

**Program Endorsement Brief: 1009.00/Applied Design  
3D Systems Technology**

Los Angeles/Orange County Center of Excellence, October 2021

**Summary Analysis**

<b>Program Endorsement:</b>	<b>Endorsed: All Criteria Met</b> <input type="checkbox"/>	<b>Endorsed: Some Criteria Met</b> <input checked="" type="checkbox"/>	<b>Not Endorsed</b> <input type="checkbox"/>
<b>Program Endorsement Criteria</b>			
<b>Supply Gap:</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
<b>Living Wage: (Entry-Level, 25<sup>th</sup>)</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
<b>Education:</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
<b>Emerging Occupation(s)</b>			
	Yes <input checked="" type="checkbox"/>	No <input checked="" type="checkbox"/>	

The Los Angeles/Orange County Center of Excellence for Labor Market Research (COE) prepared this report to provide Los Angeles/Orange County regional labor market supply and demand data for three middle-skill design occupations related to 3D systems technology: *special effects artists and animators* (27-1014), *commercial and industrial designers* (27-1021), and *graphic designers* (27-1024). Middle-skill occupations typically require some postsecondary education, but less than a bachelor’s degree.<sup>1</sup>

In addition to traditional labor market information, this report analyzes real-time labor market data to better understand the types of job postings that are requesting the knowledge, skills and abilities (KSAs) required for 3D systems technology. 3D systems technology is an emerging field and use of this technology will undoubtedly be used in virtually all industries, including design and manufacturing. This report is intended to help determine whether there is currently demand in the local labor market that is not being met by the supply from community college programs that align with the relevant occupations. In addition, job posting data is included to show which industries and employers are currently hiring middle-skill occupations that employ the KSAs necessary for 3D systems technology.

Based on the available data, there appears to be a supply gap for these three middle-skill design occupations in the region. However, real-time labor market data included in this report shows that less than 1% of design-related job postings in the past year listed 3D printing as an in-demand skill requested by employers. While the Bureau of Labor Statistics lists a bachelor’s degree as the typical entry level education for these occupations, entry-level wages exceed the

<sup>1</sup> The COE classifies middle-skill jobs as the following:

- All occupations that require an educational requirement of some college, associate degree or apprenticeship;
- All occupations that require a bachelor’s degree, but also have more than one-third of their existing labor force with an educational attainment of some college or associate degree; or
- All occupations that require a high school diploma or equivalent or no formal education, but also require short- to long-term on-the-job training where multiple community colleges have existing programs.

self-sufficiency standard wage in both Los Angeles and Orange counties. **Therefore, due to some of the criteria being met, the COE endorses this proposed program.** Detailed reasons include:

#### **Demand:**

- **Supply Gap Criteria** – Over the next five years, there is projected to be **2,441 jobs available annually** in the region due to retirements and workers leaving the field, **which is more than the 1,122 awards conferred annually** by educational institutions in the region.
  - However, not all of the annual openings will use or require the knowledge of 3D printing and/or other 3D imaging systems. Therefore, **the number of annual job openings is likely overstated for design occupations within the field of 3D systems technology.**
  - Over the past 12 months, there were **29 online job postings for middle-skill design occupations that also requested 3D printing skills.**
- **Living Wage Criteria** – Within Los Angeles County, **all of the annual job openings** for the middle-skill design occupations in this report have **entry-level wages above the self-sufficiency standard hourly wage** (\$18.10/hour).<sup>2</sup>
- **Educational Criteria** – The Bureau of Labor Statistics (BLS) lists a bachelor's degree as the typical entry-level education for all three of the design occupations in this report.
  - Furthermore, the national-level educational attainment data indicates **between 20.4% and 27.1% of workers in the field have completed some college or an associate degree.**

#### **Supply:**

- There are **24 community colleges** in the LA/OC region that issue awards related to the occupations of interest, conferring an average of **354 awards annually** between 2017 and 2020.
- Between 2016 and 2019, there was an average of **768 awards conferred annually** in related training programs by non-community college institutions throughout the region.

#### **Occupational Demand**

Exhibit 1 shows the five-year occupational demand projections for the middle-skill design occupations in this report. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to decrease by 2% through 2025. However, there will be more than 2,400 job openings per year through 2025 due to retirements and workers leaving the field. It is important to note that not all of the annual openings listed in Exhibit 1 will use or require the knowledge of 3D printing and/or other 3D imaging systems. Therefore, the data in Exhibit 1 is likely overstated for design occupations within the field of 3D systems technology.

*This report includes employment projection data by Emsi which uses EDD information. Emsi's projections are modeled on recorded (historical) employment figures and incorporate several*

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Self-Sufficiency Standard wage data was pulled from The Self-Sufficiency Standard Tool for California on 10/27/2021. For more information, visit: <http://selfsufficiencystandard.org/california>.

underlying assumptions, including the assumption that the economy, during the projection period, will be at approximately full employment. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, it may impact the projections. At this time, it is not possible to quantify the full impact of COVID-19 on projections of industry and occupational employment. Therefore, the projections included in this report do not take the full impacts of COVID-19 into account.

**Exhibit 1: Occupational demand in Los Angeles and Orange Counties<sup>3</sup>**

Geography	2020 Jobs	2025 Jobs	2020-2025 Change	2020-2025 % Change	Annual Openings
Los Angeles	21,760	21,234	(526)	(2%)	1,947
Orange	5,697	5,600	(97)	(2%)	495
<b>Total</b>	<b>27,458</b>	<b>26,835</b>	<b>(623)</b>	<b>(2%)</b>	<b>2,441</b>

### Wages

The labor market endorsement in this report considers the entry-level hourly wages for the middle-skill design occupations in this report related to 3D printing in Los Angeles County as they relate to the county’s self-sufficiency standard wage. Orange County wages are included below in order to provide a complete analysis of the LA/OC region. Detailed wage information, by county, is included in Appendix A.

**Los Angeles County**— All of the annual openings for the occupations in this report have entry-level wages above the self-sufficiency standard wage for one adult (\$18.10 in Los Angeles County).<sup>4</sup> Typical entry-level hourly wages are in a range between \$19.21 and \$27.69. Experienced workers can expect to earn wages between \$39.23 and \$61.61, which are higher than the self-sufficiency standard.

**Orange County**— The majority (89%) of annual openings for the occupations in this report have entry-level wages below the self-sufficiency standard wage for one adult (\$20.63 in Orange County).<sup>5</sup> Typical entry-level hourly wages are in a range between \$15.49 and \$28.41. Experienced workers can expect to earn wages between \$38.40 and \$52.00, which are higher than the self-sufficiency standard.

### Job Postings

There were 7,212 online job postings related to the middle-skill design occupations in this report listed in the past 12 months. The highest number of job postings were for graphic designers, product designers, senior product designers, and junior graphic designers, and motion graphic designers. The top skills were Adobe Photoshop, graphic design, Adobe InDesign, Adobe Illustrator, and Adobe Acrobat. The top three employers, by number of job postings, in the region

<sup>3</sup> Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

<sup>4</sup> Self-Sufficiency Standard wage data was pulled from The Self-Sufficiency Standard Tool for California on 10/26/2021. For more information, visit: <http://selfsufficiencystandard.org/california>.

<sup>5</sup> Ibid.

were Disney, Blizzard Entertainment, and Rivian. **Of these 7,212 online job postings, only 29 (less than 1%) mentioned 3D printing as a skill requested by employers.**

### 3D Printing/Additive Manufacturing (AM)

In the Los Angeles/Orange County region, 1,216 middle-skill job postings listed 3D printing/additive manufacturing (AM) as an in-demand skill. About half of these job postings are in the manufacturing industry (NAICS 31-33), and the top titles listed on job postings were 3D printer technicians, mechanical engineers, engineering technicians, manufacturing engineers, and additive manufacturing technicians. Top employers in the region who listed 3D printing/additive manufacturing in job postings were 3DEO, Relativity Space, and SprintRay.

*It is important to note that the job postings data included in this section reflects online job postings listed in the past 12 months and does not yet demonstrate the full impact of COVID-19. While employers have generally posted fewer online job postings since the beginning of the pandemic, the long-term effects are currently unknown.*

### **Educational Attainment**

The Bureau of Labor Statistics (BLS) lists a bachelor’s degree as the typical entry-level education for all three of the occupations in this report. Furthermore, the national-level educational attainment data indicates between 20.4% and 27.1% of workers in the field have completed some college or an associate degree. Of the 51% of middle-skill design job postings listing a minimum education requirement in Los Angeles/Orange County, 84% (3,068) requested a bachelor’s degree, 11% (395) requested a high school diploma and 6% (203) requested an associate degree.

### **Educational Supply**

**Community College Supply**—Exhibit 2 shows the three-year average number of awards conferred by community colleges in the related TOP codes: Computer Graphics and Digital Imagery (0614.60), Commercial Art (1013.00), and Graphic Art and Design (1030.00). The colleges with the most completions in the region are Golden West, LA Trade-Tech, Orange Coast, and Santa Monica. Over the past 12 months, there were 11 other related program recommendation requests from regional community colleges.

**Exhibit 2: Regional community college awards (certificates and degrees), 2017-2020**

TOP Code	Program	College	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Award Average
0614.60	Computer Graphics and Digital Imagery	Citrus	23	13	12	16
		East LA	-	16	1	6
		<b>LA Subtotal</b>	<b>23</b>	<b>29</b>	<b>13</b>	<b>22</b>
		Coastline	2	5	1	3
		Cypress	1	7	5	4
		Fullerton	1	2	1	1
		N. Orange Adult	4	9	3	5
		Orange Coast	35	38	21	31

TOP Code	Program	College	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Award Average
		Saddleback	7	4	4	5
		Santa Ana	3	-	11	5
		<b>OC Subtotal</b>	<b>53</b>	<b>65</b>	<b>46</b>	<b>55</b>
		<b>Supply Subtotal/Average</b>	<b>76</b>	<b>94</b>	<b>59</b>	<b>76</b>
1013.00	Commercial Art	LA Trade	42	44	23	36
		LA Valley	8	4	7	6
		Pasadena	4	6	-	3
		Rio Hondo	1	4	-	2
		<b>LA Subtotal</b>	<b>55</b>	<b>58</b>	<b>30</b>	<b>48</b>
		Cypress	2	2	1	2
		Fullerton	6	7	2	5
		Orange Coast	3	6	5	5
		Santa Ana	2	4	1	2
		<b>OC Subtotal</b>	<b>13</b>	<b>19</b>	<b>9</b>	<b>14</b>
		<b>Supply Subtotal/Average</b>	<b>68</b>	<b>77</b>	<b>39</b>	<b>61</b>
1030.00	Graphic Art and Design	Cerritos	10	11	11	11
		East LA	10	18	3	10
		El Camino	2	-	1	1
		Glendale	9	6	4	6
		LA City	5	6	22	11
		LA Pierce	15	22	15	17
		LA Valley	3	2	5	3
		Long Beach	2	1	2	2
		Mt San Antonio	11	15	11	12
		Pasadena	7	9	7	8
		Rio Hondo	-	30	20	17
		Santa Monica	26	31	50	36
		<b>LA Subtotal</b>	<b>100</b>	<b>151</b>	<b>151</b>	<b>134</b>
		Fullerton	14	12	12	13
		Golden West	22	57	32	37
		Irvine	-	5	16	7
		Saddleback	15	23	15	18
		Santa Ana	1	4	3	3
		Santiago Canyon	9	5	1	5
		<b>OC Subtotal</b>	<b>61</b>	<b>106</b>	<b>79</b>	<b>82</b>

TOP Code	Program	College	2017-2018 Awards	2018-2019 Awards	2019-2020 Awards	3-Year Award Average
Supply Subtotal/Average			161	257	230	216
Supply Total/Average			305	428	328	354

**Non-Community College Supply**—For a comprehensive regional supply analysis, it is also important to consider the supply from other institutions in the region that provide training programs for the middle-skill design occupations in this report. Exhibit 3 shows the annual and three-year average number of awards conferred by these institutions in the related Classification of Instructional Programs (CIP) Codes: Graphic Communications, General (10.0301), Computer Graphics (11.0803), Computer Software and Media Applications, Other (11.0899), Design and Visual Communications, General (50.0401), Commercial and Advertising Art (50.0402), Graphic Design (50.0409), and Illustration (50.0410). Due to different data collection periods, the most recent three-year period of available data is from 2016 to 2019. Between 2016 and 2019, four-year colleges in the region conferred an average of 768 awards annually in related training programs.

**Exhibit 3: Regional non-community college awards, 2016-2019**

CIP Code	Program	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Year Award Average
10.0301	Graphic Communications, General	CSU-Los Angeles	2	5	10	6
11.0803	Computer Graphics	ABC Adult School	-	5	4	3
		Los Angeles Pacific College	-	-	33	11
11.0899	Computer Software and Media Applications, Other	Art Center College of Design	7	8	12	9
		California Institute of the Arts	-	-	7	2
		Learnet Academy	41	14	-	18
50.0401	Design and Visual Communications, General	Bethesda University	3	-	-	1
		Biola University	3	2	5	3
		Fashion Institute of Design & Merchandising-LA	181	155	142	159
		Gnomon	28	37	48	38
		Otis College of Art and Design	37	43	34	38
		Platt College-LA	-	5	-	2
		University of La Verne	1	-	-	0

CIP Code	Program	College	2016-2017 Awards	2017-2018 Awards	2018-2019 Awards	3-Year Award Average
50.0402	Commercial and Advertising Art	Art Center College of Design	13	15	10	13
		Woodbury University	14	13	13	13
50.0409	Graphic Design	Art Center College of Design	71	50	73	65
		California Institute of the Arts	11	11	9	10
		California State Polytechnic University-Pomona	123	128	92	114
		CSU-Dominguez Hills	-	1	-	0
		Chapman University	24	19	17	20
		Concordia Univ.-Irvine	12	9	7	9
		Fashion Institute of Design & Merchandising-LA	44	36	38	39
		Laguna College of Art and Design	24	21	24	23
		Los Angeles Film School	-	-	3	1
		Los Angeles Pacific College	-	-	1	0
		Mt Sierra College	15	10	-	8
		New York Film Academy	-	3	3	2
		Otis College of Art and Design	-	-	1	0
		Platt College-LA	7	3	-	3
		University of La Verne	1	-	-	0
50.04.10	Illustration	Art Center College of Design	113	168	133	138
		Laguna College of Art and Design	18	18	14	17
<b>Supply Total/Average</b>			<b>793</b>	<b>779</b>	<b>733</b>	<b>768</b>

Appendix A: Occupational demand and wage data by county

Exhibit 4. Los Angeles County

Occupation (SOC)	2020 Jobs	2025 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25 <sup>th</sup> Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 <sup>th</sup> Percentile)
Special Effects Artists and Animators (27-1014)	7,155	7,314	159	2%	720	\$22.23	\$40.04	\$61.61
Commercial and Industrial Designers (27-1021)	1,387	1,266	(120)	(9%)	114	\$27.69	\$36.61	\$50.10
Graphic Designers (27-1024)	13,219	12,654	(565)	(4%)	1,113	\$19.21	\$28.28	\$39.23
<b>Total</b>	<b>21,760</b>	<b>21,234</b>	<b>(526)</b>	<b>(2%)</b>	<b>1,947</b>			

Exhibit 5. Orange County

Occupation (SOC)	2020 Jobs	2025 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Entry-Level Hourly Earnings (25 <sup>th</sup> Percentile)	Median Hourly Earnings	Experienced Hourly Earnings (75 <sup>th</sup> Percentile)
Special Effects Artists and Animators (27-1014)	818	822	5	1%	79	\$15.49	\$30.51	\$52.00
Commercial and Industrial Designers (27-1021)	636	625	(11)	(2%)	54	\$28.41	\$37.41	\$50.83
Graphic Designers (27-1024)	4,244	4,153	(91)	(2%)	361	\$19.13	\$27.84	\$38.40
<b>Total</b>	<b>5,697</b>	<b>5,600</b>	<b>(97)</b>	<b>(2%)</b>	<b>495</b>			



### Exhibit 6. Los Angeles and Orange Counties

Occupation (SOC)	2020 Jobs	2025 Jobs	5-Yr Change	5-Yr % Change	Annual Openings	Typical Entry-Level Education
Special Effects Artists and Animators (27-1014)	7,972	8,136	164	2%	799	Bachelor's degree
Commercial and Industrial Designers (27-1021)	2,022	1,891	(132)	(7%)	168	Bachelor's degree
Graphic Designers (27-1024)	17,463	16,808	(655)	(4%)	1,474	Bachelor's degree
<b>Total</b>	<b>27,458</b>	<b>26,835</b>	<b>(623)</b>	<b>(2%)</b>	<b>2,441</b>	

#### Appendix B: Sources

- O\*NET Online
- Labor Insight/Jobs (Burning Glass)
- Economic Modeling Specialists, International (Emsi)
- Bureau of Labor Statistics (BLS)
- Employment Development Department, Labor Market Information Division, OES
- California Community Colleges Chancellor's Office Management Information Systems (MIS)
- California Family Needs Calculator, Insight Center for Community Economic Development
- Chancellor's Office Curriculum Inventory (COCI 2.0)

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