Selection</b>	ID works with marketing and engineering to assure that human factors and user-interface issues are addressed. Safety and maintenance issues are often of primary importance	ID generates multiple concepts according to the industrial design process flow described earlier
<b>Concept Testing</b>	ID helps engineering to create prototypes, which are shown to customers for feedback	ID leads in the creation of models to be tested with customers by marketing
<b>System-Level Design</b>	ID has typically little involvement	ID narrows down the concepts and refines the most promising approaches
<b>Detail Design, Testing and Refinement</b>	ID is responsible for packaging the product once most of the engineering details have been addressed. ID receives product specifications and constraints from engineering and marketing	ID selects a final concept, then coordinates with engineering, manufacturing and marketing to finalize the design

# Assessing the quality of ID

- Quality of the user interfaces
- Emotional appeal
- Ability to maintain and repair the product
- Appropriate use of resources
- Product differentiation

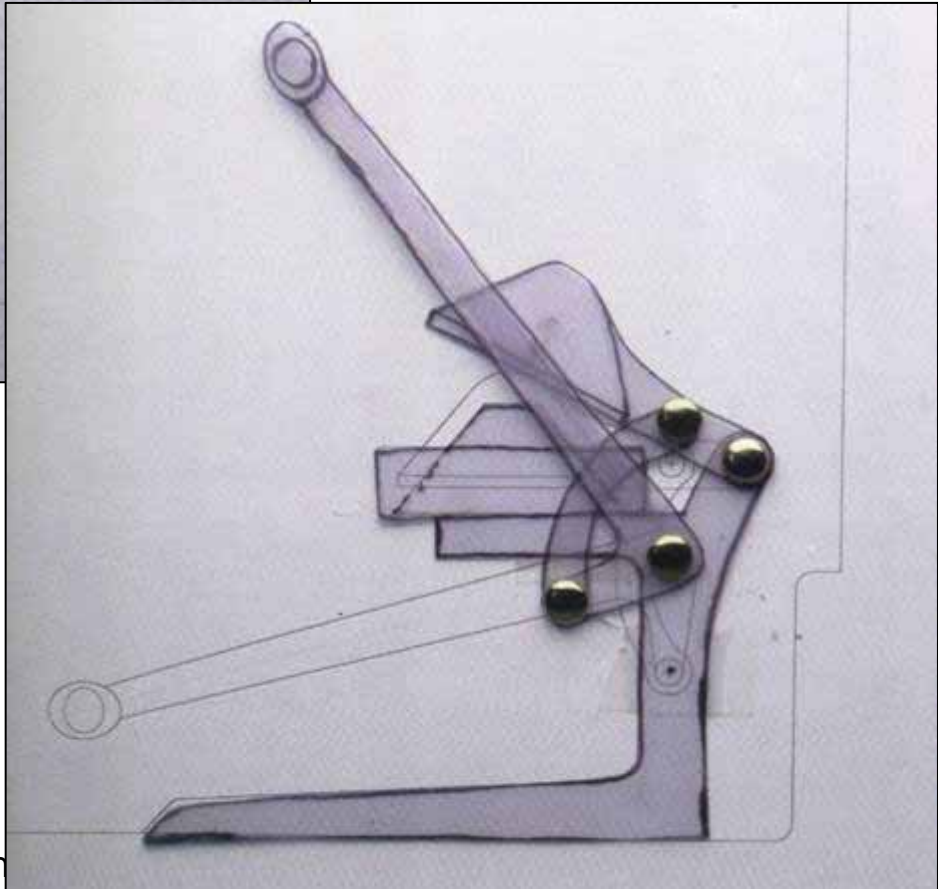
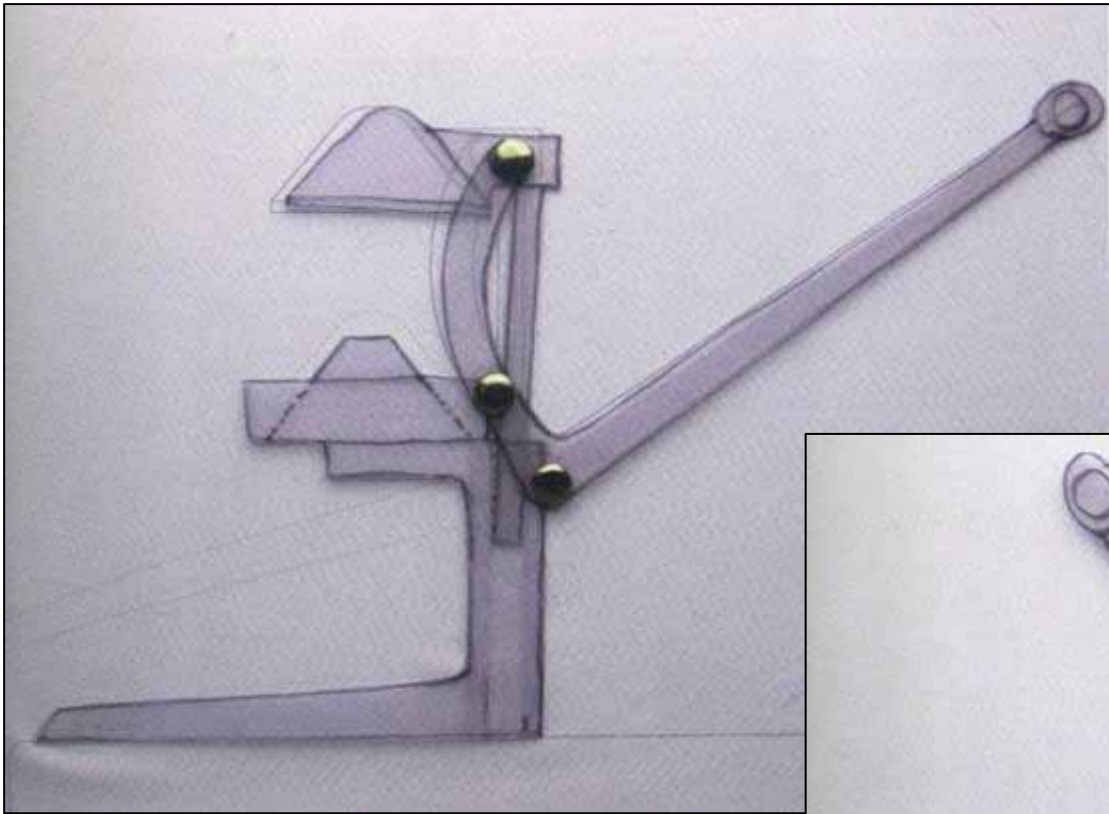
Assessment Category	Level of Importance	Explanation of Rating
1. Quality of the User Interfaces	<p>Low                      Medium                      High</p> 	<p>In general, the StarTAC is both easy to use and comfortable. For example: calls can be answered by simply opening the keypad cover, numbers can be easily dialed into the keypad, and the functions are readily accessible. The StarTAC's drawbacks include that the visual display can be difficult to interpret because it mixes upper- and lower-case alphabetic characters, and that some users inadvertently remove the battery when attempting to open the phone for the first time.</p>
2. Emotional Appeal		<p>The StarTAC has a high emotional appeal which stems from its sleek appearance and tiny size.</p>
3. Ability to Maintain and Repair the Product		<p>Although maintenance and repair are not of primary importance to the customer, the StarTAC rates high in this category. The battery can be removed and replaced easily. Customers can install various batteries depending on their preference for size, weight, and talk time.</p>
4. Appropriate Use of Resources		<p>The final design includes only those features that satisfy real customer needs. Materials were selected to satisfy manufacturing constraints, to withstand extreme environmental conditions, and to meet strict appearance criteria.</p>
5. Product Differentiation		<p>The StarTAC's appearance is clearly unique. It is easily identified when viewed in a public area or next to a competitor's product.</p>

# Example 1: Ojex Citrus Juicer

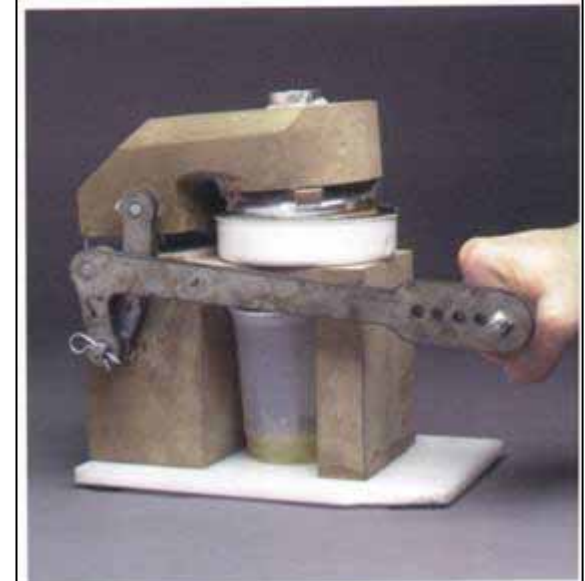
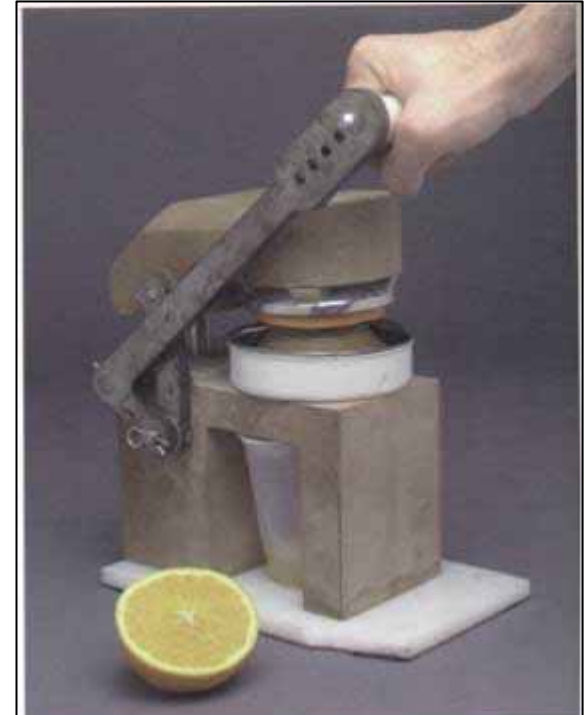
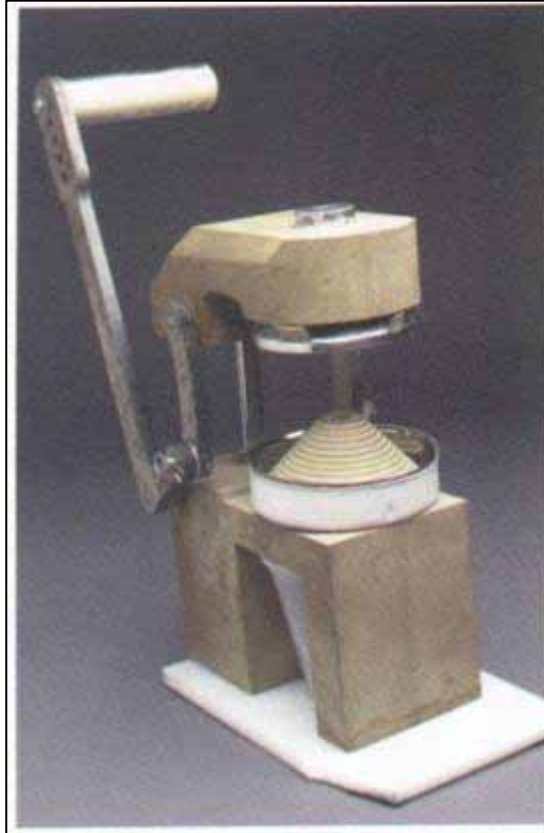
Oranjex, the leading supplier of juicers to the commercial food-service industry in South America, successfully introduced their juicers to the American restaurant and food-service industries in 1998. Recognizing an opportunity to move into the home market as well, they approached Smart Design with an idea: “Make a juicer that works just as well, but for the house”



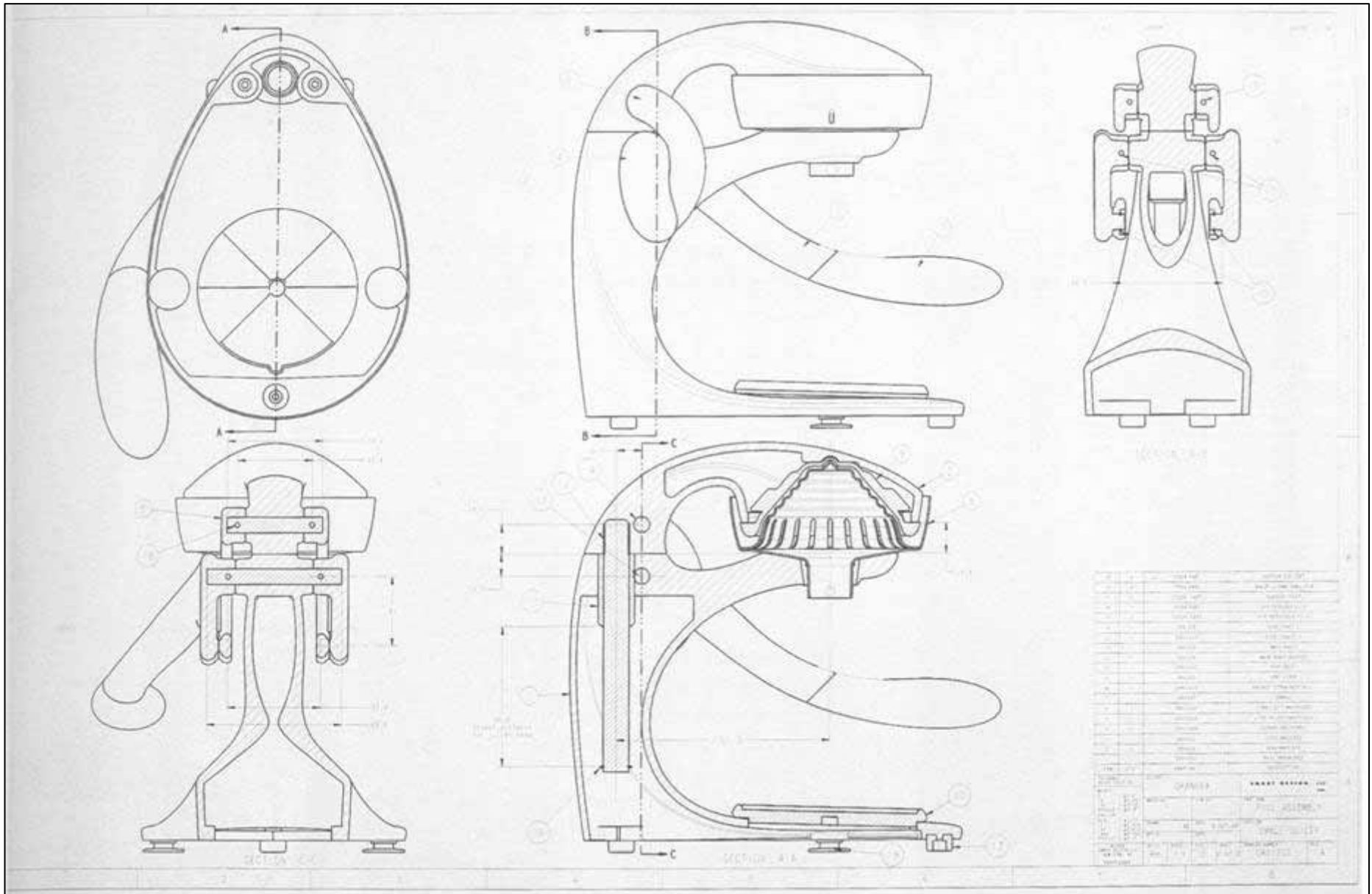




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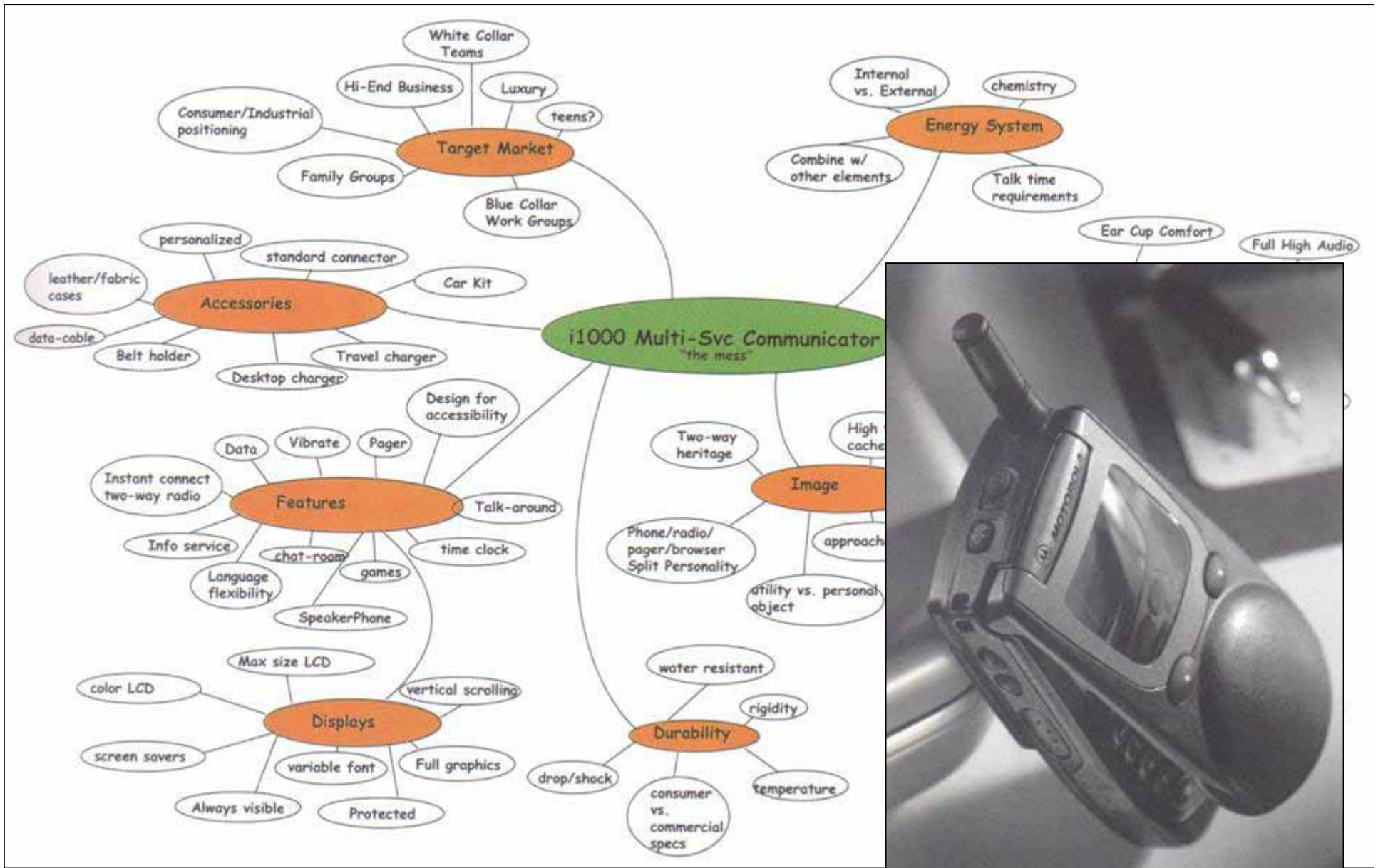


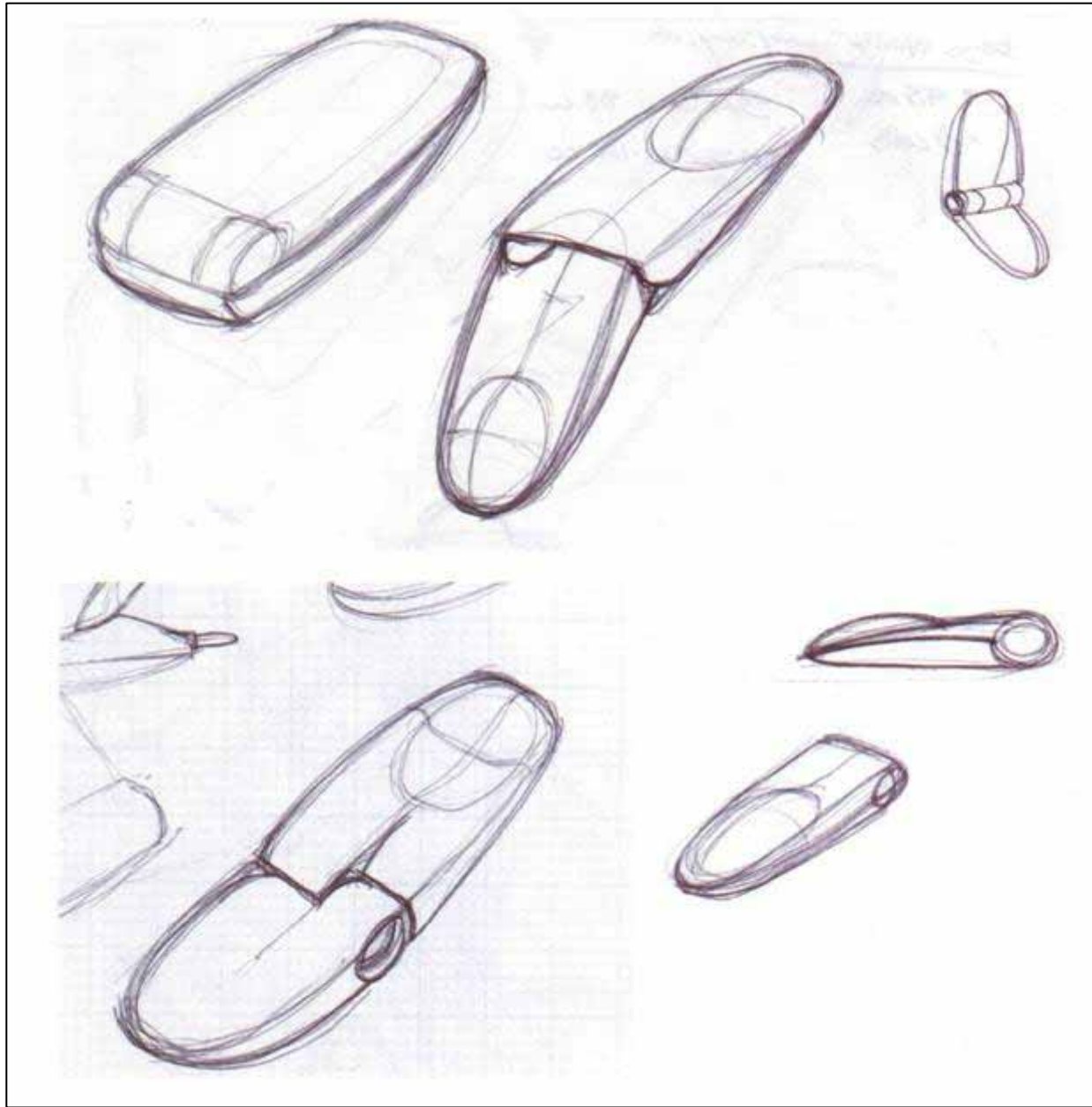
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# Example 2: Motorola i1000

The challenge before the designers at Motorola was to make existing technology accessible to a broad population. Motorola wanted to integrate paging, cellular, two-way radio and data technologies into a product with a less commercial feel than most business communication products.





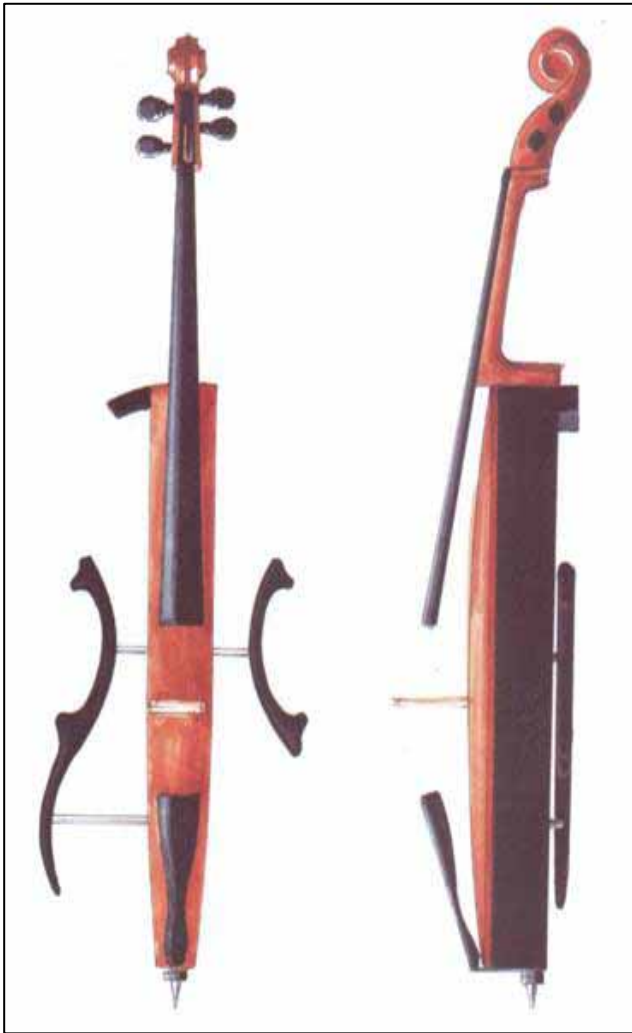


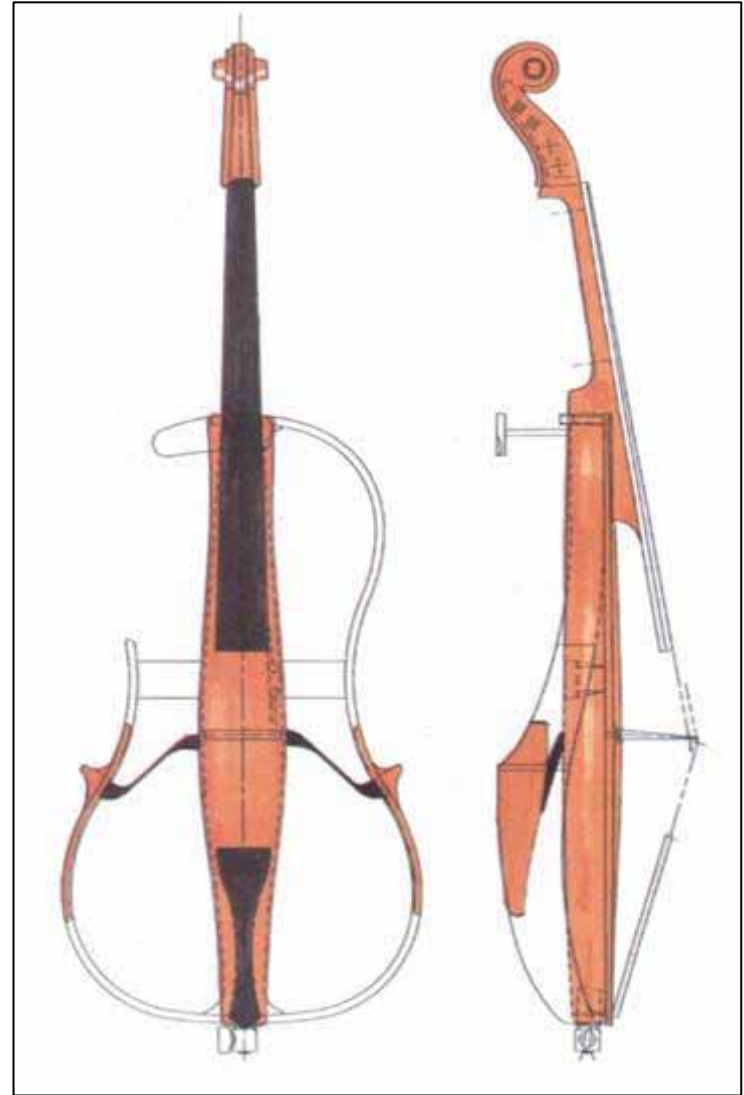
# Example 3: Yamaha SVC 200

Can a cello be given the *silent treatment*?

Surprisingly, most musical instruments can be made silent, or at least very quiet, according to Yamaha Corporation. First, they are made electric; then, added headphones render them virtually silent. At that point, Yamaha can add numerous features that enhance the player's experience and make practice more meaningful and fun, and possible in public places without annoying everybody!





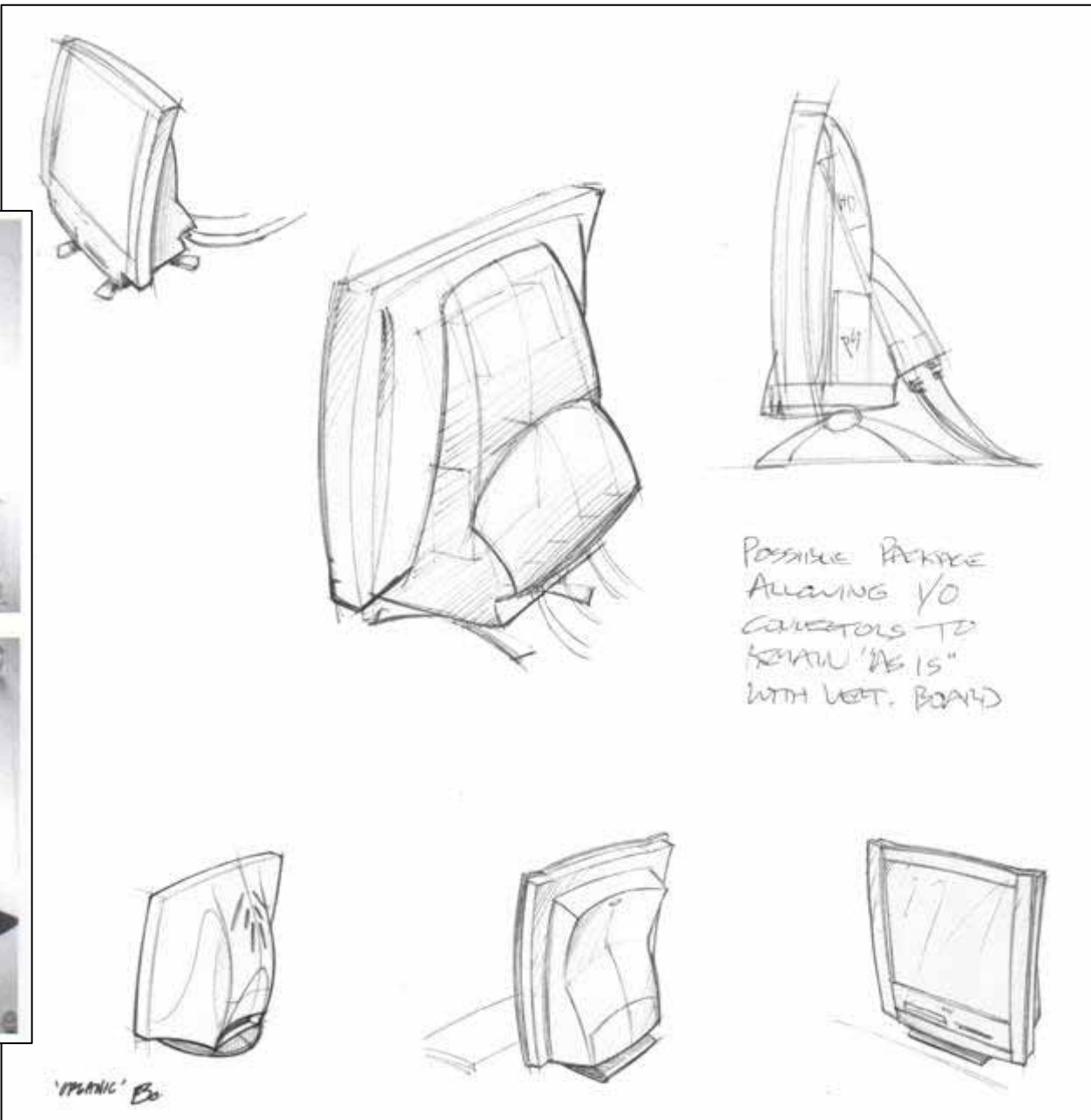
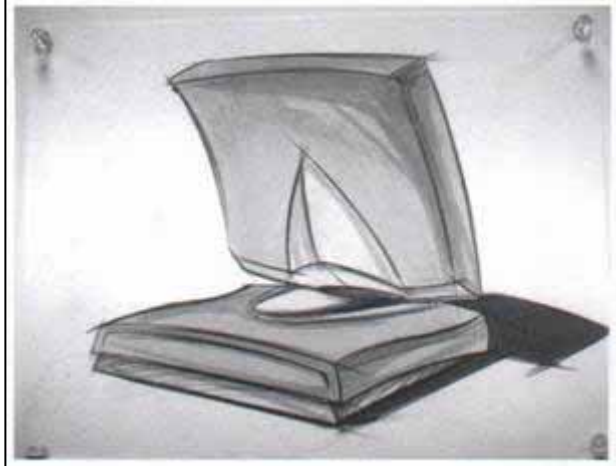
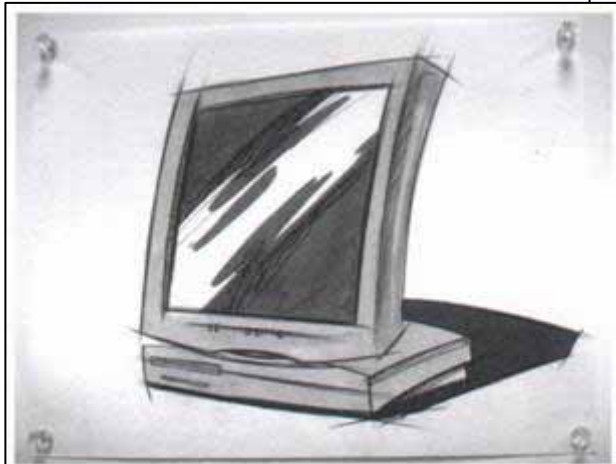


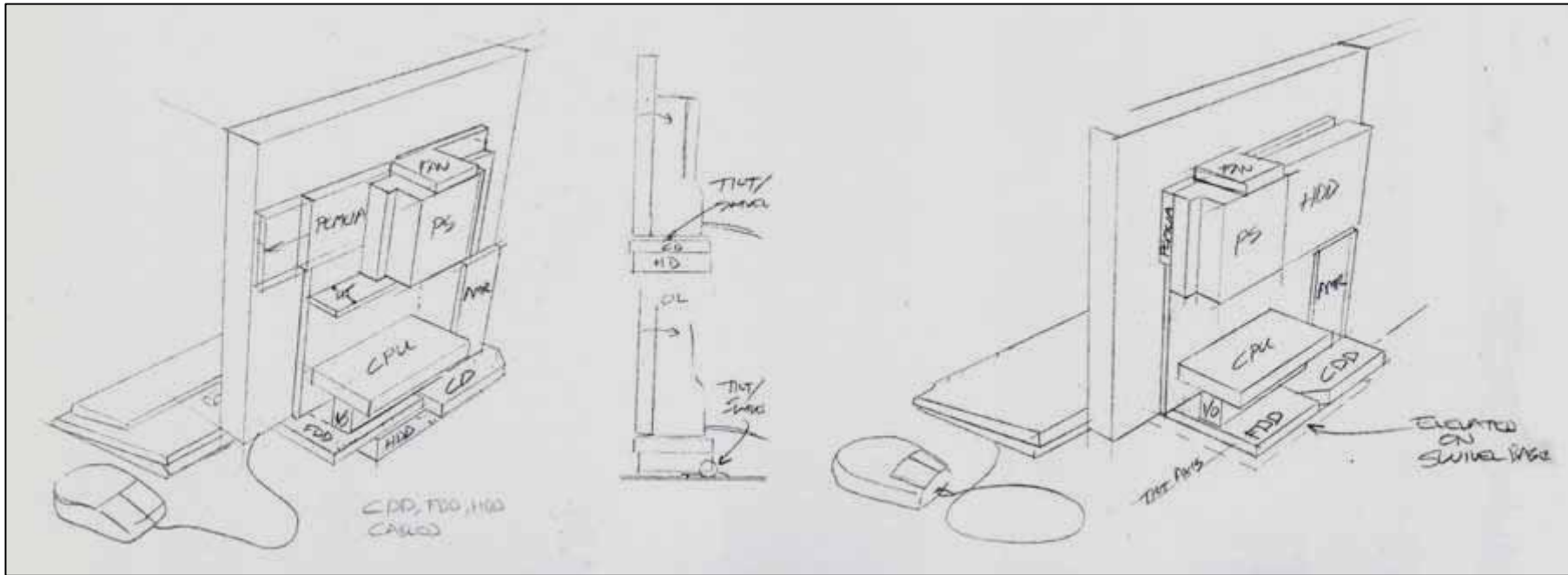


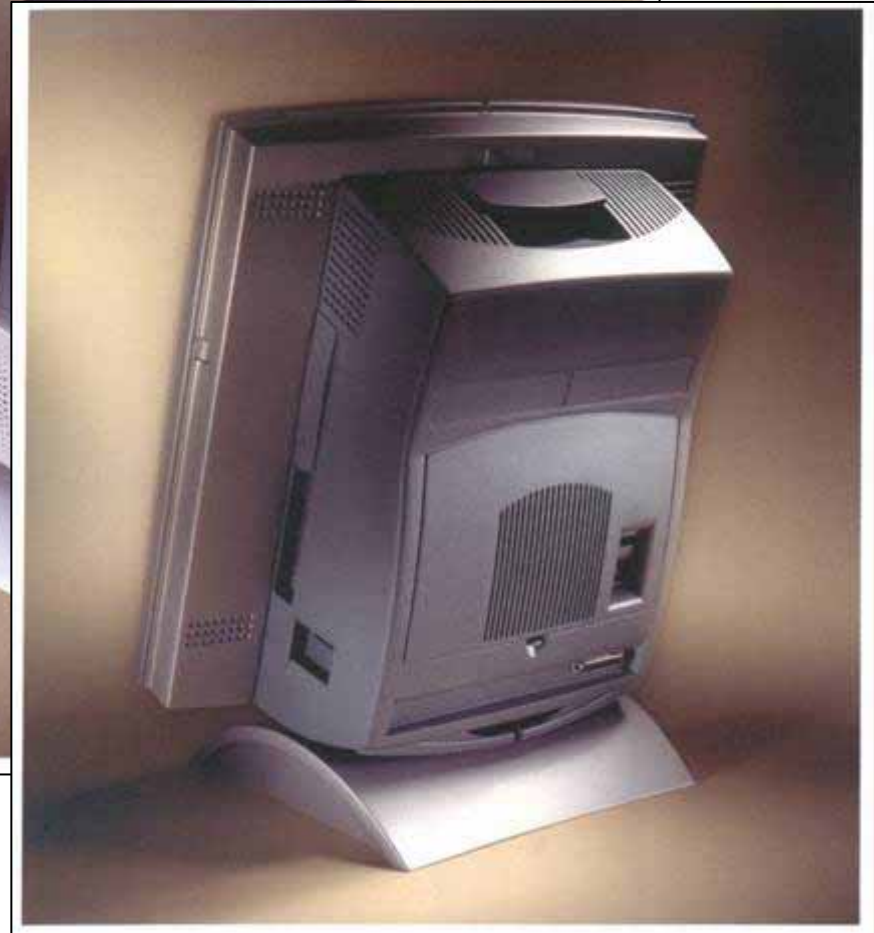
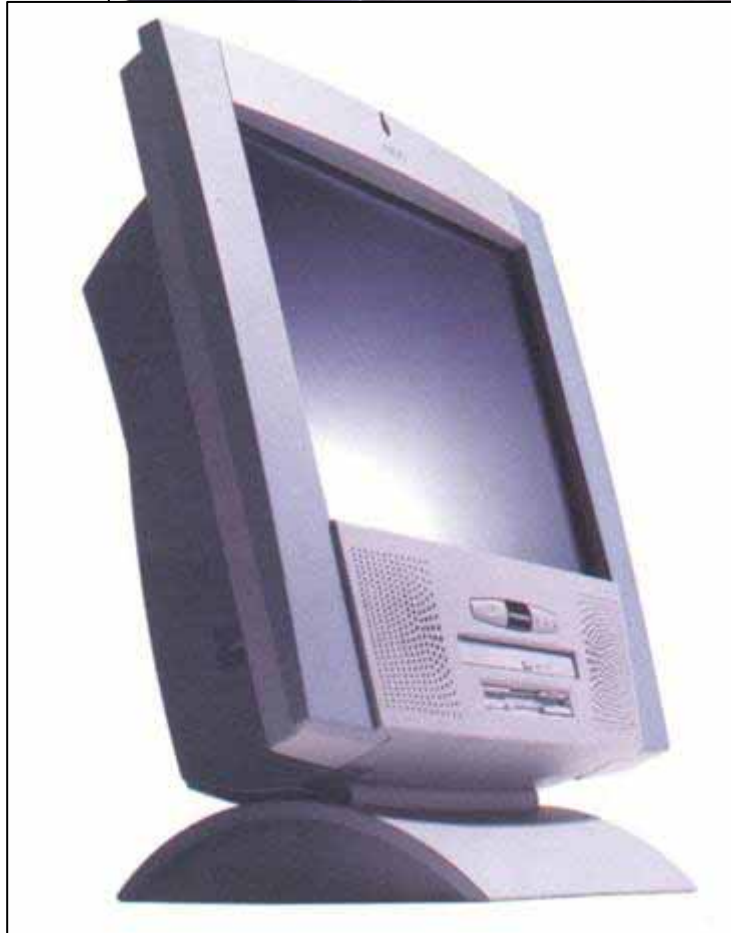
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# Example 4: NEC Z1 PC

Despite the significant advantages a computer can bring to the home, consumers think of a thousand reasons not to have one. They are expensive. They're hard to master. They look clunky. There's no room. You can get a great-looking computer, but it costs a fortune. You can get the price you want, but you have to wrestle with a large machine with multiple components...







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# Example 5: Microsoft Intellimouse

Microsoft had two goals: first, give the mouse a completely new look, and second, have the new LED tracking technology. Designed especially for navigating within a graphical user interface environment, the device has no rubber ball underneath, like a typical mouse. Instead, a scroll wheel on top of the product allows the user to intuitively scroll up, down and sideways on a page.





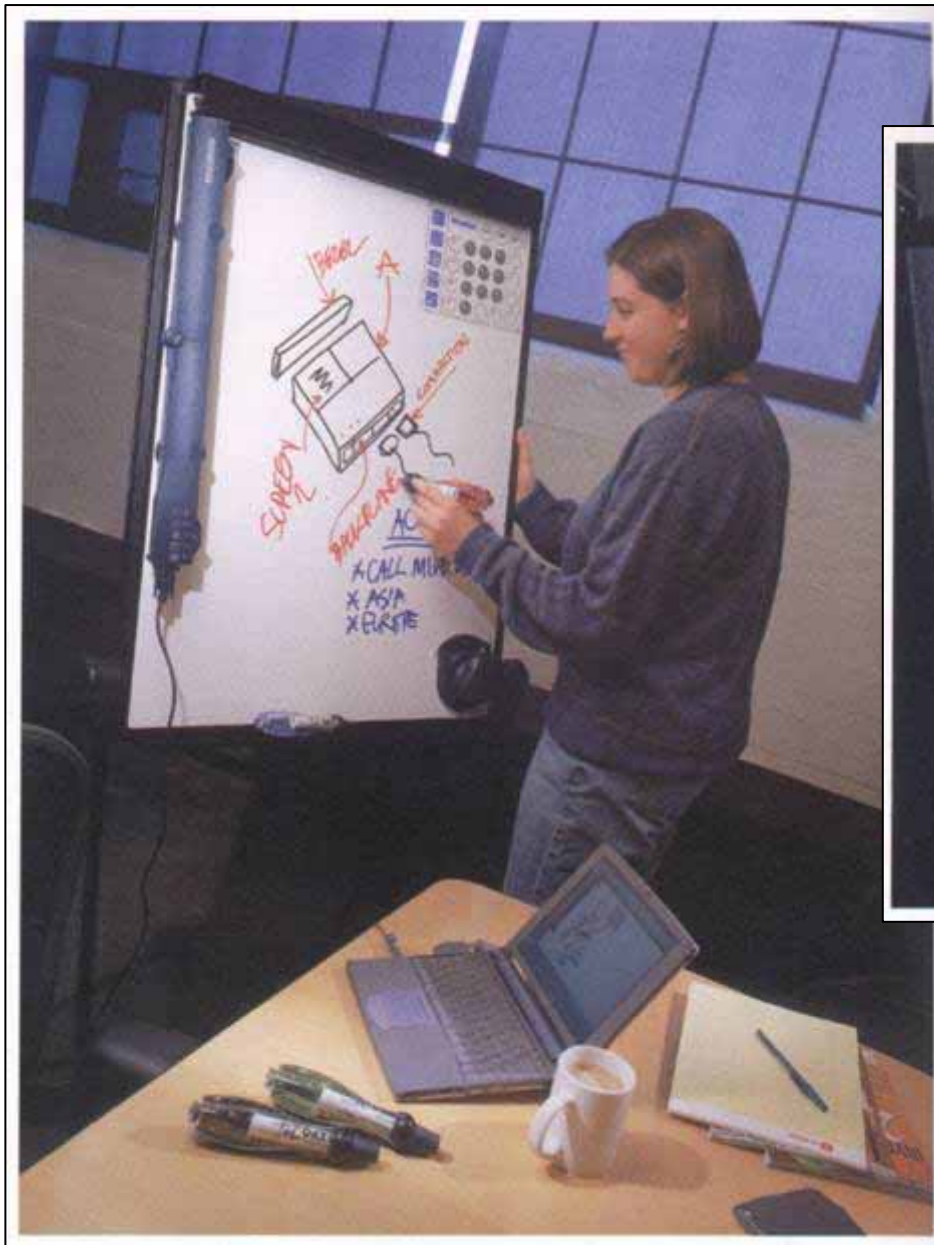


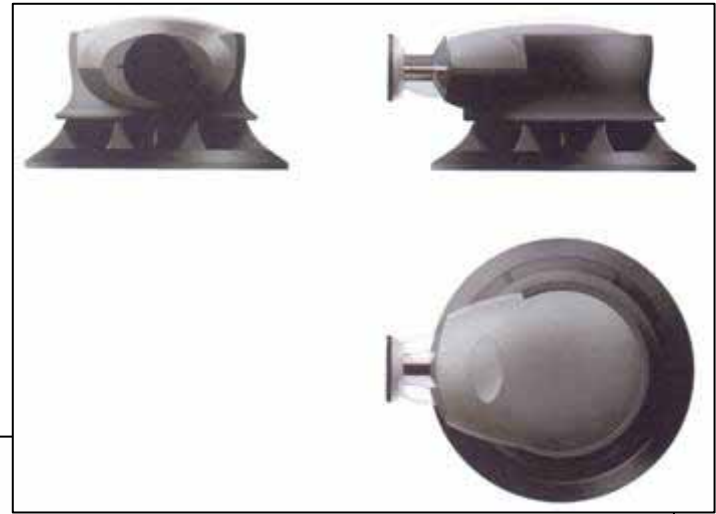


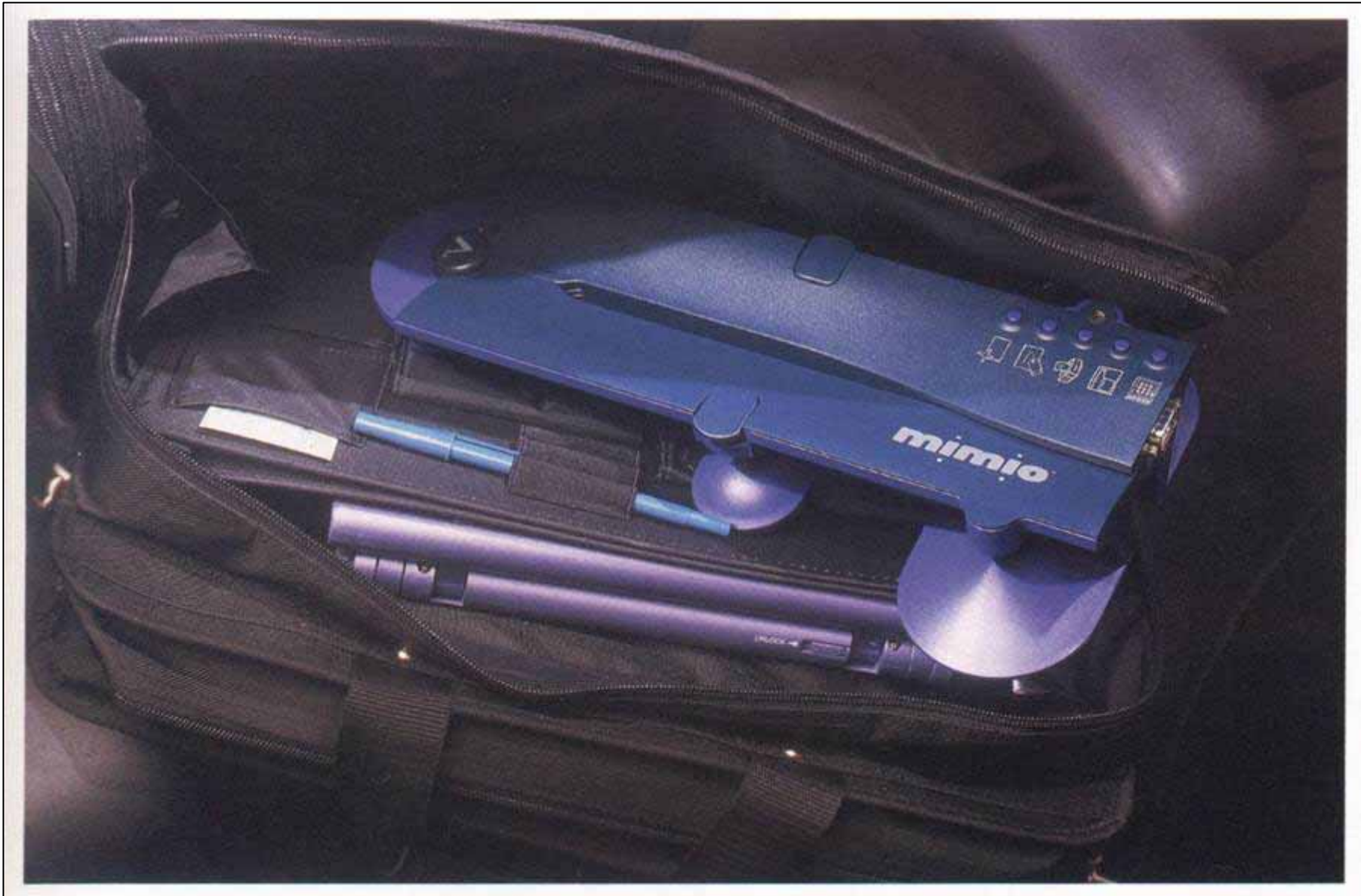
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# Example 6: Virtual Ink mimio

Graduate students of MIT formed Virtual Ink and became the designers of a portable pen-tracking technology that used a combination of infrared and ultrasound transmitters to record handwritten notes on a standard whiteboard.







# Summary

- The primary mission of ID is to design the aspects of a product that relate to the user: aesthetics and ergonomics
- Most products can benefit in some way or another from ID.
- When the success of a product relies more on technology, ID can be integrated into development process later.