

National Endowment for the Arts

# Valuing the Art of **Industrial Design**

A Profile of the Sector and Its Importance  
to Manufacturing, Technology, and Innovation



Bonnie Nichols  
NEA Office of Research & Analysis

Front cover photos courtesy of Smithsonian Cooper-Hewitt, National Design Museum, from its permanent collection

A flared white basket in a loose cross-hatched pattern, glazed earthenware, circa 1915.

GRiD Compass laptop computer prototype, designed by Bill Moggridge, 1981.

Cubo chair, designed by Vladimir Kagan, 1976.

Silver Streak iron, model 1038, designed by Corning Glass Works, 1942–46.



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arts.gov

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# Preface

Design is a field with a large and extensive presence in our nation's manufacturing and services industries, as documented by the national datasets that provide the basis for this report. Designers are prolifically inventing new products, processes, and systems that have a profound impact on our economy and civil society.

The National Endowment for the Arts (NEA) Design Program has been tracking numerous trends in the field of design, from the growing movement of design thinking to social impact design. Although this report brings together, for the first time, analytical perspectives regarding federal data on industrial design, it cannot be all-encompassing. This preface has benefited from conversations with some of the nation's leading designers, design curators, and design firms to convey information not captured by the report itself.

## **An Expanding Definition for Industrial Design**

Much of the data in this report are drawn from the U.S. Bureau of Labor Statistics (BLS). The *Occupational Handbook Outlook* from the BLS defines industrial designers as “those individuals that develop the concepts for manufactured products such as cars, home appliances, and toys.” While this dataset enables a quantitative grasp of the industry, BLS' definition is arguably limited in scope. Today's industrial designers find themselves in a variety of roles and functions beyond the development of manufactured products.

Industrial designers are working on projects for a variety of organizations, from government entities to private enterprises. Using a creative lens for approaching complex problems or challenges (often referred to as the design process), designers are engaged by a range of clients to bring a fresh approach to age-old issues. Industrial designers are not just designing commercial products, but designing user experiences, processes, and systems by applying the creative approach of what has been come to be known as “design thinking.” The idea to utilize the design process as a way to analyze and innovate has been widely embraced — from business schools to major consulting practices — and has changed the landscape of how industrial designers work.

For example, an industrial designer might not only design a high-tech medical device for a hospital, but also the patient's interactive experience and touch points with medical staff in the emergency room. Similarly, industrial designers might work with retail merchandisers to reorganize store floor plans and re-imagine the in-store experience for potential customers. Design thinking requires industrial designers to work on diverse teams to solve these more complex challenges. In a typical firm, a team might include an engineer, design strategist, marketer, and anthropologist, as well as software designers and developers, as products become more intelligent and responsive to media inputs.

Historically, industrial design has been a field of invention driven by market demand or clients. Today, there are many examples of designers pursuing clientless endeavors; some have even been on display at the Museum of Modern Art in New York. These artists probably would self-identify as industrial designers; their contributions to developing clientless work as an art form is an acknowledged practice, but one not quantifiable from the datasets explored in this report.

Furthermore, industrial designers are applying their skills to projects that achieve a broader social impact, for populations that cannot afford to hire a designer directly.<sup>1</sup> For example, Design that Matters is a 501(c)(3) nonprofit that “creates new products that allow social enterprises in developing countries to offer improved services and scale more quickly.”<sup>2</sup> Design that Matters works with industrial designers, manufacturers, and other nongovernmental organizations to develop scalable products that serve low-resource communities around the globe. Winner of the 2012 National Design Award for Corporate & Institutional Achievement, Design that Matters is developing product innovations within the nonprofit sector for significant impact. One such innovation is an affordable phototherapy device to treat jaundiced newborns in South Asian and Sub-Saharan Africa.

Postsecondary educational programs are retooling their curricula to reflect these more fluid approaches to industrial design. Bachelor’s and master’s programs in industrial design reflect the interdisciplinary nature of industrial design work. Course curriculums at leading design institutions include anthropology, systems design, and entrepreneurship in addition to the traditional manufacturing and design studio course requirements. Universities are also developing hybrid programs that apply design thinking to business and other fields of practice. Professionals trained in these postsecondary programs might find themselves working for a company where their creative skills are engaged and applied to client-driven work or systems improvement. The cross-disciplinary training and expanded professional role of industrial design thus make it difficult to assess the field conclusively by examining federal datasets alone.

### **Designers as Inventors**

This research report sheds light on the significant role that designers play in invention of new products and services. Creativity often begets innovation and invention. According to data from the U.S. Patent and Trademark Office, approximately 40 percent of inventors named on design patents were also named on utility patents. In contrast, among all inventors named on utility patents, only 2 percent were named on design patents.

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1 In 2012, the National Endowment for the Arts, Smithsonian’s Cooper-Hewitt, National Design Museum, and Lemelson Foundation released a white paper, “Design and Social Impact”: <http://www.nea.gov/pub/Design-and-Social-Impact.pdf>.

2 <http://www.designthatmatters.org>

These data demonstrate that designers are not only crafting new or improved visual ornamental designs for products — they are simultaneously inventing the new and useful products and processes themselves. While this report quantifies the number of design patents obtained annually, it can be challenging to identify the design firm or individual responsible for crafting a new product design. Most often, patents are assigned to the manufacturer or client company that commissions the design work. While industrial designers may be the ones inventing new products, their work is typically client-driven, with the client organization becoming the patent assignee. Nevertheless, there is no doubt that designers play a crucial role in driving the creative process that results in new inventions or ornamental designs.

Designers are also pursuing their creative process and new product designs through entrepreneurial ventures. While most of the data here account for industrial design establishments and industrial designers on payroll, many designers innovate products outside a formal business establishment. In 2011, \$9.2 million was pledged on Kickstarter to support design projects, and 319 successful projects were funded.<sup>3</sup> Since their launch in 2009, 4,424 design projects have been launched on Kickstarter, with a request for \$87.7 million.<sup>4</sup> Browsing the posted projects in the design category reveals that the majority of proposals are for product design. New funding platforms such as Kickstarter have enabled entrepreneurial designers to obtain capital to explore conceptual ideas and realize new inventions.

Ultimately design is a tool to inspire innovation and influence systems change. Industrial designers are creative professionals who are doing just that. While we are unable to capture all the facets of the industrial design field in this research report, we acknowledge the breadth of the field and the ever-expanding role of industrial designers as creative professionals who spark innovation, commercial products, and positive change. The NEA report begins to quantify the role of industrial designers in the U.S. economy, and should provoke a more sustained and comprehensive inquiry about the importance of industrial design as a field.

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3 <http://www.kickstarter.com/blog/2011-the-stats>

4 <http://www.kickstarter.com/help/stats> (Data retrieved June 25, 2013)



# Introduction

For nearly four decades, the National Endowment for the Arts has used federally collected data to portray the demographic and financial characteristics of artists as workers. Designers have always been a vital segment of that population, accounting for nearly 40 percent (about 830,000) of all artists, the largest share for any single artist occupation. The category is broad, and it includes fashion, floral, graphic, interior, and set designers as well as merchandise displayers. It also includes commercial and industrial designers, the subject of this report.

The NEA has not previously attempted to provide in-depth information about the subgroups of occupations that make up the design field. But the availability of such data from the U.S. Bureau of Labor Statistics — specifically through a collaboration with state workforce agencies — makes a detailed rendering possible. When it comes to understanding designers in the context of the industries that employ them, moreover, another federal statistical agency can be consulted: the U.S. Census Bureau.

By using a combination of occupational and industry statistics, this report enumerates industrial designers as workers, the sectors that hire them, the earnings of industrial designers and firms, and the states and metropolitan areas where industrial design workers and industries are most prevalent.

Why do we seek a baseline understanding of industrial design as a field? Part of the answer lies in the reward of creating new knowledge. As much research demonstrates, artists as a whole show great fluidity when it comes to standard categories of employment. They typically rely upon multiple jobs, a combination of part-time and full-time work, and they move with ease across the for-profit and nonprofit sectors. Their portfolio careers, while rich and diverse, can prove difficult to track consistently for a clear picture of artists' contributions to the U.S. economy.

With industrial design, as perhaps with design more generally, a further challenge besets cultural researchers. Industrial design is the handmaiden to a wide range of commercial industries. To appreciate the full impact of industrial design workers and their businesses, it is not enough to view this cohort in isolation. One must trace the relationship of design to product manufacturing and to architectural and engineering firms and a host of other service industries. This exercise is especially worthy at a time when a growing segment of the American public wants to know exactly where the arts can be found in manufacturing, technology, and product innovation.

As for innovation, this report uses a third federal data source — the U.S. Patent and Trademark Office — to represent designers as inventors. The report thus addresses a specific “node” on the system map that accompanies the NEA's five-year research agenda, set forth in the publication *How Art Works* (2011).<sup>5</sup> That research topic is titled “Societal Capacities to Innovate and to Express Ideas.” The present analysis of the industrial design field allows us better to quantify this elusive component of the U.S. arts ecosystem.

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National Endowment for the Arts

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5 <http://www.nea.gov/research/How-Art-Works/>

# Executive Summary

## Section One: Industrial Design as an Occupation

*Industrial designers, also known as commercial designers, develop the concepts for a variety of manufactured projects. Most findings in this section come from data collected by the U.S. Bureau of Labor Statistics.*

### 1) There are more than 40,000 industrial designers in the United States.

- Thirty percent, or approximately 12,000 industrial designers, are self-employed. This share is comparable to that for all artists (34 percent), but more than four times greater than the self-employment rate of all U.S. workers (7 percent).
- Among salaried workers, industrial designers number less than graphic designers (191,440), merchandise-display designers (73,490), floral designers (47,110), and interior designers (40,750) — but they earn more than most design workers.<sup>6</sup>

### 2) Most salaried industrial designers fall into one of two sectors: manufacturing (11,730 workers) or professional, scientific, and technical services (7,570 workers).

- Transportation equipment manufacturing (makers of auto and aerospace parts and vehicles) is one of the best-paying industries for industrial designers. The industry employs about 20 percent of all industrial designers in manufacturing.
- The professional services sector includes a range of industries. Among those retaining industrial designers on staff are specialized design firms (3,990 industrial designers); engineering and architectural firms (2,510); management, scientific, and technical consulting firms (380); and scientific R&D firms (300).

### 3) Michigan, Rhode Island, Wisconsin, Indiana, and Pennsylvania are the top five states by percentage of industrial designers in the workforce.

- Four out of the top five metropolitan areas, by concentration of industrial designers in the workforce, are in Michigan. Topping the list is the exception — Kokomo, Indiana, also an automotive manufacturing site.
- California and Michigan each employ more than 3,000 industrial designers. Both states host major hubs of auto design (e.g., the GM Technical Center in Warren, Michigan, and the BMW Design Works and the Volvo Monitoring and Concept Center in Ventura County, California).
- Industrial designers in Michigan earn an average salary of \$69,870 a year, or \$10,000 more than the national average for this occupation. Industrial designers in Silicon Valley are also among the nation's best-paid industrial designers.

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<sup>6</sup> Architects and landscape architects fall into a different occupational category than designers, so are excluded from this comparison.

**4) Over the next several years, a growing number of industrial designers will find work in the professional services sector (e.g., engineering firms and specialized design firms).**

- Industrial designer employment in this sector is projected to leap by 29 percent.
- Manufacturers will continue to employ the greatest share of salaried industrial designers. Yet projected declines in manufacturing employment overall will trim the number of industrial designers in this sector.
- Continued growth is projected for overall employment of industrial designers, though the growth rate (+10.5 percent from 2010 to 2020) is somewhat lower than for all occupations as a whole (+14.3 percent).

**Section Two: Industrial Design as a Business**

*As an industry, industrial design refers to business establishments engaged primarily in creating and developing designs and specifications that optimize the use, value, and appearance of manufactured products. Most findings in this section come from data collected by the U.S. Census Bureau.*

**1) There are 1,579 industrial design business establishments in the U.S., with a total annual payroll of approximately \$1.4 billion.**

- In 2007, the most recent year for which such data are available, industrial design firms earned more than \$1.5 billion in total revenue. About 94 percent came from sales of product design, model design and fabrication, and other industrial design services.
- Other revenue came from clothing and graphic design, and drafting and other specialized services, among other sources.
- Roughly 14 percent (218) of all industrial design firms earned about \$113 million by exporting their services. The sales accounted for roughly one-fourth of these firms' total revenue (\$468 million).

**2) Total revenues earned by the industrial design industry are highly concentrated among the largest firms.**

- The four largest industrial design firms generate 11 percent of the industry's total revenue; the 20 largest, 32 percent; and the 50 largest, 45 percent.<sup>7</sup>
- By contrast, the professional services sector as a whole — of which industrial design is a part — relies far less on larger firms. The 50 largest firms in the sector generate only 18 percent of its total revenue.

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<sup>7</sup> Although the U.S. Census Bureau is barred from reporting data on individual establishments, industry news reports suggest that the top four are Continuum (West Newton, Massachusetts), IDEO (Palo Alto, California), Frog Designs (San Francisco, California), and Lunar Design (Palo Alto, California).

**3) Rhode Island, Oregon, Michigan, New York, and California rank in the top five states by per-capita concentration of industrial design firms. But a ranking by sheer number of such firms would exclude Rhode Island and Oregon and include Florida and Illinois.**

- Rhode Island's industrial design firms cluster around Providence's Rhode Island School of Design (RISD).
- Ranked by payroll size of industrial design firms, the top five states are California, New York, Ohio, Illinois, and Texas. In California, annual payroll of industrial design firms (just under \$240 million) is more than twice that of New York's industrial design industry.
- The top metro area ranked by concentration of industrial design firms per capita is Greensboro-High Point, North Carolina — often called the “Furniture Capital of the World.” North Carolina is home to many well-known manufacturers of furniture such as Thomasville, Bernhardt, and Broyhill, which are also the top three “assignees” of North Carolina's design patents.

**Section Three: Industrial Design as a Product Innovator**

*Design patents protect the visual characteristics embodied in or applied to an article. A utility patent protects the way an article is used and works, while a design patent protects the way an article looks. Most findings in this section come from data collected by the U.S. Patent and Trademark Office (USPTO).*

**1) The number of U.S.-awarded design patents per 100,000 population is at an all-time high: seven in 2012, compared with one at the turn of the 20th century.**

- Historical data show two growth spurts for U.S.-awarded design patents: 1910 through the mid-1940s, and the late 1980s through the present date.
- Amid the last economic recession, growth in design patents slowed in 2008 and fell by nearly 10 percent the following year.

**2) Between 1998 and 2012, the U.S. Patent and Trademark Office awarded 165,108 design patents (12,445 in 2012 alone) to U.S. companies and individuals.**

- More than half of design patents (54 percent) awarded in 1998–2012 fall in eight classes:
  - furnishings
  - recordings, communication, or informational retrieval equipment
  - tools and hardware
  - packages and containers for goods
  - equipment for preparing or serving food or drink
  - transportation
  - environmental heating and cooling or fluid handling
  - games, toys, or sports goods
- One out of five of all U.S. design patents protect the unique external appearance of furnishings or systems used for recording, communication, or information retrieval (e.g., smart phones, computer icons, and computer keyboards).

**3) Forty-five percent of design patents are awarded to U.S. companies, and 32 percent to foreign firms. The remainder are awarded mostly to U.S. individuals.**

■ The top ten U.S. companies by number of industrial design patents awarded are:

- Microsoft
- Procter & Gamble
- Nike
- Goodyear
- Black & Decker
- Wolverine World Wide
- Kohler Company
- Apple
- 3M
- Ford

■ The top ten foreign companies by number of industrial design patents awarded are:

- Samsung
- Sony
- Foxconn
- LG Electronics
- Panasonic
- Honda
- Nokia
- Toyota
- Toshiba
- Canon

■ The top ten U.S. states by industrial design patents awarded per capita are:

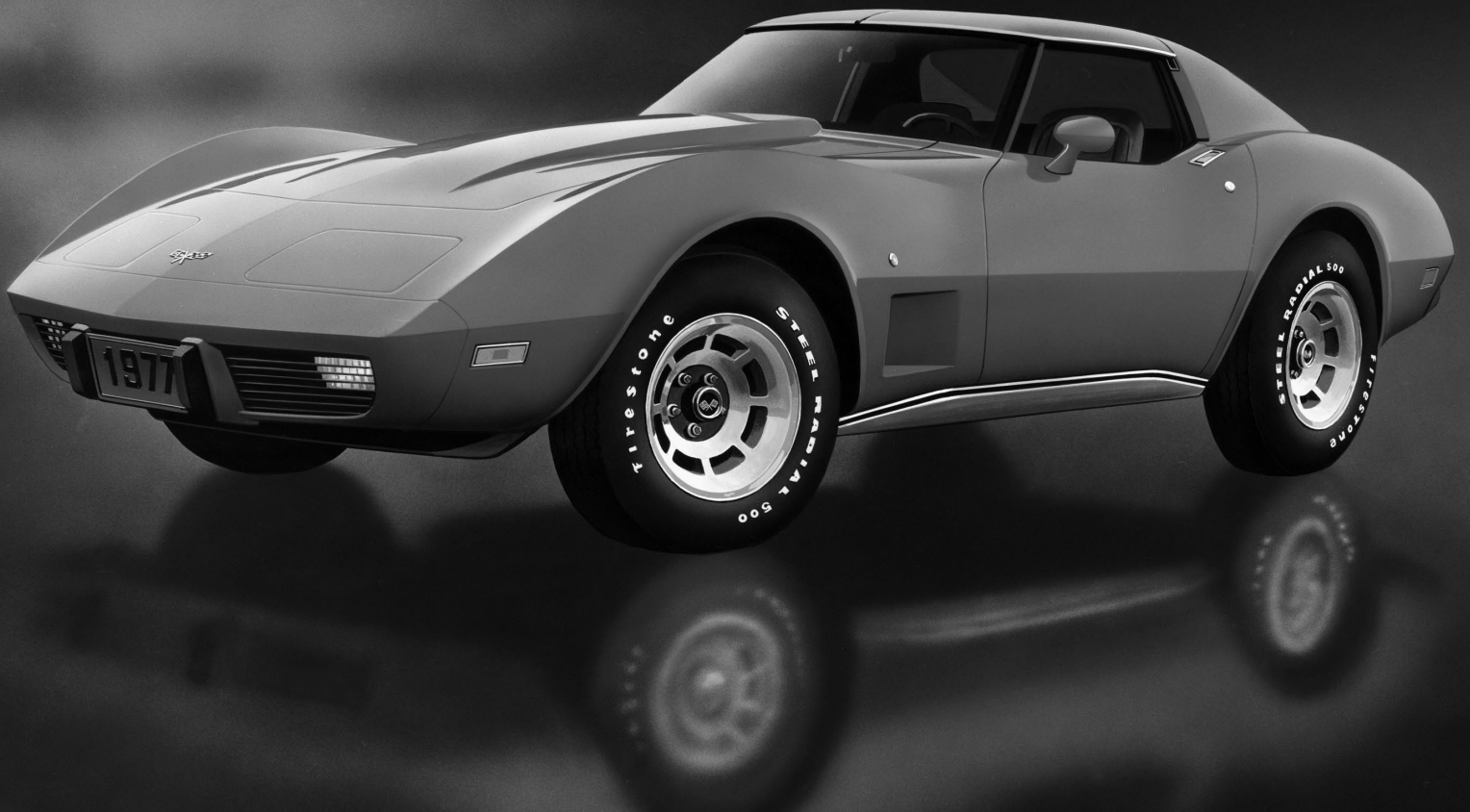
- Washington
- Wisconsin
- Oregon
- Rhode Island
- California
- Minnesota-Ohio
- Illinois
- Massachusetts
- New York
- Michigan

**4) Industrial designers are also inventors.**

■ In an analysis of U.S. patents awarded between 1975 and 2010, Alan Marco, the USPTO's acting chief economist, has found that 40 percent of people named on design patents ("designers") over that period (55,000 out of 136,000) were also named on utility patents. By contrast, among the 2.5 million people named on utility patents ("inventors") over the same period, only 2 percent were named on design patents.

■ Over the period studied, the mean number of utility patents naming a designer-inventor (a person named on both a design and utility patent) was 7.3. By contrast, the mean number of utility patents naming an inventor who had not been named on a design patent was 3.3.

# Part 1. Industrial Design as an Occupation



1977 Chevrolet Corvette, an example of industrial design in the automotive manufacturing industry. Photo Courtesy of General Motors, © GM Corporation

In its 2012–2013 edition of the *Occupational Outlook Handbook*, the U.S. Bureau of Labor Statistics (BLS) reports that industrial designers, also known as commercial designers, develop the concepts for manufactured products such as cars, home appliances, and toys. To varying degrees, they combine art, business, and engineering to make products that people use every day.

The following section draws from BLS data to profile trends in industrial design employment, identify the sectors that employ the greatest numbers of industrial designers, and rank earnings and concentration levels of such workers by state and metropolitan area.

In 2010, there were 40,800 industrial designers working in the U.S. Roughly 30 percent were self-employed – a figure comparable to the self-employment rate for artists of all types (34 percent). By contrast, only 7 percent of all U.S. workers were self-employed.

Most of the findings presented in this section, however, concern the 70 percent of industrial designers who are “wage and salaried non-farm workers.” The data source is BLS’ Occupational Employment Statistics (OES) program, which provides far more detailed occupational and industry data than other sources, but which necessarily excludes self-employed workers.<sup>8</sup>

Among all design occupations, industrial designers are comparatively few in number. In 2012, the most recent year for which OES data are available, there were 29,030 industrial designers (excluding self-employed workers). They thus make up a smaller number than do graphic designers (191,440), merchandise display designers (73,490), and floral designers (47,110). Still, industrial designers earn more than most workers in other design occupations (annual median wage: \$59,610).<sup>9</sup>

It is worth noting that architecture and landscape architecture — two occupations whose skills and services may intersect with those of designers — are excluded from this comparison, as each is defined separately from design in BLS’ occupational taxonomy.<sup>10</sup>

### Employment and Earnings by Design Occupations, 2012

	Number employed	Annual median wages
<b>Designers:</b>		
Industrial	29,030	\$59,610
Fashion	16,560	\$62,860
Floral	47,110	\$23,810
Graphic	191,440	\$44,150
Interior	40,750	\$47,600
Merchandise display	73,490	\$26,410
Set and exhibit	8,680	\$50,300
All others <sup>1</sup>	7,560	\$45,330

Note: Figures exclude self-employed designers

<sup>1</sup> “All other designers” include jewelry designers, memorial designers, and designers of ornamental metalwork.

Source: Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor

### Employment by Industry

Industrial designers are concentrated in two sectors: manufacturing and professional services. In 2012, roughly 11,700 industrial designers worked in manufacturing and 7,600 in professional, scientific, and technical services, which includes architectural and engineering services, specialized design services (including industrial design services), scientific research services, and advertising services, among other industries.<sup>11</sup> Combined, manufacturing and professional services employ 65 percent of salaried workers in this occupation.

<sup>8</sup> Using data from the Current Population Survey, the Bureau of Labor Statistics reports employment of 131.5 million nonagricultural workers in 2012. Of these, 8.7 million were self-employed.

<sup>9</sup> Industrial designers with a supervisory role can be classified as “managers” in the OES system, and therefore cannot be identified for the purpose of counting them as industrial designers.

<sup>10</sup> The OES program reports 98,470 employed architects in 2012. Median annual earnings for architects were \$71,700.

<sup>11</sup> The sector employing the next highest number of industrial designers is wholesale trade, i.e., the buying and selling of merchandise for distribution to retailers. 3,540 salaried industrial designers worked in this sector in 2012.

## Occupational Employment Statistics

Occupational Employment Statistics is a collaborative program between the BLS and state workforce agencies. The OES surveys 200,000 non-farm establishments every six months, taking three years to fully collect the sample of 1.2 million establishments. OES data are used to report employment and wage estimates for about 800 occupations at national, state, metropolitan, and nonmetropolitan levels.

The OES also reports employment and wage estimates by industry. At the national level, estimates are reported for 450 industries, which are categorized by the North American Industry Classification System (NAICS).

On the whole, industrial designers working in manufacturing earn less than designers working in professional services — \$56,880 versus \$63,580 in 2012. This small difference fades, however, when transportation manufacturing is examined, particularly motor vehicle manufacturing.

In 2012, about 310 industrial designers worked in motor vehicle manufacturing. The BLS withheld earnings data for these workers out of concern that information for such a small group might lead to public disclosure of businesses participating in the OES surveys. Therefore, to identify wages earned by industrial designers working in motor vehicle manufacturing, we turn instead to prior-year OES data.

In 2011, those jobs were far more numerous. That year, there were 800 industrial designers employed in motor vehicle manufacturing; their median earnings were \$89,410 — \$28,000 more than median earnings for all industrial designers. (As will be shown later in this section, the nearly 500-employee drop between 2011 and 2012 reflects a broader decline in employment across the auto manufacturing industry.)

Other transportation-equipment manufacturing industries also pay well. According to the 2012 OES data, industrial designers working in aerospace product manufacturing earned an average of \$72,000.<sup>12</sup> Designers employed in the manufacture of motor vehicle parts, which includes car seats, interior trim, and steering wheels, earned median wages of \$62,930.

### Industrial Designer Employment by Sector, 2012

Sector	Number employed	Annual median wages
<b>Manufacturing</b>	11,730	\$56,880
<b>Professional, scientific and technical services</b>	7,570	\$63,580
<b>Wholesale trade</b>	3,540	\$51,770
<b>Retail trade</b>	510	\$50,720
<b>Administrative and support and waste management services</b>	400	\$60,880
<b>Construction</b>	350	\$56,480
<b>Information</b>	230	\$56,980
<b>Federal, state, and local government</b>	210	\$52,510
<b>Educational services</b>	60	*
<b>Transportation and warehousing</b>	50	\$53,450
<b>Arts, entertainment, and recreation</b>	30	\$63,450
<b>Management of companies</b>	n/a	n/a
<b>Other services</b>	*	\$60,350

\* Not reported by the Bureau of Labor Statistics

n/a: Not reported in this table due to likely data anomaly

Detail by sector does not add to total employment of industrial designers.

Source: Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor

<sup>12</sup> The manufacture of aerospace products includes the design of airplane prototypes.



## Industrial Designer Employment by Selected Manufacturing Industries, 2012

Manufacturing industry	Number employed	Annual median wages
<b>Transportation equipment manufacturing</b>	2,430	\$64,470
Motor vehicle manufacturing	310	*
Motor vehicle body and trailer manufacturing	280	\$58,300
Motor vehicle parts manufacturing	1,170	\$62,930
Aerospace product and parts manufacturing	360	\$71,780
Other transportation equipment manufacturing	120	\$54,520
<b>Machinery manufacturing</b>	1,820	\$53,140
<b>Plastics and rubber products manufacturing</b>	990	\$52,650
<b>Electrical equipment appliance and component manufacturing</b>	810	\$60,680
<b>Furniture and related product manufacturing</b>	770	\$48,150
<b>Computer and electronic product manufacturing</b>	570	\$67,800
<b>Jewelry and silverware manufacturing</b>	380	\$61,120

\* Not reported by the Bureau of Labor Statistics in 2012. In 2011 that figure was \$89,410.

Detail by sector does not add to total. 11,730 industrial designers are employed in manufacturing.

Source: Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor

In the professional services sector, 85 percent of industrial designers are employed in two industries — “specialized design services” and architectural or engineering services. Of the two industries, specialized design (which includes establishments that provide primarily *industrial* design services) employs a greater number of industrial designers — nearly 4,000 in 2012.

Architectural and engineering services, alternatively, employ fewer industrial designers — about 2,500 in 2012. Nearly all of those designers work in engineering — 2,310 in 2012.<sup>13</sup> Industrial designers working in architectural or engineering services earned about \$10,000 more than designers in the specialized design services industry.

## Industrial Designer Employment by Professional Services Industries, 2012

	Number employed	Annual median wages
<b>Specialized design services</b>	3,990	\$58,530
<b>Architectural, engineering, and related services</b>	2,510	\$69,250
<b>Computer systems design and related services</b>	*	\$63,020
<b>Management, scientific, and technical consulting services</b>	380	\$67,530
<b>Scientific research and development services</b>	300	\$71,500
<b>Advertising, public relations, and related services</b>	*	\$60,280
<b>Other professional, scientific, and technical services</b>	40	\$37,660

\* Not reported by the Bureau of Labor Statistics

Source: Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor

<sup>13</sup> As outlined by U.S. Census Bureau product codes, engineering services firms design industrial machinery and manufacturing processes, work that commonly involves industrial designers.

### Projected Employment Growth, 2010–2020

The BLS' Office of Employment Projections expects the number of employed industrial designers in the U.S. to reach 45,100 by 2020.<sup>14</sup> This estimate, which includes self-employed *and* wage-and-salary designers, represents a 10.5 percent gain from the number of employed industrial designers in 2010. Although positive, the growth rate projected for industrial designer employment is somewhat below the average growth rate of 14.3 percent forecast for all occupations.<sup>15</sup>

The BLS projections call for wage-and-salary industrial designers to remain at 70 percent of all workers in that occupation, with the remaining 30 percent continuing as self-employed. Among *salaried* industrial designers, employment is projected to rise to 31,400 in 2020 — a 9.9 percent gain from 2010 employment levels. (Among non-salaried industrial designers, employment is projected to rise by 12 percent, to 13,700 workers.)

By sector, the BLS projects more hiring of industrial designers in the “professional services” sector and reduced employment in manufacturing, a pattern that coincides with the trend of long-term declines in overall manufacturing employment.<sup>16</sup> Despite this decline, manufacturing is projected to remain the leading employer of industrial designers.

In 2010, for example, 7,200 salaried industrial designers were employed by professional services. By 2020, the BLS projects that number to rise by 28.5 percent to reach 9,200 designers. Most of this growth is expected to stem from increased hiring in the two professional services industries employing the greatest numbers of industrial designers — architectural and engineering services and specialized design services. Between 2010 and 2020, both industries are projected to add between 800 and 1,000 industrial designers to their payrolls.

Industrial designer employment in manufacturing, as stated earlier, is projected to decline. Between 2010 and 2020, the BLS calls for industrial designer employment in the manufacturing sector to fall from 11,900 workers to 11,500 — a dip of 3.4 percent.

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<sup>14</sup> BLS projections assume that the economy is at or near full employment.

<sup>15</sup> The average growth rate projected for all occupations reflects strong growth patterns for a variety of jobs. Examples include occupations such as personal care and home health aides, which serve aging populations, and whose employment is projected to grow by 70 percent between 2010 and 2020; and carpenter helpers, whose employment is expected to increase by more the 50 percent as the construction industry recovers from the severe 2007–2009 recession.

<sup>16</sup> An examination of the 25-year period from 1988 to 2012 reveals that employment in the manufacturing sector has steadily declined. In 1988, for example, manufacturing employed 17,906 workers. By 2012, that number fell to 11,919. For more information, see estimates produced by the BLS' Current Employment Statistics program.

**Industrial Designer Employment in Selected Manufacturing and Professional Services Industries, 2010 (Actual) and 2020 (Projected)**

	2010		2020		2010–2020
	Number employed	Percent of occupation	Number employed	Percent of occupation	Percentage change in employment
<b>All industrial designers</b>	40,800	100.0%	45,100	100.0%	+10.5%
Self-employed	12,200	30.0%	13,700	30.4%	+12.0%
Wage and salary workers	28,600	70.0%	31,400	69.6%	+9.9%
<b>Manufacturing</b>	11,900	29.2%	11,500	25.5%	-3.4%
<i>Selected industries:</i>					
Plastic products	1,000	2.4%	1,200	2.6%	+21.3%
Machinery	1,900	4.6%	1,800	4.0%	-4.6%
Computer and electronic products	500	1.3%	500	1.0%	-15.0%
Transportation equipment (including motor vehicles and aerospace)	2,300	5.5%	2,300	5.1%	+1.7%
Miscellaneous manufacturing	2,000	5.0%	1,700	3.7%	-19.0%
<b>Professional, scientific, and technical services</b>	7,200	17.6%	9,200	20.5%	+28.5%
<i>Selected industries:</i>					
Architectural, engineering, and related services	3,200	7.9%	4,200	9.3%	+29.8%
Specialized design services	2,800	7.0%	3,600	8.0%	+27.1%

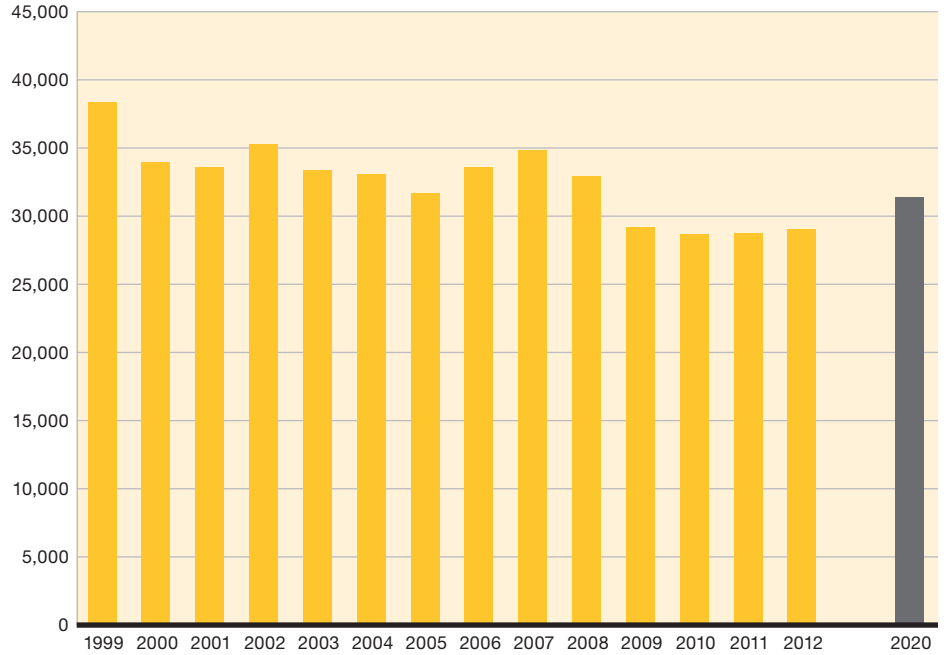
Note: The employment figures shown were taken from BLS estimates rounded to the nearest one-thousand. Consequently, percentage changes in employment are not necessarily evident in the employment figures.

Source: Office of Employment Projections, Bureau of Labor Statistics, U.S. Department of Labor

Not all manufacturing industries are expected to cut industrial design jobs — the manufacture of plastics, for example, is projected to add a modest number of industrial design jobs, and transportation manufacturing is expected to employ about the same number of industrial designers in 2020 as it did in 2010. However, the BLS projects industrial designer employment to decline in the manufacture of machinery and equipment, computer and electronic products, and “miscellaneous manufacturing,” which includes a varied list of manufactured goods such as jewelry, sporting goods and toys, office supplies, and musical instruments.

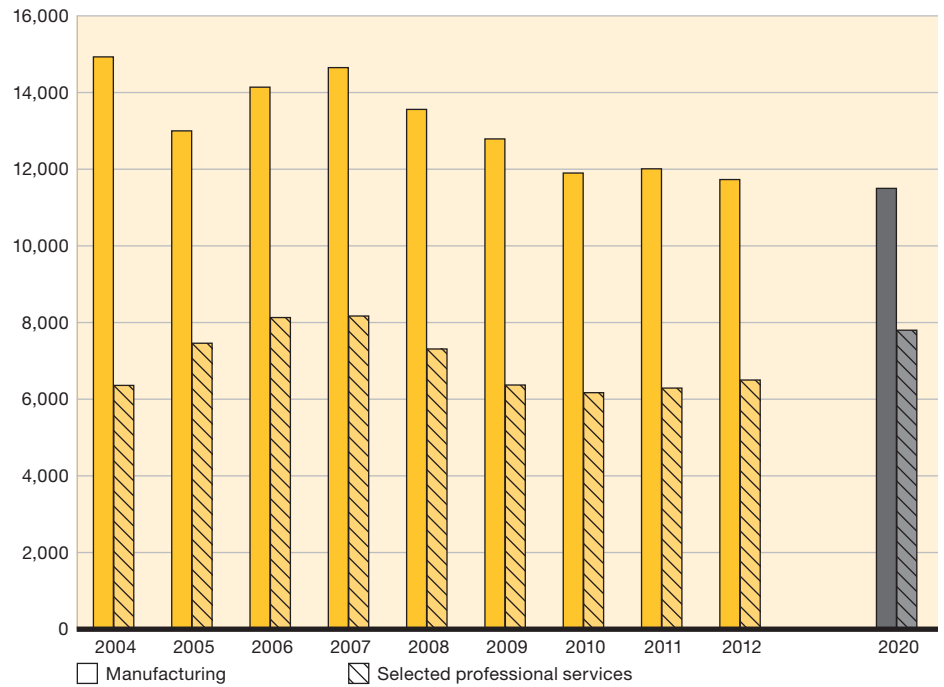
As noted earlier, manufacturing is projected to remain the largest employer of industrial designers, despite a gradual reduction in the number of workers employed in this sector. In 2020, manufacturing will continue to employ almost 37 percent of salaried industrial designers.

**Wage-and-Salary Employment of Industrial Designers,  
1999–2012 (Actual) and 2020 (Projected)**



Source: Occupational Employment Statistics and Employment Projections Program, U.S. Bureau of Labor Statistics

**Wage-and-Salary Employment of Industrial Designers, by  
Manufacturing and Selected Professional Services Industries,  
2004-2012 (Actual) and 2020 (Projected)**



Selected professional services consist of architectural and engineering services and specialized design services.

Source: Occupational Employment Statistics and Employment Projections Program, U.S. Bureau of Labor Statistics

## “One Word: Plastics”

Lower industrial-designer employment in manufacturing coincides with the trend of long-term declines in overall manufacturing employment. An examination of the 25-year period from 1988 to 2012 reveals that employment in the manufacturing sector has steadily declined. In 1988, for example, manufacturing reported 17,906 jobs. By 2012, that number fell to 11,919.

Still, specific manufacturing industries are projected to increase hiring. For example, between 2010 and 2020, the BLS expects plastic manufacturers to add 100,000 jobs. This increased hiring reflects the industry trying to stabilize following deep hiring cuts resulting from the 2007-2009 U.S. recession. In 2000, for example, plastic manufacturers reported nearly 737,000 jobs. In 2010, that count dropped to fewer than 500,000 jobs. By 2020, the BLS expects employment in plastics manufacturing to pick up to almost 600,000 positions.

Construction industries were also hit hard by the recession. Between 2000 and 2010, construction shed almost 1.3 million jobs. But between 2010 and 2020, the BLS projects that construction will add 1.8 million jobs. As construction recovers, it is adding to the employment rosters of the architectural and engineering services industry and of the specialized design services industry, both of which are projected to add industrial designer positions between 2010 and 2020.

## Education for Industrial Design

According to the U.S. Bureau of Labor Statistics, industrial designers naturally must have knowledge of design techniques. But they might also need an understanding of engineering and technology, production processes, computers, mathematics, and even physics. Because industrial designers often present their work to marketing staff and clients, the occupation requires English language skills.

A bachelor's degree is required for most entry-level industrial design jobs. As for degrees specific to industrial design, the U.S. Department of Education's National Center for Education Statistics (NCES) reports that U.S. postsecondary schools awarded 1,397 bachelor's degrees in industrial design in 2011, the most recent year for which data are reported.<sup>17</sup> As a share of all bachelor's degrees awarded, industrial design has been just below 1 percent since 2003.<sup>18</sup>

## Locations of Industrial Designers

There are only two U.S. states employing more than 3,000 industrial designers — California and Michigan. Michigan, however, far exceeds California in *concentration* of industrial designers. In 2012, as a share of Michigan's employed labor force, industrial designers were nearly four times greater than the U.S. average.<sup>19</sup> The “location quotient” for California's industrial designers, alternatively, was 1.06 — as a share of all employed workers in California, industrial designers were 6 percent greater than the U.S. average.

Ranked closely behind Michigan is Rhode Island. In 2012, about 320 industrial designers were employed in Rhode Island. Although Rhode Island is home to far fewer designers than California and Michigan, industrial designers compose a large share of Rhode Island's workforce. Relative to all workers in the state, Rhode Island's industrial designers exceed the U.S. average by a factor of three. (See *sidebar on page 31 for more about Rhode Island's industrial design industry.*)

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17 Degrees conferred were based on NCES' Integrated Postsecondary Education Data System, or IPEDS. The IPEDS collects information from every college, university, and technical and vocational school that participates in federal student financial aid programs. IPEDS uses the Classification of Instructional Programs (CIP) to categorize degrees and certificates conferred. Industrial design awards are classified as CIP 50.0404.

18 156 master's degrees in industrial design were awarded in 2011, or about 0.02 percent of all master's degrees conferred. The number of associate's degrees in industrial design is negligible (fewer than 100 since 2005).

19 The location quotient is the ratio of the area concentration of occupational employment to the national average concentration. A location quotient greater than one indicates the occupation has a higher share of employment than average, and a location quotient less than one indicates the occupation is less prevalent in the area than average.

As a share of all employed workers, industrial designers in Wisconsin are twice the national average. Workers in this occupation are also concentrated in Indiana, Pennsylvania, and Ohio, where the location quotient for each state is roughly 1.5, or 50 percent greater than the national average.<sup>20</sup>

### States with the Highest Concentrations of Industrial Designers, 2012

	Employed industrial designers	Location quotient
<b>Michigan</b>	3,280	3.75
<b>Rhode Island</b>	320	3.19
<b>Wisconsin</b>	1,800	1.98
<b>Indiana</b>	990	1.57
<b>Pennsylvania</b>	1,880	1.51
<b>Ohio</b>	1,640	1.46
<b>Illinois</b>	1,730	1.38
<b>Iowa</b>	360	1.09
<b>Massachusetts</b>	780	1.09
<b>California</b>	3,370	1.06

Source: Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor

### Earnings by State

Not only is Michigan home to large numbers of industrial designers, it also leads in best-paid industrial designers.<sup>21</sup> In 2012, Michigan's industrial designers earned about \$10,000 more than the average earned by all U.S. industrial designers. Moreover, Michigan's designers earned a premium of \$35,500 above the wages paid to all workers in the state, whose annual earnings averaged \$34,750, comparable to the average earned by all U.S. workers.

Contributing to this finding is Michigan's motor vehicle manufacturing industry. As discussed earlier, motor vehicle manufacturing, and related industries such as the manufacture of motor vehicle parts, are among the best-paying industries employing industrial designers. (The U.S. Census Bureau's County Business Pattern data show that the largest annual payroll in motor vehicle manufacturing was in Michigan — \$2 billion in 2011.)

Highly paid industrial designers are also found in Oregon and New York, whose 2012 earnings were \$69,080 and \$67,650, respectively. As discussed in later sections of this report, Oregon and New York, like Michigan, are home to large numbers of industrial design firms.

<sup>20</sup> The location quotient for industrial designers in Vermont is also high — 2.41 in 2012. This high quotient stems less from the number of industrial designers in Vermont (160) than from Vermont's small number of employed workers (294,090 in 2012).

<sup>21</sup> Industrial designers in New Mexico earned a median annual income of \$82,040 in 2012, according to OES data. This unusually high estimate, however, likely resulted from the small number of establishments from New Mexico reporting to the OES program, which may have skewed the sample for that state. In this publication, therefore, the estimate for New Mexico's high median annual earnings is discounted.

## States with the Best-Paid Industrial Designers, 2012

	Number employed	Median annual earnings	Median annual earnings of all workers	Premium earned by industrial designers
<b>U.S.</b>	29,303	\$59,610	\$34,750	\$24,860
Michigan	3,280	\$69,870	\$34,370	\$35,500
Oregon	200	\$69,080	\$35,650	\$33,430
South Carolina	390	\$68,420	\$30,210	\$38,210
New York	1,810	\$67,650	\$39,910	\$27,740
District of Columbia	30	\$67,480	\$61,960	\$5,520
Massachusetts	780	\$65,710	\$43,420	\$22,290
Connecticut	250	\$64,400	\$42,030	\$22,370
New Jersey	860	\$64,160	\$39,870	\$24,290
New Hampshire	80	\$63,800	\$35,740	\$28,060
Ohio	1,640	\$63,210	\$33,350	\$29,860

Source: Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor

### Industrial Designers by Metropolitan Statistical Area

The OES program also provides occupational employment estimates by metropolitan statistical area. In number and concentration of industrial designers, metropolitan areas tend to reflect state rankings. For example, Warren-Troy-Farmington Hills, Michigan, employs the greatest number of industrial designers — 1,430 in 2012. With 880 employed designers in 2012, Detroit-Livonia-Dearborn, Michigan, ranks fourth.<sup>22</sup>

Moreover, five of the top ten metropolitan areas, ranked by concentration of industrial designers, are in Michigan. In addition to the Warren and Detroit areas, this list includes Niles-Benton Harbor, Holland-Grand Haven, and Kalamazoo-Portage.

Metropolitan areas in Wisconsin and Indiana are also on this list, including Wausau and Oshkosh-Neenah in Wisconsin, and Kokomo, Indiana, which ranks first in concentration of industrial designers by metropolitan area. Like the Michigan metro areas on the list, Kokomo is a locus for automotive manufacturing.

### Metropolitan Areas with the Highest Concentration of Industrial Designers, 2012

Metropolitan area	Number employed	Location quotient
<b>Kokomo, IN</b>	80	9.19
<b>Niles-Benton Harbor, MI</b>	110	8.36
<b>Holland-Grand Haven, MI</b>	150	6.39
<b>Warren-Troy-Farmington Hills, MI Metropolitan Division</b>	1,430	5.98
<b>Detroit-Livonia-Dearborn, MI Metropolitan Division</b>	880	5.66
<b>Wausau, WI</b>	80	5.59
<b>Anderson, SC</b>	60	4.36
<b>Oshkosh-Neenah, WI</b>	80	4.17
<b>Kalamazoo-Portage, MI</b>	90	3.29
<b>Greenville-Mauldin-Easley, SC</b>	210	3.20

Source: Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor

<sup>22</sup> Warren-Troy-Farmington Hills and Detroit-Livonia-Dearborn are the two divisions composing the Detroit-Warren-Dearborn core-based statistical area (CBSA).

### Earnings by Metropolitan Area

Not only does Warren-Troy-Farmington rank highly in number and concentration of industrial designers, but designers working there are also among the best-paid. In 2012, industrial designers working in the Greater Warren-Troy-Farmington area earned annual median wages of \$74,730 — about \$15,000 above average.

Automotive manufacturing is again shaping the list of areas with well-paid industrial designers. Warren, Michigan, for example, is home to the GM Technical Center, which employs many of GM's designers and engineers. Michigan, however, is not the only automotive design area in the United States. Southern California is home to automotive design centers for most of the major carmakers.

BMW Design Works and the Volvo Monitoring and Concept Center, for example, are located in Ventura County, which is part of California's Oxnard-Thousand Oaks-Ventura metropolitan area. Industrial designers working in this area are the best paid in the country, earning a median annual salary in 2012 of \$100,610 — \$41,000 more than the national average salary for industrial designers. Further, industrial designers working in Oxnard-Thousand Oaks-Ventura earn nearly \$64,000 more than the average earned by all workers in the area.

Also well paid are industrial designers working in Santa Ana-Anaheim-Irvine, which counts Ford Advanced Product Creation, Toyota's Caltex Design Research, and the Hyundai American Technical Center among its automotive design centers. In 2012, industrial designers working in the Greater Santa Ana-Anaheim-Irvine area earned a median annual salary of \$69,450.

Additionally, Silicon Valley's industrial designers earn above-average salaries. In 2012, annual median earnings were \$81,400 in the San Jose-Sunnyvale-Santa Clara metro, and \$73,790 in Greater San Francisco. Although high by national standards, industrial designer compensation in these areas reflect overall high wages paid in Silicon Valley. In 2012, for example, workers in San Jose-Sunnyvale-Santa Clara earned \$18,000 more than the average U.S. worker.

### Top-Paying Metropolitan Areas for Industrial Designers, 2012

	Number employed	Median annual earnings	Median annual earnings of all workers	Premium earned by industrial designers
<b>U.S.</b>	29,303	\$59,610	\$34,750	\$24,860
Oxnard-Thousand Oaks-Ventura CA	110	\$100,610	\$36,930	\$63,680
San Jose-Sunnyvale-Santa Clara CA	200	\$81,400	\$53,470	\$27,930
Warren-Troy-Farmington Hills MI Metropolitan Division	1,430	\$74,730	\$36,150	\$38,580
San Francisco-San Mateo-Redwood City CA Metropolitan Division	350	\$73,790	\$50,690	\$23,100
Cincinnati-Middletown OH-KY-IN	570	\$73,020	\$34,770	\$38,250
Portland-Vancouver-Hillsboro OR-WA	200	\$71,080	\$38,430	\$32,650
Dayton OH	100	\$70,490	\$33,940	\$36,550
Santa Ana-Anaheim-Irvine CA Metropolitan Division	350	\$69,450	\$38,490	\$30,960
Greenville-Mauldin-Easley SC	210	\$69,440	\$30,770	\$38,670
Grand Rapids-Wyoming MI	230	\$69,350	\$33,450	\$35,900

Excludes metropolitan areas with fewer than 100 employed industrial designers

Source: Occupational Employment Statistics, Bureau of Labor Statistics, U.S. Department of Labor



## Car Design in Southern California — “Detroit West”

Detroit may be the first area that comes to mind as the epicenter of auto design in the U.S. After all, GM, Toyota, and Ford all design cars in the Greater Detroit Metropolitan Area. However, all three companies also have design operations in Southern California, as do many of the world’s leading car manufacturers, so much so that the Southern California counties of Ventura, Los Angeles, Orange, and San Diego are collectively called “Detroit West.”

In addition to design centers for GM, Toyota, and Ford, Southern California is also home to the Volkswagen Design Center (Santa Monica), BMW Design Works (Newbury Park), and Mercedes Advanced Design (Carlsbad), to name just a few.

Southern California’s car culture and pleasant temperatures are no doubt a draw to auto designers. But so, too, is the local design talent cultivated by Pasadena’s Art Center College of Design. Art Center’s alumni include a Who’s Who of car design, including Pete Brock and Larry Shindoa, who designed the 1957 Corvette Stingray concept car; Christopher Bangle, BMW’s first American chief of design; and Harald Belker, who may be best known for designing vehicles for Hollywood films (e.g., Steven Spielberg’s *Minority Report*), but who also helped design the Mercedes Smart Car.

## Car Design Centers in Southern California



## Part 2. Industrial Design as a Business



Continuum employees illustrate the design process and cross-disciplinary nature of industrial design work. Photo courtesy of Continuum LLC

As discussed in the preceding section, hiring of industrial designers is projected to increase in the professional services sector, which contains a variety of industries, including specialized design services and, more specifically, *industrial design services*.

The U.S. Census Bureau defines industrial or commercial design services, represented by NAICS 541420, as establishments engaged primarily in creating and developing designs and specifications that optimize the use, value, and appearance of their products.<sup>23</sup> The Census Bureau reports that industrial design services can include the determination of the materials, construction, mechanisms, shape, color, and surface finishes of the product, taking into consideration human characteristics and needs, safety, market appeal, and efficiency in production, distribution, use, and maintenance.

<sup>23</sup> NAICS is the North American Industrial Classification System.

This section draws on two U.S. Census Bureau business data sources to examine the industrial design industry. The first is 2011 County Business Patterns (CBP) data, which are based on annual business surveys, including the Service Annual Survey (which surveys 72,000 service businesses with paid employees), and on administrative data extracted from Bureau's Business Register. CBP data are used to enumerate establishments that offer industrial design services, workers employed in these firms, and the industry's payroll.<sup>24</sup>

The second data source for this section of the report is the 2007 Economic Census. Although less current than CBP data, the Economic Census provides greater detail about industrial design firms' services and revenues.<sup>25</sup>

This part of the report relies almost exclusively on Economic Census terminology for sectors and their component industries. Because some industry names are likely to be unfamiliar to most people, a brief explanation of the classification system as it relates to industrial design is given in an appendix to this report (see page 48).

### Specialized Design Services

Industrial design establishments make up a small share of the specialized design services industries. However, its payroll is comparable to that of interior design services, an industry employing twice the number of workers.

CBP data show 1,579 business establishments specializing in industrial design in 2011. By contrast, there were 11,135 firms specializing in interior design and 15,000 in graphic design.<sup>26</sup>

The same year, industrial design firms employed 16,308 workers. Although this count was half the number of workers employed by interior design firms, the commercial design services industry's payroll was \$1.4 billion, close to the \$1.5 billion paid in wages and salaries by interior design firms.

### Specialized Design Services, 2011

Specialized design services	Number of establishments	Number of paid employees <sup>2</sup>	Annual payroll (\$1,000)
<b>Industrial design services</b>	1,579	16,308	\$1,379,490
<b>Graphic design services</b>	15,226	50,241	\$2,653,155
<b>Interior design services</b>	11,135	32,478	\$1,547,402
<b>Other specialized design services<sup>1</sup></b>	2,010	8,248	\$448,931

<sup>1</sup> Examples include fashion, floats, jewelry, lighting, and textile design services

<sup>2</sup> As of March 12, 2012

Source: County Business Patterns, U.S. Census Bureau, U.S. Department of Commerce

24 A business establishment is a single physical location at which business is conducted or services are provided. It is not necessarily identical to a company or enterprise, which may consist of one establishment or more.

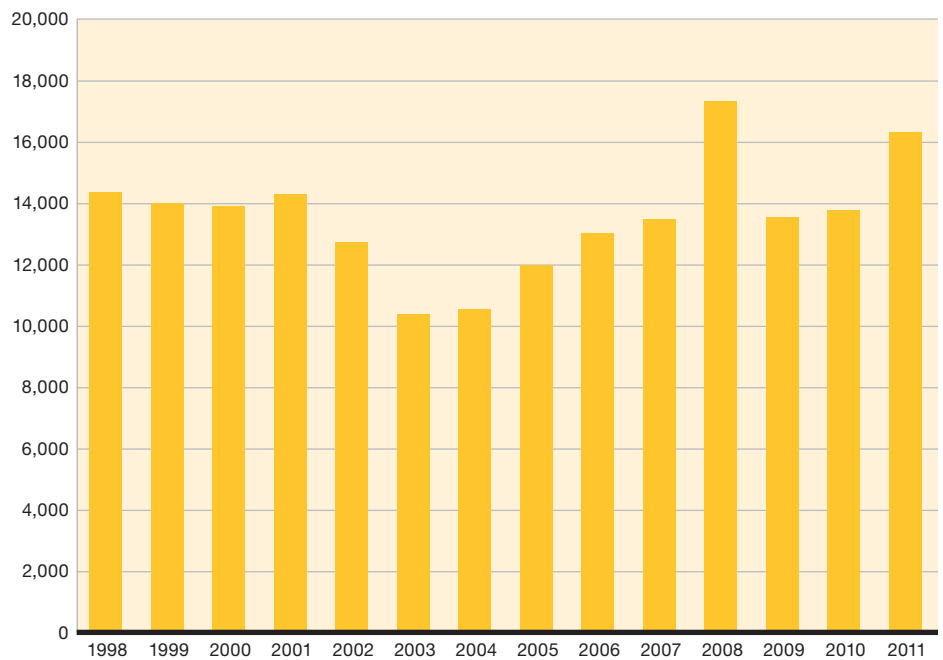
25 The U.S. Census Bureau conducts the Economic Census every five years. It is conducted for years ending with "2" and "7."

26 Unless otherwise noted, "establishment" and "firm" are used interchangeably in this report.

CBP data also show that the number of industrial design firms and the number of workers employed by them have fluctuated in response to business cycles, particularly during the severe 2007–2009 recession. For example, in 2008, the first full year of the recession, employment in industrial design firms actually grew by more than 28 percent to reach 17,300 workers. But in 2009, the effects of the recession took hold and employment in that industry dropped by 22 percent — the single largest percentage point decline in the 1998–2011 period.<sup>27</sup>

In 2010, the number of workers employed by industrial design firms stabilized at 13,770, then grew sharply in 2011 to reach 16,300 workers, a number suggesting the beginning of a recovery in industrial design employment.<sup>28</sup>

### Number of Workers Employed in Industrial Design Firms, 1998–2011



Source: County Business Patterns, U.S. Census Bureau, U.S. Department of Commerce

<sup>27</sup> Current CBP data extraction tools provide data for the 1998–2011 period. Archived data for 1994–1997 are also available on the Bureau’s CBP website at <http://www.census.gov/econ/cbp/historical.htm>.

<sup>28</sup> CBP estimates for 2012 are scheduled for release in April 2014.

## Revenue Sources

Not surprisingly, most of the revenue earned by industrial design establishments stems from sales of product design and related services. The 2007 Economic Census, the most recent business census for which statistics are available, showed that product design and model design and fabrication (as well as “other industrial design”) accounted for nearly 94 percent of the revenue earned by industrial design firms.<sup>29</sup> In 2007, product design and related services generated \$1.4 billion in sales.

In addition to their primary work of designing products, some industrial design businesses offer other services such as drafting and graphic and clothing design. In 2007, for example, 148 industrial design firms provided graphic design services. Although that number was small — fewer than 10 percent of all the establishments in that industry — graphic design services generated \$37.1 million in sales, and half of that figure (\$18.8 million) came from sales of graphic designs of corporate or organizational images.

## Products and Services Provided by Industrial Design Firms, 2007

	Establishments	Revenue (\$1,000)	Percent of industry revenue
<b>Industry total</b>	1,637	\$1,541,787	100.0%
<b>Industrial design services</b>	1,605	\$1,441,980	93.5%
Product design	1,243	\$941,596	61.1%
Model design and fabrication	656	\$274,511	17.8%
Other industrial design	457	\$217,278	14.1%
<b>Drafting services</b>	25	\$3,152	0.2%
<b>Graphic design services</b>	148	\$37,142	2.4%
Corporate/organization image graphic design services	79	\$18,766	1.2%
Advertising graphic design creative services	57	\$9,079	0.6%
Publication graphic design services	19	\$375	*
Commercial illustration graphic design services	29	\$820	0.1%
Website design and development services	53	\$1,270	0.1%
All other graphic design services	17	\$6,831	0.4%
<b>Clothing design services</b>	22	\$6,515	0.4%
<b>Other specialized design services</b>	11	\$10,112	0.7%
<b>Resale of merchandise</b>	60	\$22,647	1.5%
<b>All other operating revenue</b>	46	\$19,968	1.3%

\* Not reported

Source: 2007 Economic Census, U.S. Census Bureau, U.S. Department of Commerce

<sup>29</sup> Of the 1,637 industrial design services establishments enumerated by the 2007 Economic Census, 1,605 reported revenue by product or service. Consequently, percent of revenue by various products (e.g., product design, graphic design, etc.) does not add to 100 percent.

### *Industrial Design Exports*

The Economic Census also tracks sales from exported services. In 2007, 218 industrial design firms exported \$112.7 million in services, amounting to one-quarter of all revenue earned by firms exporting industrial design services.

### **Industrial Design Services Establishments Exported Services, 2007**

Number of establishments exporting services	Total revenue of these establishments (\$1,000)	Revenue from exported services (\$1,000)
218	\$467,900	\$112,745

Source: 2007 Economic Census, U.S. Census Bureau, U.S. Department of Commerce

### *Revenue Earned by the Largest Industrial Design Firms*

While most business data produced by the U.S. Census Bureau are reported for “establishments,” the Economic Census also shows the percent of revenue earned by the largest “firms,” which refers to a business organization consisting of one domestic establishment or more under common ownership.

That small distinction aside, the Economic Census shows that much of the revenue earned in this industry is concentrated among the top companies, more so than for other firms in the professional services sector, to which industrial design firms belong.<sup>30</sup>

In 2007, for example, the four largest industrial design firms (i.e., largest in revenue) earned 11.4 percent of all the revenue earned in that industry. Although the U.S. Census Bureau is barred from reporting data on individual establishments, industry analysts suggest that the top four are Continuum (West Newton, Massachusetts), IDEO (Palo Alto, California), Frog Designs (San Francisco, California), and Lunar Design (Palo Alto, California).

By contrast, the four largest firms in all professional, scientific, and technical services (the sector that encompasses industrial design firms) earned 4.2 percent of the sector’s revenue.

Comparing industrial design firms to other specialized design companies underscores this concentration. In 2007, the top 50 industrial design services firms earned 45 percent of the industry’s revenue, while the top 50 interior and graphic design companies earned 12–13 percent.

The top 50 “other specialized design” firms earned 39 percent of the industry’s revenue — above average but below the share reported for the top industrial design firms.

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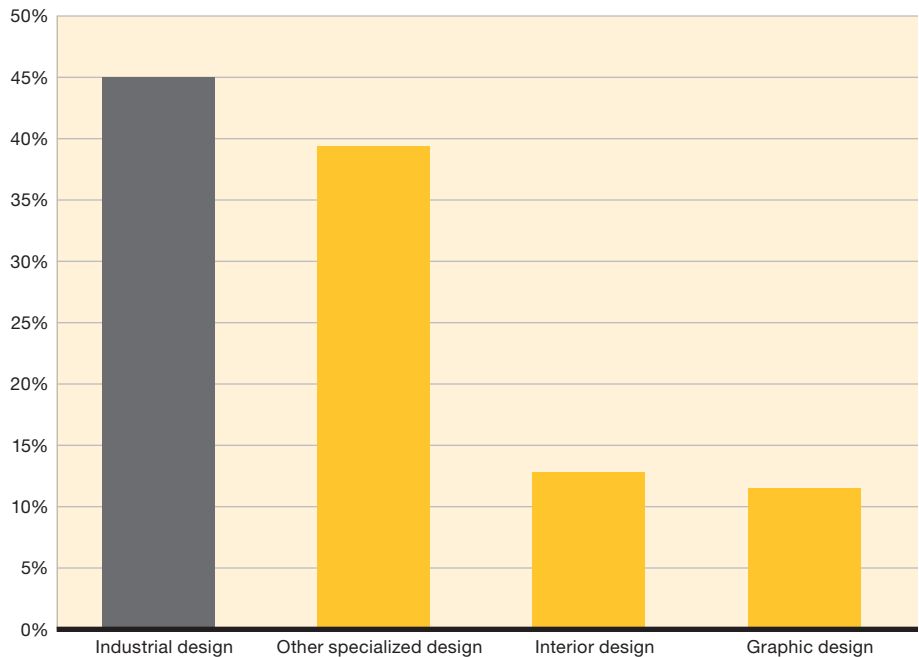
<sup>30</sup> As explained in Part 1, “professional services” includes architectural and engineering services, specialized design services (including industrial design services), scientific research services, and advertising services, among others.

## Percent of Revenue Earned by Largest Firms, 2007

	Number of establishments	Revenue (\$1,000)	Percent of revenue earned by largest firms
<b>Industrial design services</b>			
<b>All firms</b>	1,637	\$1,541,787	100.0%
4 largest firms	11	\$176,136	11.4%
8 largest firms	16	\$290,131	18.8%
20 largest firms	31	\$488,561	31.7%
50 largest firms	73	\$693,153	45.0%
<b>Professional, scientific, and technical services</b>			
<b>All firms</b>	847,492	\$1,251,003,504	100.0%
4 largest firms	3,067	\$52,890,516	4.2%
8 largest firms	7,086	\$86,265,201	6.9%
20 largest firms	8,779	\$155,028,542	12.4%
50 largest firms	19,898	\$229,218,067	18.3%

Source: 2007 Economic Census, U.S. Census Bureau, U.S. Department of Commerce

## Percent of Revenue Earned by the 50 Largest Specialized Design Firms, per Industry, 2007



Source: 2007 Economic Census, U.S. Census Bureau, U.S. Department of Commerce

## State Location of Industrial Design Businesses

Returning to CBP data, state tabulations show that the greatest numbers of industrial design services establishments are in the large-population states of California, New York, Florida, Illinois, and Michigan. In 2011, those five states were home to half of all U.S. industrial design firms.

These states also rank highly in numbers of industrial design establishments per capita. In California, New York, and Michigan, for example, there were roughly four establishments per 500,000 population — a figure well above the U.S. average of 2.5. However, in number of industrial design establishments per capita, no state ranks as high as Rhode Island. In 2011, 18 establishments were located in Rhode Island. Given the state's 2011 population of 1.1 million, Rhode Island, consequently, was home to 8.6 industrial design firms per 500,000 population.

### Industrial Design Services Establishments, 2011 Selected Top States

	Number of establishments	Per capita <sup>1</sup>
<b>U.S.</b>	1,579	2.5
California	299	4.0
New York	168	4.3
Florida	127	3.3
Illinois	95	3.7
Michigan	85	4.3
Ohio	74	3.2
North Carolina	72	3.7
Massachusetts	49	3.7
Oregon	34	4.4
Connecticut	26	3.6
Rhode Island	18	8.6

<sup>1</sup> Per 500,000 population

Source: County Business Patterns, U.S. Census Bureau, U.S. Department of Commerce



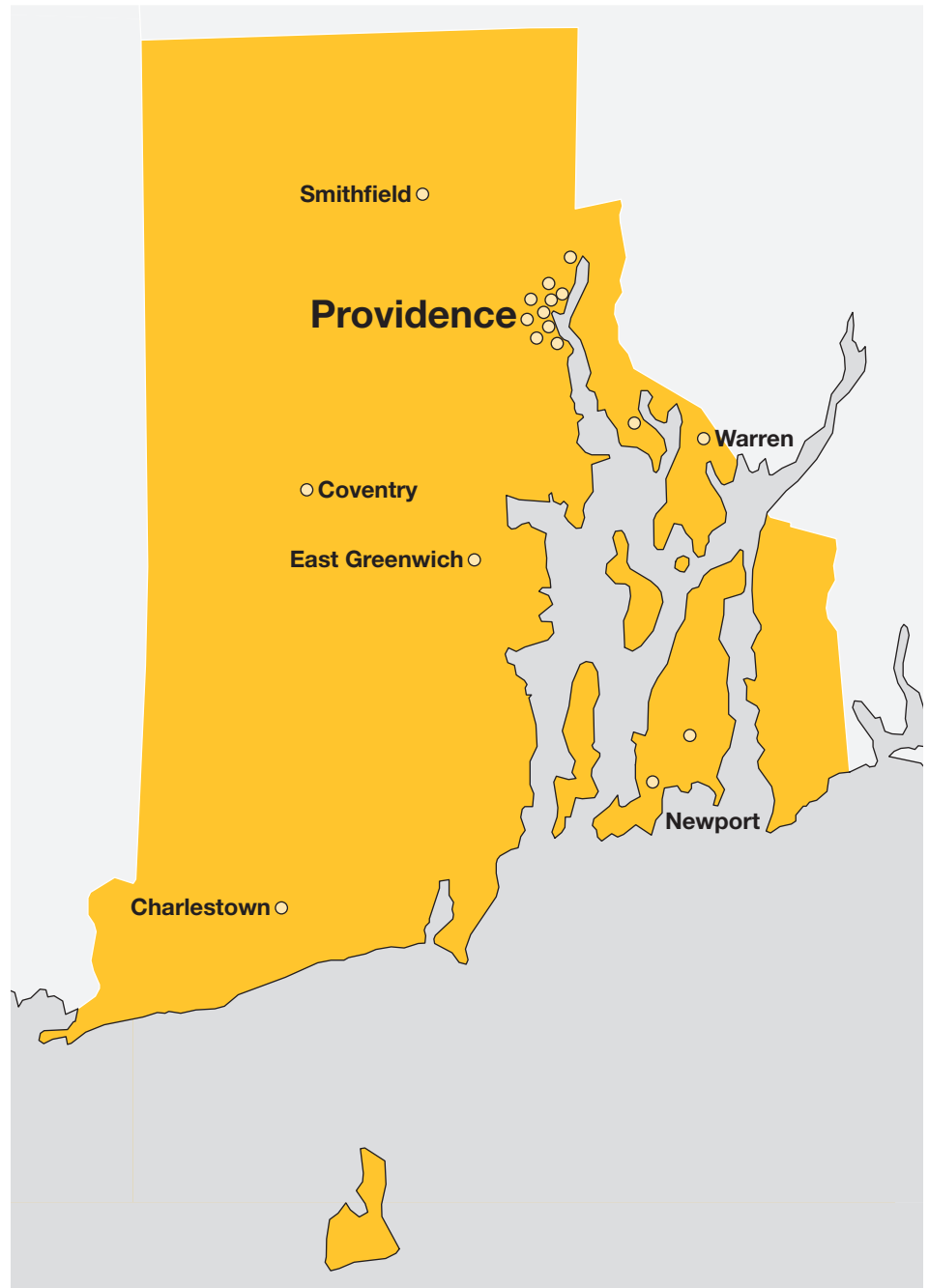
## Design in Rhode Island

Per capita, Rhode Island is home to more industrial design establishments than any other state. In 2011, there were roughly eight industrial design firms per 500,000 population — a count significantly higher than the national average of 2.5, and higher than the four establishments per 500,000 population in California, New York, or Michigan.

Rhode Island's primacy in industrial design services stems in part from the Rhode Island School of Design (RISD) in Providence. There are 18 industrial design firms in Rhode Island, ten in Providence alone. Examples of local firms are Observatory, Tellart, Ximedica, Item New Product Development, and Fuzion Design. Notably, toy manufacturer Hasbro is headquartered in nearby Pawtucket, Rhode Island.

RISD was founded by Helen Rodelia Rowe Metcalf in 1877 — more than 40 years before women gained the right to vote. Its alumni include Stuart Karten, founder of the Los Angeles-based industrial design firm, Karten Design, and David Hanson, well known for his creation of realistic, humanoid robots.

## Industrial Design Services in Rhode Island Business Establishments in 2011



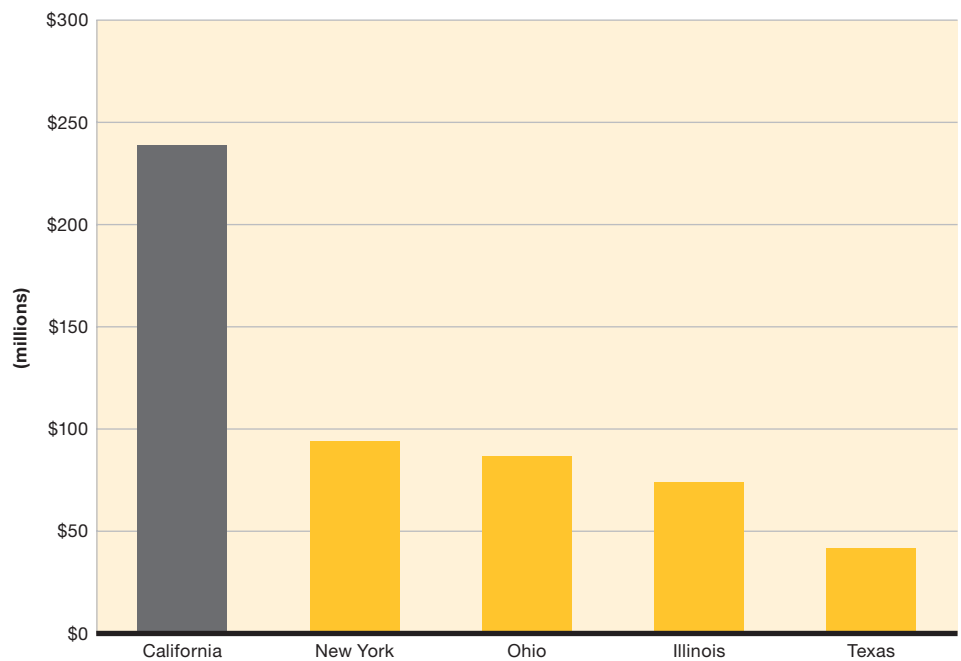
Source: County Business Patterns, U.S. Census Bureau, U.S. Department of Commerce

### State Payroll

While CBP data do not report revenue, they do show payroll, which is used here to gauge the finances of industrial design establishments by state. In 2011, the payrolls of California's industrial design firms exceeded \$239 million, and in New York, the industry's payroll was \$94 million. Other states ranking high in industrial design firms' payroll included Ohio (\$86.7 million), Illinois (\$74.1 million), and Texas, which, while home to only 59 such establishments in 2011, generated \$42 million in industrial design payroll.

California's large industrial design payroll reflects the sheer size of the industry in that state. For example, California's payroll for the industry is more than two times greater than for New York's industrial design sector. Also, California is home to twice the number of industrial design firms and workers as New York.

### Industrial Design Services Payroll Top Five States in 2011



Source: County Business Patterns, U.S. Census Bureau, U.S. Department of Commerce

### **Industrial Design Businesses by Metropolitan Statistical Area**

CBP data also show counts of business establishments in the industrial design services industry for metropolitan statistical areas, though estimates of payroll and number of employees are typically reported for large metro areas only.

In 2011, the New York and Los Angeles metropolitan areas scored the greatest numbers of establishments: 170 and 147, respectively. In fact, 20 percent of all U.S. industrial design establishments are located in either the New York and Los Angeles areas.

These two areas also rank highly in number of firms per capita. In New York, there were 4.3 industrial design establishments per 500,000 population, and, in Los Angeles, even more — 5.7 per 500,000 population.

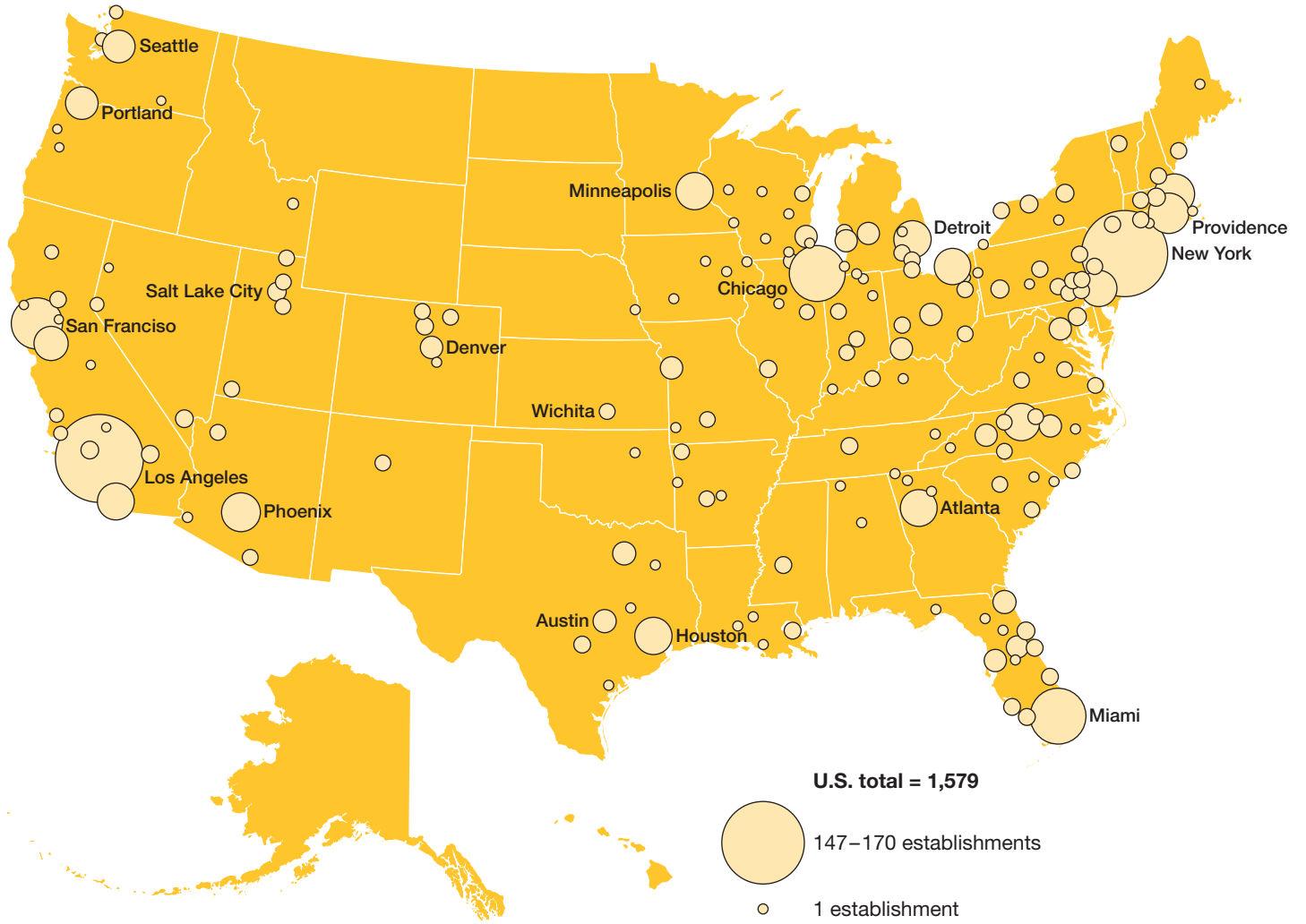
Per capita, the San Francisco, California area had 6.9 industrial design firms in 2011, while Portland (Oregon), San Jose (California), and Providence (Rhode Island) each had 6.2 per 500,000 population. However, no metro area approaches Greensboro-High Point (North Carolina) in number of establishments per capita. In 2011, the estimated population for Greensboro-High Point was just over 700,000, giving the area 21.2 industrial design firms per 500,000 population.

Propelling Greensboro-High Point's per-capita count of commercial design firms is the area's furniture industry — indeed, High Point has been called the “Furniture Capital of the World.” As will be discussed in Part 3 of this report, furnishings account for a large share of design patents awarded by the U.S. Patent and Trademark Office (USPTO). U.S. design patents awarded in North Carolina are dominated by the furnishings product class and by well-known furniture manufacturers such as Thomasville, Bernhardt, and Broyhill, which are the top three “assignees” of North Carolina's design patents.<sup>31</sup>

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<sup>31</sup> The USPTO identifies the origin of a patent by the residence of the first-named “inventor,” or, in this case, a designer. Patents are typically assigned to the manufacturer employing the designer, either on staff, or whose services were acquired through a design services company.

**Industrial Design Services**  
Business Establishments in 2011



Source: County Business Patterns, U.S. Census Bureau, U.S. Department of Commerce

## Industrial Design Services Establishments, 2011 Top Metropolitan Areas

	Number of establishments	Per capita <sup>1</sup>	Payroll (\$1,000)	Number of employees
<b>U.S.</b>	1,579	2.5		
New York-Northern New Jersey-Long Island, NY-NJ-PA	170	4.3	\$87,053	1,183
Los Angeles-Long Beach-Santa Ana, CA	147	5.7	\$92,454	1,030
Chicago-Naperville-Joliet, IL-IN-WI	86	4.5	\$70,253	700
San Francisco-Oakland-Fremont, CA	61	6.9	\$64,624	580
Miami-Fort Lauderdale-Pompano Beach, FL	56	4.9	\$5,838	124
Detroit-Warren-Livonia, MI	39	4.5	D	a
Boston-Cambridge-Quincy, MA-NH	37	4.0	\$21,126	260
Greensboro-High Point, NC <sup>2</sup>	31	21.2	\$6,245	114
San Diego-Carlsbad-San Marcos, CA	29	4.6	\$10,444	157
Portland-Vancouver-Beaverton, OR-WA	28	6.2	\$12,517	207
Minneapolis-St. Paul-Bloomington, MN-WI	27	4.0	\$9,588	127
Cleveland-Elyria-Mentor, OH	26	6.3	\$16,227	287
Seattle-Tacoma-Bellevue, WA	26	3.7	\$30,690	360
San Jose-Sunnyvale-Santa Clara, CA	23	6.2	D	b
Providence-New Bedford-Fall River, RI-MA	20	6.2	\$10,222	129

<sup>1</sup> Per 500,000 population

<sup>2</sup> Population in 2011 was 730,531

D: Withheld to avoid disclosing data for individual companies

a: 2,500–4,999 employees

b: 250–499 employees

Note: 20 industrial design services establishments were also reported for the Philadelphia, Houston, Atlanta, and Phoenix metropolitan areas. However, each of these metros was at or below the national per capita average of 2.5.

Source: County Business Patterns, U.S. Census Bureau, U.S. Department of Commerce

# Part 3. Industrial Design as a Product Innovator

Aug. 24, 1948.

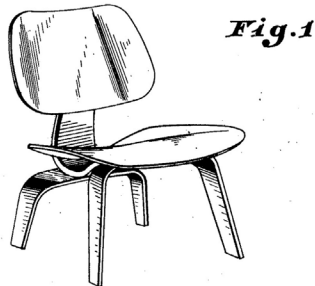
C. EAMES  
CHAIR

Des. 150,683

Patented Aug. 24, 1948

Des. 150,683

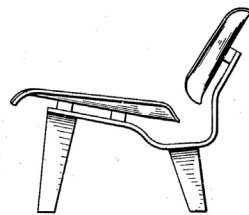
Filed March 27, 1947



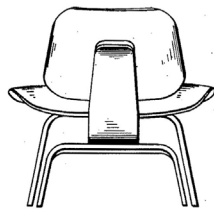
*Fig. 2*



*Fig. 3*



*Fig. 4*



Inventor  
Charles Eames

By  
Lyons Lyons  
Attorneys

## UNITED STATES PATENT OFFICE

150,683

DESIGN FOR A CHAIR

Charles Eames, West Los Angeles, Calif., assignor  
to Evans Products Company, Detroit, Mich., a  
corporation of Delaware

Application March 27, 1947, Serial No. 137,926

Term of patent 14 years

(Cl. D15-1)

To all whom it may concern:

Be it known that I, Charles Eames, a citizen of the United States, residing at West Los Angeles, in the county of Los Angeles and State of California, have invented a new, original, and ornamental Design for Chair, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

Figure 1 shows a perspective view of the chair embodying my new design.

Figure 2 is a front elevational view thereof.

Figure 3 is a side elevational view thereof.

Figure 4 is a rear elevational view thereof.

I claim:

The ornamental design for a chair, as shown.  
CHARLES EAMES.

### REFERENCES CITED

The following references are of record in the file of this patent:  
New York Times, Magazine Sec. 6, April 7, 1946, pages 38 and 39, chairs in lowermost line of illustrations.

1948 design patent for a chair by Charles Eames. Assignee, Evans Products Company, Detroit, Michigan

So far, this report has profiled the industrial design field in terms of workers and establishments, their locations and earnings, and their actual and projected growth rates. But what does industrial design contribute to product innovation? To answer the question, we turn to an additional metric: the annual growth rate of U.S.-awarded design patents. Patents are not necessarily a perfect measure of product innovation, but they are an accessible and concrete measure.

Through this lens, we witness the 19th-century birth of U.S. industrial design and ensuing periods of heightened design activity such as the 1930s era of streamlining. As of 2012, moreover, there were roughly seven U.S.-awarded design patents per 100,000 population — an all-time high for industrial design in this country.

Patent data also illustrate the breadth of products designed by industrial designers. Patents protect the designs of products ranging from ice cream cones and dog beds, to power tools and high chairs. Design patents were at the center of the recent billion-dollar legal dispute between rival smartphone manufacturers Apple and Samsung.

Patent data show that industrial design is big business. In addition to Apple and Samsung, companies such as Microsoft and Nike lead in U.S. awards of design patents. The headquarters of U.S. manufacturing firms, in turn, contribute to a geographic pattern in which design-patent awards are concentrated in western and midwestern states.

Finally, patent data reveal that industrial designers are inventive. “Designers-inventors” (individuals who are named on both design *and* utility patents) are named on substantially more utility patents than inventors named only on utility patents.

### **A Brief History of Design Patents**

Although the U.S. government awarded its first patent in 1790 (signed by President George Washington and Secretary of State Thomas Jefferson), patents initially protected only the invention of a new article or the improvement of a processing system. Patents to protect the *design* of a “useful” product were not available until the 1840s, when new manufacturing technologies introduced design elements as a means of creating distinctive consumer products. In particular, the manufacture of two products, iron stoves and patterned textiles, illustrate the development of U.S. industrial design and the motive for protecting designs through patents.

In the 1830s, New York’s Jordan Mott revolutionized the process for manufacturing cast-iron stoves by incorporating fluting and curves into his stove designs. First added to enhance heat dissipation, these design elements distinguished Mott’s stoves and created consumer appeal for the stoves and other metal products he manufactured. During this same period, New England’s textile manufacturer Francis Lowell designed an ornate calico print that became so popular it largely replaced checks and home-spun plaids.

Because design patents were unavailable in the 1830s, both Mott and Lowell were subject to piracy from their competitors until 1842. That year, with help from Mott’s lobbying efforts, the U.S. passed a statute providing for the grant of patents for “any new and original design for a manufacture or for printing on fabric.”

Today, the U.S. Patent and Trademark Office defines “design” as the visual characteristics embodied in or applied to an article. The design patent relates to the configuration or shape of an article, to the surface ornamentation applied to an article, or to the combination of the configuration and surface ornamentation. To distinguish between design and utility, the USPTO guide notes that a “utility” patent protects the way an article is *used* and *works*, while a “design” patent protects the way an article *looks*.

## Forms of Intellectual Property Protection

**Utility patents** protect a new and useful process, machine, article of manufacture, composition of matter, or any new and useful improvement thereof. The statutory period is 20 years after the application date.

**Design patents** protect new, original, and ornamental design for an article of manufacture. The statutory period is 14 years from date of issuance.

**Plant patents** protect the invention or discovery of asexually reproduced new plant variety. The statutory period is 20 years after the application date.

**Copyright** protects the authors of literary, dramatic, musical, artistic, and other intellectual works, both published and unpublished. The copyright protects the form of expression rather than the subject matter of the work. Per the Copyright Act of 1976, copyrighted works created as of January 1978 are protected for the life of the author plus an additional 70 years.

**Trademark** laws protect a word, name, symbol, device, or design and packaging (as in trade dressing) that is used in trade with goods to indicate the source of the goods and to distinguish them from the goods of others. Trademark rights prevent others from using a confusingly similar mark or design/packaging. Trademark rights apply until abandonment.

**Trade secret laws** protect technological and industrial information not generally known in the trade against unauthorized industrial use by others. Legal protection is afforded only to owners who have taken diligent steps to preserve trade secrets.

## Types of Designs Protected by Patents

Examining design patents by class reveals the diversity of industrial design. U.S. patent designs are awarded in product-design classes ranging from food items (e.g., the design of chocolate bars) and animal husbandry products (such as horse saddles and bird houses), to the design elements of dishwashers, swimming pools, and musical instruments.

Of the 32 distinct design patent classes, however, more than half of all design patents granted in the U.S. are awarded in just eight classes, with the top two classes accounting for 20 percent.<sup>32</sup> Between 1998 and 2012, the USPTO awarded 29,540 design grants in furnishings — a class covering the design of furniture, cabinets, and carpets — and in recording, communication, and information equipment, which includes the design of smartphones, computer icons, and computer keyboards.

The remaining top classes include design patents in tools and hardware, packages and containers, transportation, and toys.

## U.S.-Awarded Design Patents, Top Eight Classes, 1998–2012

Class	Class Title	1998–2012	2012	Share of all design patents: 1998–2012
ALL	All design patents	165,108	12,445	100.0%
	Design patents granted in top eight classes	89,542	6,457	54.2%
D06	Furnishings (Cabinet, rocking chair, playpen, carpet design)	16,393	1,103	9.9%
D14	Recording, communication, or information retrieval equipment (Mobile telephone, mouse pad, computer icon, barcode scanner)	13,147	1,194	8.0%
D08	Tools and hardware (Chain saw, furniture castor, shelf brackets, scissors)	11,142	696	6.7%
D09	Packages and containers for goods (Perfume bottle, egg carton, drinking bottle)	10,164	867	6.2%
D07	Equipment for preparing or serving food or drink <sup>1</sup> (Espresso maker, banana holder, napkin holder, pizza oven)	10,019	858	6.1%
D12	Transportation (Car chassis, golf cart, wheelchair, ATV)	9,991	579	6.1%
D23	Environmental heating and cooling; fluid handling (Outdoor fountain, sink faucet, sauna, ceiling fan)	9,449	576	5.7%
D21	Games, toys, and sports goods (Hockey stick, treadmill, baby rattle, jukebox)	9,237	584	5.6%

<sup>1</sup> Not elsewhere classified

Data source: U.S. Patent and Trademark Office, U.S. Department of Commerce

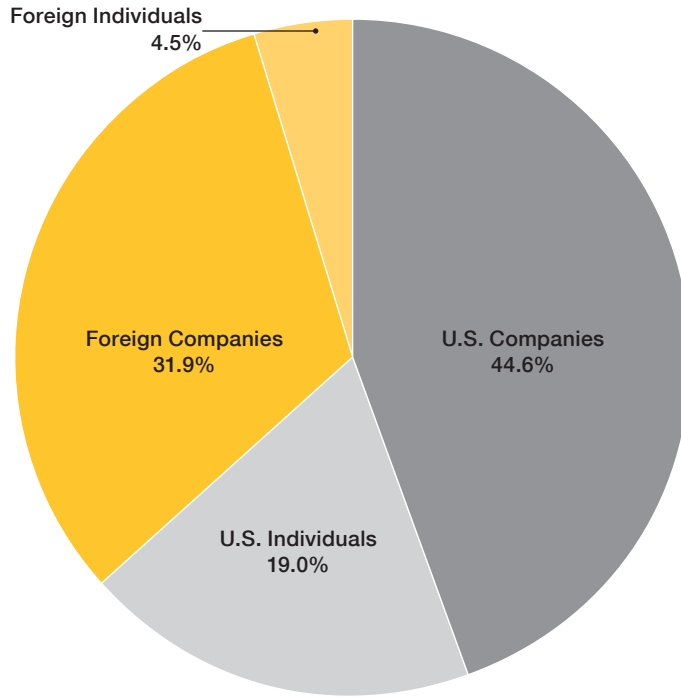
<sup>32</sup> These figures apply to design patents of U.S. origin. However, combining U.S. and foreign origin design patents, product classes D14 and D06 account for 11 percent and 8 percent, respectively, of the total number of USPTO-awarded design patents in 1998–2012.



## Design Patents by Ownership

Companies, both U.S. and foreign, receive roughly 75 percent of the design patents granted by the USPTO. In 2012, that split was 45 percent to U.S. companies and 32 percent to foreign businesses.<sup>33</sup>

### U.S.-Awarded Design Patents by Ownership, 2012



Data source: U.S. Patent and Trademark Office, U.S. Department of Commerce

Examining design patents granted to companies by country reveals that designed manufactured goods (manufactured goods protected by U.S. design patents) sold in this country are dominated by a diverse U.S. manufacturing industry and by foreign manufacturers concentrated among Asian electronics and auto industries.

In number of U.S. design patents granted, the top ten U.S. companies represent a wide range of manufacturing. First on this list is Microsoft, followed by Procter & Gamble and Nike. Each of these companies, which collectively represent such diverse sectors as software, consumer products, and sporting apparel, were granted more than 1,500 design patents between 1999–2012.

The top U.S. list also includes manufacturers of tires and rubber (Goodyear), plumbing fixtures (Kohler), office supplies (3M), and auto manufacturing (Ford). Also on the list, Apple, maker of the iPhone and iPad, received 788 U.S. design patents from 1999 to 2012.

<sup>33</sup> Patent origin is determined by the residence of the first-named “inventor,” or in the case of design patents, the first-named designer. The reported figures show the percent of awarded patents as distributed by year of patent application. For more information, please see USPTO Table A2-2b cited in the references to this report.

## U.S.-Awarded Design Patents, 1999–2012

### U.S. Headquarter Companies — Top 10 in Design Patents

Grantee	Design patents granted: 1999–2012	Headquarters	Industry
<b>All U.S. headquartered companies</b>	101,376	n/a	n/a
Microsoft Corporation	1,900	Redmond, WA	Computer software/video games
Procter & Gamble Company	1,842	Cincinnati, OH	Personal care
Nike, Inc.	1,690	Washington County, OR	Footwear and apparel
Goodyear Tire and Rubber Company	1,260	Akron, OH	Tires and rubber
Black & Decker, Inc.	1,023	Towson, MD	Power tools/hardware
Wolverine World Wide	939	Rockford, MI	Footwear
Kohler Company	853	Kohler, WI	Plumbing, cabinetry, engines
Apple, Inc.	788	Cupertino, CA	Computer hardware/software
3M Innovative Properties Company	754	St. Paul, MN	Diversified (e.g., Post-It, Thinsulate)
Ford Motor Company <sup>1</sup>	745	Dearborn, MI	Automotive

<sup>1</sup> Includes design patents awarded to Ford Global Technologies

Data source: U.S. Patent and Trademark Office, U.S. Department of Commerce

Among foreign companies granted U.S. design patents, Asian countries, particularly companies headquartered in Japan and Taiwan, compose the largest share. Moreover, the Asian companies granted U.S. design patents are concentrated in electronics and auto manufacturing. Between 1999 and 2012, Sony was granted more than 3,000 U.S. design patents. Honda received more than 1,200 U.S. design patents.

Although companies in the United States are granted more U.S. design patents than foreign-owned companies, the top ten foreign companies in number of design patents receive more patents than U.S. companies ranking highly in awards of design patents. Between 1999 and 2012, the top ten foreign companies in grants of U.S. design patents received 15,561 patents. Over this same period, the top ten U.S. companies received 11,794 design patents. This concentration — a large number of U.S. design patents granted to fewer foreign companies — stems largely from Samsung and Sony. Between 1999 and 2012, each company received more than 3,000 U.S. design patents.

## U.S.-Awarded Design Patents, 1999–2012

### Foreign-Headquartered Companies — Top 10 in Design Patents

Grantee	Design patents granted: 1999–2012	Headquarters	Industry
<b>All foreign-headquartered companies</b>	87,433	n/a	n/a
Samsung Electronics Co.	3,323	South Korea	Electronics and information technology
Sony Corporation	3,308	Japan	Electronics and entertainment
Foxconn (Hon Hai Precision Industry Co.)	1,613	Taiwan	Electronics
LG Electronics	1,496	South Korea	Diversified (e.g., electronics, entertainment)
Panasonic <sup>1</sup>	1,488	Japan	Electronics
Honda Motor Company	1,239	Japan	Automotive
Nokia Corporation	1,051	Finland	Communications and information technology
Toyota Motor Corporation	973	Japan	Automotive
Toshiba Corporation	588	Japan	Engineering and electronics
Canon, Inc.	482	Japan	Imaging and optical products

<sup>1</sup> Includes design patents granted to the Matsushita Industrial Company in 1999 through 2008

Data source: U.S. Patent and Trademark Office, U.S. Department of Commerce

## The Patent Trial of the Century: Apple vs. Samsung

In August 2012, a U.S. district court awarded Apple more than \$1 billion in damages in a patent dispute with rival smartphone and tablet manufacturer Samsung. Although the award to Apple was reduced to \$599 million in March 2013, it remains among the highest patent-infringement awards. *The Wall Street Journal* termed the dispute “The Patent Trial of the Century.”

The case was particularly relevant to industrial design because Apple and Samsung’s arguments hinged on design rights — four of the six patents contested were design patents.

Underscoring the importance Apple has placed on design, *InformationWeek* reported in September 2006 that 11.8 percent of Apple’s patent portfolio is made up of design patents — a share well above the electronics industry’s average of 2.7 percent.

## State Clustering of Design Patents

A geographic analysis of design patents reinforces the general impression that much of U.S. industrial design is clustered in western and midwestern states.

For example, California ranks first and foremost in grants of U.S. design patents. Between 2008 and 2012, 12,520 design patents were awarded in California. This tally represents 20 percent of all state-level design patents. Ranking a distant second was New York, which garnered roughly 4,600 design patents, or 7.3 percent of the state total.

Adjusting for state population, however, changes that ranking. Per capita, Washington state ranks first in number of U.S. design patents granted between 2008 through 2012. Over this period, Washington garnered 40.3 design patents per capita. Washington State is also home to Microsoft Corporation, which is among the top-ranking companies in design patent awards.

Following closely in state rank are Wisconsin and Oregon, each granted 39 design patents per capita between 2008 and 2012. Wisconsin and Oregon are home to S.C. Johnson & Son and Nike, respectively. Over this five-year period, 34.5 design patents, per 100,000 population, were awarded in Rhode Island, home to the Hasbro toy company.

In addition to Wisconsin, other Great Lake states ranking highly in numbers of design patents include Minnesota and Ohio. Between 2008 and 2012, 32.7 design patents, per capita, were awarded in Minnesota. Minnesota is headquarters to the 3M Innovative Properties Company (maker of Post-It and Thinsulate). Over this period, nearly the same number of design patents, per 100,000 people, were awarded in Ohio, home to both Procter & Gamble and the Goodyear Tire and Rubber Company.

Although the western and midwestern states dominate in awards of U.S. design patents, Massachusetts and New York also rank highly with roughly 25 design patents per capita. Contributing to this ranking are New York’s Colgate-Palmolive Company and the Gillette Company in Massachusetts.

## U.S.-Awarded Design Patents, Selected Top States, 2008–2012

State	Per capita design patents granted <sup>1</sup>	Illustrative Corporate Headquarters
Washington	40.3	Microsoft Corporation
Wisconsin	39.0	S.C. Johnson & Son, Inc.
Oregon	38.8	Nike, Inc.
Rhode Island	34.5	Hasbro, Inc.
California	33.5	Apple, Inc.
Minnesota, Ohio	32.7, 32.5	3M Innovative Properties Company, Procter & Gamble Company
Illinois	29.0	Motorola, Inc.
Massachusetts	25.5	Gillette Company
New York	23.7	Colgate-Palmolive Company
Michigan	22.8	Ford Motor Company

<sup>1</sup> Per 100,000 people, calculated from U.S. Census Bureau population estimates for 2008–2012

Data source: U.S. Patent and Trademark Office, U.S. Department of Commerce

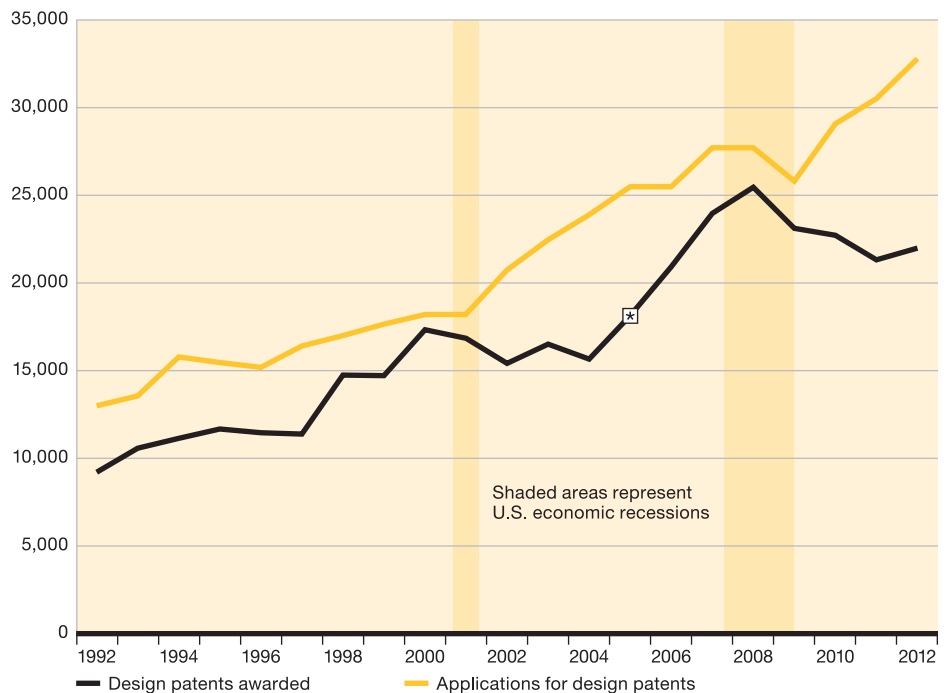


## Business Cycles and Trends in Design Patents

The number of U.S. design patents ebbs and flows with U.S. business cycles. In 1999, the USPTO awarded 14,732 design patents (both U.S. and of foreign origin). Although there was strong growth in the number of design patents granted in 2000, the relatively mild U.S. recession of 2001 likely contributed to the decline in U.S. design patents granted in 2001 and 2002. As the U.S. economy recovered, there was an increase in the number of design patents awarded. For example, USPTO-awarded design patents grew by nearly 15 percent in both 2006 and 2007.

In December of 2007, however, the U.S. economy fell into a severe recession that lasted until June 2009. Growth in design-patent awards slowed to 6 percent in 2008, followed by a sharp drop in design patents of nearly 10 percent in 2009. The number of design patents granted continued to fall, albeit less sharply, in 2010 and 2011. Recent counts for 2012 show a modest recovery of 2.8 percent growth in U.S.-awarded design patents.

### U.S.-Awarded Design Patents, Grants and Applications, 1992–2012



\* The USPTO awarded 12,951 design patents in 2005. That count, however, reflects administrative changes, including an aberration resulting from the USPTO's transition from paper to electronic publishing of patents. Consequently, the number of design patents awarded in 2005, shown in the graph above, was calculated by averaging the number awarded in 2004 and 2006, resulting in an estimate of 18,330 design patents awarded in 2005.

Data source: U.S. Patent and Trademark Office, U.S. Department of Commerce

Although marked, business cycles are short-run phenomena that can mask long-term trends in design patents. Examination of U.S.-awarded design patents since 1910 reveals two distinctive growth periods: 1910 through the mid-1940s and, in particular, the late 1980s through the present.

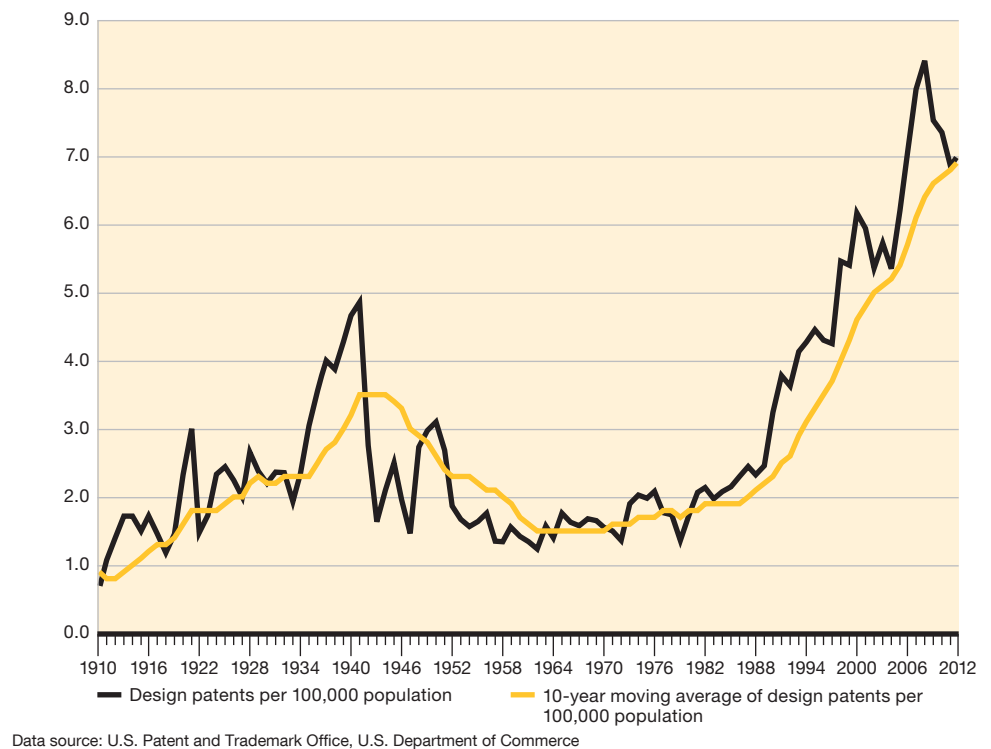
To illustrate, the graph below shows a ten-year moving average of U.S.-awarded design patents, per capita. As indicated, design patents witnessed growth between 1910 and the mid-1940s — over this timeframe, U.S.-awarded design patents grew from approximately one design patent per 100,000 population to four.

Remarkable for this period is that unlike utility patents, which plummeted during the 1930s, the number of U.S.-awarded design patents generally grew throughout the Great Depression. Propelling that growth was a milestone in industrial design — “streamlining” introduced by the Burlington *Zephyr* at the 1933–34 Chicago Century of Progress Exhibition (see sidebar on page 45).

However, the mid-1940s through most of the 1960s witnessed a reversal in this trend. In 1958, for example, U.S.-awarded design patents per capita fell to 1.4. The decline during that period reflects, in part, a 1952 revision to patent law that provided short-term protection for ornamental designs of useful articles under a modified copyright approach.

In 1976, however, the U.S. Congress rejected that revision and returned the protection of industrial design to the conventional patent system.<sup>34</sup>

#### History of U.S. Patented Designs per Capita, 1910–2012, by Year Granted



34 Reichman, J.H., “Design Protection and the New Technologies: A United States Experience in a Transitional Experience,” *Baltimore Law Review*, 1989, vol. 19.

## Streamlining:

### 1933–1934 Chicago Century of Progress Exposition

Manufacturing companies managing to survive the Great Depression of the 1930s faced stiff competition. In order to distinguish their products, companies hired industrial designers who increasingly followed a new design style — streamlining.

Streamlining, made popular by the Burlington *Zephyr*, was introduced at the Century of Progress Exposition at the Chicago World's Fair in 1933 and 1934. It was based on the naturally efficient shapes of fish and birds and incorporated curved and tapered shapes that offered less resistance to air and fluid.

Captivating the American public, streamlined design was evident in objects as varied as cameras, cars, radios, refrigerators, and even the iconic Coca-Cola bottle. Among its chief proponents were Raymond Loewy, who designed the aforementioned Coca-Cola bottle, as well as the Saturn Spaceship and the Greyhound bus and logo, among other products. Interestingly, Loewy's design studio employed Audrey Moore Hodges, who was the first full-time female auto designer, and who designed the 1947 Studebaker Champion.

Other streamlining designers included Norman Bel Geddes, known for his theatrical and movie sets; Walter Dorwin Teague, associated with exhibition design as well as designs for Ford, Kodak, and Boeing; and Henry Dreyfuss, who famously designed table-top telephones for Bell Laboratories, Hoover vacuum cleaners, and the New York City Hudson locomotive.

In the 1980s, consequently, the per-capita concentration of U.S.-awarded design patents rose, heralding a post-industrial era of sustained growth in design and utility patents. In 2008, USPTO-granted design patents per capita reached a high of 8.4. For that matter, the 1980s post-industrial period also witnessed strong growth in *utility* patents, which, per 100,000 population, climbed from 27 in 1980 to nearly 52 in 2008.

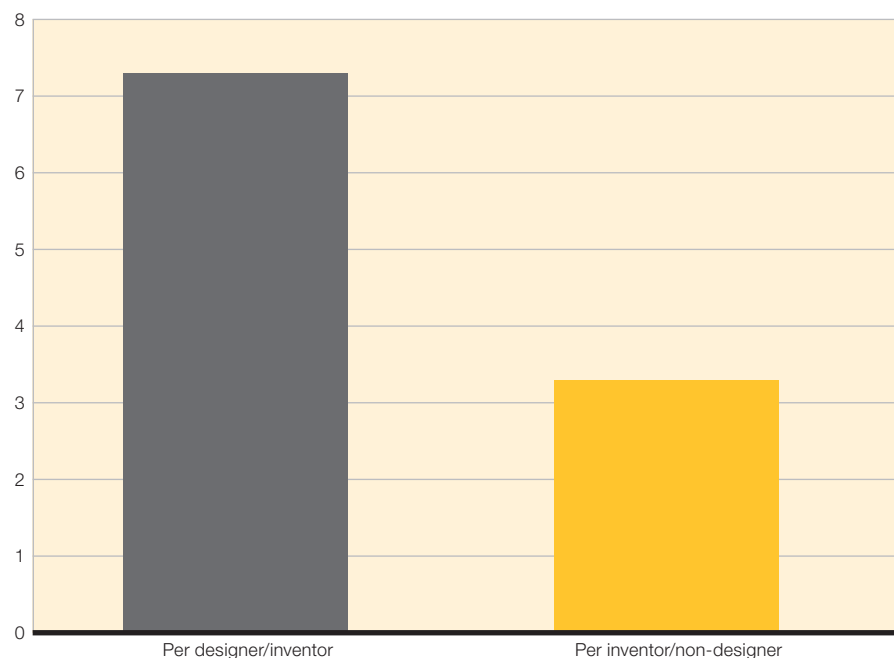
### Industrial Designers as Inventors

In May 2012, the Brookings Institution convened “The Arts, New Growth Theory, and Economic Development,” a National Endowment for the Arts-sponsored symposium to examine “new growth theory” as a tool for assessing the impact of art and culture on the U.S. economy. Presenting at this conference, Alan Marco, currently the USPTO's acting chief economist, portrayed designers as prolific inventors.

Examining patent filing data between 1975 and 2010, Marco found that, among 136,000 “designers” (those named as inventors on *design* patents), 55,000, or 40 percent, were “designers” and “inventors” (named as inventors on *utility* patents as well).<sup>35</sup> Among the 2.5 million “inventors” during this period, only 2 percent were “inventors” and “designers,” i.e., named inventors on both utility and design patents.

Even more telling was the high number of utility patents originating with “designers-inventors.” Over the period studied, the mean number of utility patents originating with designers-inventors was 7.3. By contrast, the average number of utility patents naming inventors-designers was 3.3.

### Average Number of Utility Patents, 1975–2010



Analysis by Alan Marco, U.S. Patent and Trademark Office, U.S. Department of Commerce

<sup>35</sup> All USPTO-granted patents list the individual inventors of the work. However, many patents are awarded to companies, who were listed as the assignees on patent applications.

## Conclusion: The NEA and Industrial Design



D-Rev Chief Executive Officer and Designer Krista Donaldson demonstrates the Brilliance product, an affordable medical device to treat severely jaundice newborns. Photo courtesy of D-Rev: Design Revolution

At first glance, it may seem as though industrial design has little to do with the National Endowment for the Arts. After all, industrial design clusters around the commercial enterprises of manufacturing and industrial design services.

But that view would be shortsighted. While the Arts Endowment does not award grants to for-profit companies, it does support the schools that train industrial designers and the museums that display and interpret design to the public. In 2013, for example, the agency awarded \$50,000 to Atlanta's Robert W. Woodruff Arts Center of the High Museum to support Spark: Innovative Automotive Design, an exhibition that will investigate how visionary automotive designs influenced the automotive industry.



Also, not all industrial design occurs in large, for-profit companies. D-Rev, for example, is a California-based nonprofit product-development company whose mission is to improve the lives of the world's poorest populations. In 2013, D-Rev received a \$25,000 NEA grant to develop an interactive online platform for product designers working on social-impact projects.

However, the connection between the NEA and industrial design goes beyond awarding grants. In the fall of 2013, the Arts Endowment, in partnership with the Bureau of Economic Analysis, is scheduled to release the first-ever U.S. satellite account on arts and cultural industries. To fully measure how the arts affect the U.S. economy, the Arts and Cultural Production Satellite Account (ACPSA) will capture traditionally nonprofit arts industries, such as art museums and symphony orchestras, as well as commercial enterprises. The ACPSA, for example, will include a domain labeled "applied arts and design services," which will measure production and employment by specialized design services industries, including industrial design.

Further, the ACPSA, at the time of its release, will be accompanied by an NEA taxonomy of arts and cultural occupations, which will include industrial designers and other design professionals. The ACPSA, and its associated occupations, thus will account for the total economic impact of industrial design, whether in the commercial or nonprofit sector.

As the final section of this report suggests, however, one cannot assign a true value to this industry and its workers without also considering the role of design in product invention. It is to be hoped that future studies, both quantitative and qualitative, will clarify more extensively the link between industrial design and innovation in products and services, but also in processes, systems, and user experiences. A broader frame of inquiry and a mixed-methods research approach would go even further to improve public knowledge about this protean and prolific sector.

# Appendix

## Understanding Industry Classifications

As reported by the U.S. Census Bureau, the North American Industry Classification System (NAICS) is used by federal statistical agencies in classifying business establishments for the collection, tabulation, and presentation of statistical data describing the U.S. economy. The NAICS structure is hierarchical and begins at the two-digit level, which represents the industry sector, and expands to six digits of industry classification detail.

This report, for example, draws on statistics for two industry sectors — manufacturing, which is NAICS 31, 32, and 33, and “professional, scientific, and technical services,” which is NAICS 54. Each of these industry sectors comprises industry groups and detailed industries. Professional, scientific, and technical services, for example, includes legal services, accounting and payroll services, computer systems design firms, and advertising and public relations firms, just to name a few.

The professional, scientific, and technical services sector also includes architectural, engineering, and related services (NAICS 5413) and specialized design services (NAICS 5414), two *industry groups* that commonly employ industrial designers. In turn, architectural, engineering, and related services contain architectural services businesses, engineering services firms, and drafting businesses, among others. Specialized design services is the parent group to industrial design firms, fashion design houses, graphic design businesses, and companies selling “other specialized design services” such as jewelry design.

Within the NAICS structure, business establishments are assigned an industry code based on the production or service accounting for the largest share of the establishment’s sales or revenue. As discussed in this report, in 2007, 148 industrial design firms (out of a total of 1,637) did \$37 million in graphic design business. But these establishments were classified as industrial design firms — the majority of their sales stemmed from product design and other industrial design services.

### Illustration of NAICS Structure

NAICS	Hierarchy	Sector, industry group, and industry
<b>54</b>	Industry sector	Professional, scientific, and technical services
<b>5414</b>	<i>Industry group</i>	<i>Specialized design services</i>
54141	Industry	Interior design services
54142	Industry	Industrial design services
54143	Industry	Graphic design services
54149	Industry	Other specialized design services
<b>5413</b>	<i>Industry group</i>	<i>Architectural, engineering, and related services</i>
54131	Industry	Architectural services
54132	Industry	Landscape architectural services
54133	Industry	Engineering services
54134	Industry	Drafting services
54135	Industry	Building inspection services
54136	Industry	Geophysical surveying and mapping services
54138	Industry	Testing laboratories

Source: U.S. Census Bureau, U.S. Department of Commerce

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Prototype for a domestic electric space heater, designed by Bill Moggridge, 1973. Photo courtesy of Smithsonian Cooper-Hewitt, National Design Museum, from its permanent collection





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