

Form and Function: The Right Equation

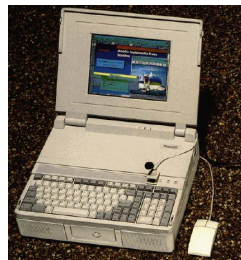
Since the introduction of Toshiba's first notebook model, the T1100, consumer preferences have greatly impacted notebook form factors. In 1987, Toshiba launched two versions of the same notebook model: one featuring two diskettes instead of a hard-drive disk, weighing 4.8 kg, and another version featuring the first built-in notebook HDD, weighing 5.2 kg. Users preferred more storage and, as a result, the next model — the T3200 — which featured a 40 MB HDD, weighed in at 8.5 kg, more than double the 4.1 kg of the T1100.

This significant jump was an early indicator of a trend that would continue up until this very day — a delicate balance providing users with increasing processing power and a lightweight package suited to the user's needs. This article will take a look at how Toshiba has responded to user's desires for mobility, smaller sizes and lighter weights over the past 20 years while continuously ensuring high performance and support for innovative features.



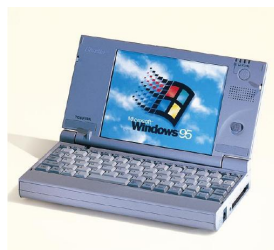
Trends Over the Years

In 1993, Toshiba introduced the T3400C model, weighing 1.8 kg, the ultimate in portability, at the time. In the same year, the larger and heavier T6600C, weighing 7.8 kg, represented a pioneer model in the new generation of multimedia notebooks for those users who preferred extended functionality.



Mobile computing was continuing to develop at a rapid pace. Smaller-sized notebooks represented greater gains in mobility while the larger notebooks ensured better performance and greater HDD storage capacities. Trading mobility for performance was the trend of the day.

Then, in 1997, Toshiba broke away from the old paradigm by launching its smallest notebook, the Libretto 50CT. Weighing only 0.85 kg and with dimensions of 34x115x210 mm, the model was closer in size to a handheld computer than the standard A4, 2.5 kg, notebook.



YEAR	"Lightweight" systems throughout the years
1985	<p>T1100</p> <ul style="list-style-type: none"> • 4.1kg; 73x305x307 mm; • external drive only; 256 KB Memory; • Processor: 16-bit, Intel Corp. 80C88 processor
1993	<p>T3400C</p> <ul style="list-style-type: none"> • 1.8 kg; 42x251x201 mm; • HDD: 120MB; 4-20 MB Memory; • Processor: Enhanced Intel 486SX, 33 MHz
1997	<p>Libretto 50CT</p> <ul style="list-style-type: none"> • 0.85 kg; 34x115x210 mm; • HDD: 770 MB; 64 MB Memory; • Processor: Intel Pentium 75 MHz/50 MHz (smallest Toshiba notebook ever released)
2005	<p>Portégé R200</p> <ul style="list-style-type: none"> • 1.29 kg; 286 x 229 x 9.9 (front) / 19.8 (back) mm; • HDD: 60GB; 256-1,280 MB Memory; • Processor: Intel Pentium M 1.20 GHz
2005	<p>Libretto U100</p> <ul style="list-style-type: none"> • 0.98 kg ; 210 x 165 x 29.8 (front) / 33.4 (back) mm; • HDD: 60GB; 512-1,024 MB Memory; • Processor: Intel Pentium M 1.10 GHz

The key differentiator from a handheld computer was the Libretto's processing power — with the Intel Pentium chip, 75 MHz, 770 MB hard-drive, 64 MB of memory and running on Windows 95, the notebook was a true desktop replacement.

Since then, the trade-off of mobility over performance is no longer the case. High-performance lightweight notebooks, like the Libretto U100, signal a shift towards niche building, targeted notebook form and function for a specific type of user, including:

- **Ultraportable** – Lightweight and thin, ideal for frequent, on-the-go, business travelers
- **Desktop replacement** – High-performance yet mobile
- **AV Notebook PC** – Entertainment center, portable within and outside of the home
- **Value notebook** – Mid-weight, ideal for students, transporting from home, school, or the library

Lightening the load – Innovative Technologies

Toshiba's ability to continuously introduce innovative and smaller models featuring advanced processing power and additional capabilities, has been a direct consequence of parallel developments in interconnected technological factors.

- **Silicon technology** Advances in silicon research and development have been the reigning factors in the production of smaller notebook models. Toshiba's notebooks have tremendously benefited from integrating Intel technology: Intel has developed strained silicon, which is a technique for creating faster, smaller transistors.
- **Lighter materials** — The emergence of lighter casing materials, such as magnesium alloy, that provide rugged support, has enabled the development of lighter models while ensuring data and hardware protection.

At 0.98 kg, the **Libretto U100** is truly deserving of being named after its first predecessor: the Libretto 50 CT, released in 1997 and Toshiba's smallest desktop replacement model to date. Measuring 21 by 16.5 cm and approximately 3 cm wide, the Libretto U100 is smaller, lighter and more compact than other Toshiba models. Light enough to be carried with one hand, the notebook nevertheless features a 60GB hard-drive disk, 512 to 1,024 MB of memory as well as the Intel Pentium M processor, which, at 1.10 GHz, delivers the high-quality performance expected from a true desktop replacement computer. Support for five different ways of connecting to the internet, as well as virtual surround sound and 3D audio effects for exceptional audio playback, create all-in-one convenience in an exceptionally small package.



- **New battery technology** — While batteries have undergone type variations including NiCD, NiMH to Lithium-ion and Lithium polymer, they also changed shape from cylindrical to flat. These developments ensured that each new battery type offered more power while weighing less and taking up less space.
- **Smaller HDDs** — The hard-drive disk is something of a paradox: as its size has been decreasing over the past 20 years, the storage capacity has been increasing. User demand for increased storage went hand-in-hand with multimedia support and the HDD had to comply by enabling the greatest performance in the smallest

possible package. Toshiba has had a leading role in HDD development over the years, as a pioneer, by developing 1.8" HDD technology and, later, by halving the size of the standard notebook HDDs to a mere 0.85".

Future Trends

New developments in notebook computing are an indication that the trend of balancing weight and size against greater performance and additional features will continue into years to come, segmenting models to user's needs. Ultra-portables will



maintain their status-quo as the ultimate in mobility whereas advanced multimedia functionalities will find their niche in slightly heavier and more equipped models. For example, Toshiba's Portégé R series comprises notebooks that weigh barely more than 1 kg and are thinner than 2 cm, whereas the Toshiba Satellite series features slightly heavier machines with improved multimedia support. A recent release of a new model in the Libretto series, the Libretto U100, offers users an exceptionally small notebook with impressive features.

With the advent of nanotechnology, decreasing fuel cell size, and other innovative technological developments, even more possibilities will emerge, offering users a much wider variety of sizes and functionalities than ever before. We have entered the era of the 'prosumer' (a technologically savvy consumer) and, ultimately, the user will have the final say about what direction the notebook form factor balancing trend will take.