Computer Aided Design (CAD)

This is an advanced course in drafting principles and applications and a drafting class is a prerequisite for this course. This is an appropriate advanced course for any student who may pursue a career in industrial, manufacturing or engineering technology. Students will construct various advanced drawings using SolidWorks software. This is a state of the art industrial advanced technology course. In this class, the student will be doing a wide range of assemblies and students will further their skills in advanced solid modeling. Relations are used to define attributes such as tangency, parallelism, perpendicularity and concentricity with respect to sketch geometry. The student will understand that the assembly mates define equivalent relations with respect to the individual parts or components, allowing the easy construction of assemblies. Students will also learn additional advanced mating features such as gear and cam follower mates, which allow modeled gear assemblies to accurately reproduce the rotational movement of an actual gear train.

-SolidWorks is a 3D mechanical CAD (computer-aided design) program that runs on a Microsoft Windows machine.
-SolidWorks is currently used by over 1.3 million engineers and designers at more than 130,000 companies worldwide.
-The Sheffield Telegraph comments that SolidWorks is the most popular CAD software in the world.
-Its user base ranges from individuals to large corporations, and covers a very wide cross-section of manufacturing market segments.
## CAD Overview

<table>
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<tr>
<th>Course Description</th>
<th>Topics at a Glance</th>
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| This is a one-year advanced level course which provides students the opportunity to expand their skills in mechanical drafting. This course is a must for students planning to major in any field of engineering. This class provides more use in SolidWorks in both a mechanical setting. Advanced topics in mechanical design including lofting, mold design, multi-body parts, sheet metal and complex assemblies. | • Drawing of complex shapes  
• Extrude a Boss/Base  
• Cut an advanced shape  
• How to loft and mold  
• How to do complex assemblies  
• Use vector mechanics  
• How to use SolidWorks in the design and analysis of mechanisms  
• Design multi-body parts  
• Sheet metal layout and design |

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| • Advanced material configure  
• Checking the mass properties of objects  
• Drawing quizzes  
• Final Exams  
• Journal and Periodical Research and Analysis  
• Teacher and Student Designed Assessments |
Prepared Graduates

The preschool through twelfth-grade concepts and skills that all students who complete the Colorado education system must master to ensure their success in a postsecondary and workforce setting.

1. CTE Essential Skills: Academic Foundations

ESSK.01: Achieve additional academic knowledge and skills required to pursue the full range of career and postsecondary education opportunities within a career cluster.

Prepared Graduate Competencies in the CTE Essential Skills standard:

- Complete required training, education, and certification to prepare for employment in a particular career field
- Demonstrate language arts, mathematics, and scientific knowledge and skills required to pursue the full range of post-secondary and career opportunities

2. CTE Essential Skills: Communications Standards

ESSK.02: Use oral and written communication skills in creating, expressing, and interrupting information and ideas, including technical terminology and information

Prepared Graduate Competencies in the CTE Essential Skills standard:

- Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice
- Demonstrate use of concepts, strategies, and systems for obtaining and conveying ideas and information to enhance communication in the workplace

3. CTE Essential Skills: Problem Solving and Critical Thinking

ESSK.03: Solve problems using critical thinking skills (analyze, synthesize, and evaluate) independently and in teams using creativity and innovation.
Prepared Graduate Competencies in the CTE Essential Skills standard:

- Employ critical thinking skills independently and in teams to solve problems and make decisions
- Employ critical thinking and interpersonal skills to resolve conflicts with staff and/or customers
- Conduct technical research to gather information necessary for decision-making

4. CTE Essential Skills: Safety, Health, and Environmental

ESSK.06: Understand the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance

Prepared Graduate Competencies in the CTE Essential Skills standard:

- Implement personal and jobsite safety rules and regulations to maintain safe and helpful working conditions and environment
- Complete work tasks in accordance with employee rights and responsibilities and employers obligations to maintain workplace safety and health

5. CTE Essential Skills: Leadership and Teamwork

ESSK.07: Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives

Prepared Graduate Competencies in the CTE Essential Skills standard:

- Employ leadership skills to accomplish organizational skills and objectives
6. CTE Essential Skills: Employability and Career Development

ESSK.09: Know and understand the importance of employability skills; explore, plan, and effectively manage careers; know and understand the importance of entrepreneurship skills

Prepared Graduate Competencies in the CTE Essential Skills standard:

- Identify and demonstrate positive work behaviors and personal qualities needed to be employable
- Develop skills related to seeking and applying for employment to find and obtain a desired job
COLORADO COMMUNITY COLLEGE SYSTEM CAREER & TECHNICAL EDUCATION TECHNICAL STANDARDS
REVISION & ACADEMIC ALIGNMENT PROCESS

Colorado’s 21st Century Career & Technical Education Programs have evolved beyond the historic perception of vocational education. They are Colorado’s best kept secret for:

- Relevant & rigorous learning
- Raising achievement among all students
- Strengthening Colorado’s workforce & economy

Colorado Career & Technical Education serves more than 116,000 Colorado secondary students annually through 1,200 programs in 160 school districts, 270 High Schools, 8 Technical Centers, 16 Community Colleges & 3 Technical Colleges. One of every three Colorado high school students gains valuable experiences by their enrollment in these programs.

ALIGNMENT REQUIRED BY SB 08-212

22-7-1005. Preschool through elementary and secondary education - aligned standards - adoption - revisions.

2(b): In developing the preschool through elementary and secondary education standards, the State Board shall also take into account any Career & Technical Education standards adopted by the State Board for Community Colleges and Occupational Education, created in Section 23-60-104, C.R.S., and, to the extent practicable, shall align the appropriate portions of the preschool through elementary and secondary education standards with the Career and Technical standards.

STANDARDS REVIEW AND ALIGNMENT PROCESS

Beginning in the fall of 2008, the Colorado Community College System conducted an intensive standards review and alignment process that involved:

NATIONAL BENCHMARK REVIEW

Colorado Career & Technical Education recently adopted the Career Cluster and Pathway Model endorsed by the United State Department of Education, Division of Adult and Technical Education. This model provided access to a national set of business and industry validated knowledge and skill statements for 16 of the 17 cluster areas. California and Ohio provided the comparative standards for the Energy cluster

- Based on this review Colorado CTE has moved from program-specific to Cluster & Pathway based standards and outcomes
- In addition, we arrived at fewer, higher, clearer and more transferrable standards, expectations and outcomes.

COLORADO CONTENT TEAMS REVIEW

The review, benchmarking and adjusting of the Colorado Cluster and Pathway standards, expectations and outcomes was through the dedicated work of Content Teams comprised of secondary and postsecondary faculty from across the state. Participation by instructors from each level ensured competency alignment between secondary and postsecondary programs. These individuals also proposed the draft academic
alignments for math, science reading, writing and communication, social studies (including Personal Financial Literacy) and post secondary and workforce readiness (PWR.)
ACADEMIC ALIGNMENT REVIEW

In order to validate the alignment of the academic standards to the Career & Technical Education standards, subject matter experts in math, science, reading, writing and communication, and social studies were partnered with career & technical educators to determine if and when a true alignment existed.

CURRENT STATUS

• One set of aligned Essential skills to drive Postsecondary and Workforce Readiness inclusion in all Career & Technical Education programs.

• 52 pathways with validated academic alignments

• 12 pathways with revised standards ready for alignment (currently there are no approved programs in these pathways)

• 21 pathways where no secondary programming currently exists. Standards and alignments will be developed as programs emerge.

• Available for review at: www.coloradostateplan.com/content_standards.htm
Colorado Career & Technical Education Standards Academic Alignment Reference System

The Career & Technical Education standards have been organized by Career Cluster (17) and Pathway (81). In addition, a set of “Essential Skills” was developed to ensure the Postsecondary and Workforce Readiness within any cluster or pathway. These workforce readiness skills are applicable to all career clusters and should form the basis of each CTE program.

**Organization**

**Essential Skills**
There exists a common set of knowledge and skills that are applicable to all students regardless of which cluster or pathway they choose. This set of standards is meant for inclusion in each program to enhance the development of postsecondary and workforce readiness skills.

**Career Cluster**
A Career Cluster is a grouping of occupations and broad industries based on commonalities. The 17 Career Clusters organize academic and occupational knowledge and skills into a coherent course sequence and identify pathways from secondary schools to two- and four-year colleges, graduate schools, and the workplace. Students learn in school about what they can do in the future. This connection to future goals motivates students to work harder and enroll in more rigorous courses.

**Career Pathway**
Pathways are sub-groupings of occupations/career specialties used as an organizing tool for curriculum design and instruction. Occupations/career specialties are grouped into Pathways based on the fact that they require a set of common knowledge and skills for career success.

**Prepared Completer Competency**
This level targets the “big ideas” in each pathway. These are the competencies that all students who complete a CTE pathway must master to ensure their success in a postsecondary and workforce setting. Prepared Completer Competencies will not usually be “course” specific but grow with the student’s progression through the sequence of courses.

**Concept/Skill**
The articulation of the concepts and skills that indicates a student is making progress toward being a prepared completer. They answer the question: *What do students need to know and be able to do?*

**Evidence Outcome**
The indication that a student is meeting an expectation at the mastery level. *How do we know that a student can do it?*
Academic Alignments

Academic alignments, where appropriate in Math, Reading, Writing and Communication, Science and Social Studies (including Personal Financial Literacy) were defined by CTE and academic subject matter experts using the following criteria:

- It was a point where technical and academic content naturally collided;
- The student must demonstrate adequate proficiency with the academic standard to perform the technical skill; and
- It could be assessed for both academic and technical understanding.

Colorado’s CTE programs have had academic alignments dating back to the early 1990’s. While these alignments resulted in an increase in academic focus in CTE programs, the reality is that a true transformation in intentional teaching toward the academic standard was limited.

With these alignments comes a new expectation: If a CTE instructor is teaching a CTE concept that has an identified alignment, they must also be intentional about their instruction of the academic standard. CCCS will be providing professional development and instructional resources to assist with the successful implementation of this new expectation. In addition, this expanded expectation will require increased collaboration between CTE and academic instructors to transform teaching and learning throughout each school.

For each set of Cluster and Pathway standards, the academic alignments have been included and are separated by academic area. CCCS chose to align at the “Evidence Outcome” level. The aligned academic evidence outcome follows the CTE evidence outcome to which it has been aligned. For a sample, see Illustration A.
Illustration A

AGBS.01 The student will describe agribusinesses, the relationship of agribusiness to the industry of agriculture and will identify opportunities in the agribusiness systems pathway.

AGBS.01.a The student will understand the history and global significance of agribusinesses.

AGBS.01.a.b Define the major trends and relationship of agribusiness to global agriculture production.

MA.10 - GR.9-12.GLE.1 - EO.a Reason quantitatively and use units to solve problems (CCSS. N-Q).

The academic standard number used in the alignments matches the Colorado Department of Education standards numbering convention.
### Career Pathway Abbreviations

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<th>Career Cluster</th>
<th>Career Pathway</th>
<th>Abbreviation</th>
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<td>Agriculture and Natural Resources Cluster</td>
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<td>Agriculture and Natural Resources Cluster</td>
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<td>Agriculture and Natural Resources Cluster</td>
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<td>Agriculture and Natural Resources Cluster</td>
<td>Food Products and Processing Systems Pathway</td>
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<td></td>
<td>Energy Cluster</td>
<td>Energy Efficiency &amp; Environmental Technology</td>
<td>EEET</td>
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<td></td>
<td>Energy Cluster</td>
<td>Renewable Energy Production</td>
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<td>Energy Cluster</td>
<td>Electrical Energy Transmission &amp; Distribution</td>
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<tr>
<td>Energy Cluster</td>
<td>Electromechanical Generation &amp; Maintenance</td>
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<tr>
<td>Energy Cluster</td>
<td>Fossil Energy Extraction, Processing &amp; Distribution</td>
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**Business, Marketing, Government and Public Administration**

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<td>Marketing Cluster</td>
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**Postsecondary and Workforce Readiness**

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**Health Science, Criminal Justice and Public Safety**

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<td>Law, Public Safety, Corrections, &amp; Security</td>
<td>Emergency and Fire Management Services Pathway</td>
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<td>Law, Public Safety, Corrections, &amp; Security</td>
<td>Law Enforcement Services Pathway</td>
<td>LEAS</td>
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<td>Hospitality, Human Services and Education (Family and Consumer Sciences)</td>
<td>Education &amp; Training Cluster</td>
<td>Teaching and Training Pathway</td>
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<td>Restaurants and Food and Beverage Services Pathway (Catering)</td>
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<td>Human Service Cluster</td>
<td>Early Childhood Development Pathway (Child &amp; Adolescent Development)</td>
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<td>Human Service Cluster</td>
<td>Family and Community Services Pathway (Nutrition and Wellness)</td>
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<td>Warehousing and Distribution Center Operations Pathway</td>
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<td>ARTS CORE CLUSTER</td>
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<td>STEM Cluster</td>
<td>STEM Cluster Standards</td>
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</table>
CAD Standards

STCO.01 Understand and demonstrate the characteristics, scope and core concepts of technology.

STCO.01.01 Understand and apply tools, materials and processes.

STCO.01.01.a Apply and create an appropriate process for an assigned situation to solve a real world problem, using tools and materials.

STCO.01.01.b Interpret of results of a study, including inferences and predictions. - Define and explain the meaning of significance (both practical and statistical).

STCO.01.02 Apply characteristics of technology.

STCO.01.02.a Analyze rate, goal and commercialization of technology through a production process.

STCO.01.03 Use the appropriate technology to determine scope.

STCO.01.03.a Demonstrate the ability to formulate results by the collection and interpretation of data.

STCO.01.04 Identify and apply the core concepts of technology.

STCO.01.04.a Demonstrate the ability to characterize a plan and identify the necessary tools that will produce a technical solution when given a problem statement.

STCO.01.04.b Describe the elements of good engineering practice (e.g. understanding customer needs, planning requirements, analysis, using appropriate tools and materials, prototyping, test, evaluation and verification.

STCO.01.04.c Effectively use project management techniques (including, but not limited to, time management practices, effective organizational skills, conduct analysis of cost, resources, and production capability and quality practices with continuous improvement

STCO.01.04.d Apply knowledge of scientific development to solve real world technical applications.
STCO.02 Understand and demonstrate the relationships among technologies and the connections between technology and other fields of study.

STCO.02.01 Understand and apply tools, materials and processes.

STCO.02.01.a Apply invention as a process of connecting science, technology and math, along with materials, tools and innovation to create breakthrough devices, tools and systems.

STCO.02.02 Synthesize and apply technological knowledge and advances of science and mathematics.

STCO.02.02.a Develop, communicate, and justify an evidence-based scientific prediction regarding the effects of the action-reaction force pairs on the motion of two interacting objects.

STCO.02.02.b Use mathematical principals to analyze the application of an existing material or system with the goal of improving and modifying it.

STCO.02.02.c Gather, analyze and interpret data on chemical and physical properties of elements (e.g., density, melting point, boiling point, pH, conductivity).

STCO.02.02.d Develop, communicate and justify an evidence based scientific explanation regarding the potential or kinetic nature of a type of energy.

STCO.02.02.e Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.

STCO.02.02.f Find solutions to equations involving power and exponential functions; solve these equations graphically or numerically or algebraically using calculators, graphing utilities or other.

STCO.03 Understand and demonstrate the cultural, social, economic, political and environmental effects of technology.

STCO.03.01 Understand and apply tools, materials and processes of technology.

STCO.03.01.a Understand why the management of waste produced from technological systems is an important societal issue.

STCO.03.01.b Explain how humans devise technologies to reduce the negative consequence of other technologies. (e.g. expanded use of recycling and new processes such as deconstruction vs. demolition).

STCO.03.02 Demonstrate an understanding of the environmental consequences of technology.

STCO.03.02.a Explain how making decisions about the use of technology involves weighing the trade-offs between the positive and negative effects.

STCO.03.02.b Develop an appreciation for the vast relationships in technology and how future developments and society’s well being is dependent on how well technology is understood, developed, used and restricted.
STCO.03.03 Understand the impact of technology on cultural, social, economic, and political changes.

STCO.03.03.a Apply the knowledge of natural science and mathematics gained by study, experience and practice applied with creativity and judgment.

STCO.03.03.b Think critically, analyze evidence, read graphs, understand logical arguments, detect logical fallacies, test conjectures, evaluate risks, and appreciate the role mathematics plays in the modern world, i.e., be quantitatively literate.

STCO.04 Understand and demonstrate the influence of technology on history and the societal role in the development and use of technology.

STCO.04.01 Understand and apply tools, materials and processes of technology.

STCO.04.01.a Develop an understanding of the factors that drive technological development (e.g. social and cultural priorities as well as the acceptance and use of products and systems).

STCO.04.01.b Trace the development and use of tools and materials through the evolution of civilization.

STCO.04.02 Explain the evolution of techniques, measurement, and resources.

STCO.04.02.a Understand that the design and construction of structures have evolved from the development of techniques for measurement, controlling systems, and the understanding of special relationships.

STCO.04.02.b Understand that just as the Iron Age was defined by the use of iron, the information age is evolving the use of information as a resource.

STCO.04.03 Understand how development is driven by demands, values, and interests.

STCO.04.03.a Chronicle technology development throughout history and the forces that were apparent during the historical timeline from the Iron Age to the Information Age.

STCO.04.03.b Identify factors that contribute to the design and demand for various technologies (e.g. economy, fads, and advertising).

STCO.04.04 Explain the acceptance and use of products and systems.

STCO.04.04.a Learn that most technological development has been evolutionary, the result a series of refinements to a basic invention.

STCO.04.05 Apply the process of inventions and innovations.

STCO.04.05.a Identify changes in society and the creation of new needs and wants to the process of invention and innovation.

STCO.05 Develop and demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
STCO.**05.01**  Understand and apply tools, materials and processes of technology.

- **STCO.05.01.a** Recognize the multidisciplinary approach in solving technological problems.
- **STCO.05.01.b** Gather, analyze and interpret data on the quantity of energy in a system or object using appropriate measurements, equations and graphs.
- **STCO.05.01.c** Develop an understanding of counting techniques to solve problems in real world contexts.

**STCO.05.02**  Implement trouble shooting techniques in problem solving.

- **STCO.05.02.a** Gather knowledge to correct issues relevant to use and preventative maintenance. (the noisy belt, leaking window, screws to repair human joints, Hubble telescope).
- **STCO.05.02.b** Analyze and interpret prior knowledge of tools, materials and processes to create a plan of action.
- **STCO.05.02.c** Gather, analyze and interpret data and graphs regarding position, velocity and acceleration of moving objects.
- **STCO.05.02.d** Develop new ideas to solve and eliminate recurring issues.

**STCO.05.03**  Apply research and development in problem solving.

- **STCO.05.03.a** Apply a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.
- **STCO.05.03.b** Utilize research in solving technological problems.
- **STCO.05.03.c** Evaluate the efficiency of a variety of energy transformations.
- **STCO.05.03.d** Demonstrate the relationship between all representations of linear functions using point-slope, slope-intercept, and standard form of a line through tables, graphs, symbols, text, and geometric models.
- **STCO.05.03.e** Categorize sequences as arithmetic, geometric, or neither and develop formulas for the general terms related to arithmetic and geometric sequences using tables, graphs, symbols, text, and geometric models.

**STCO.05.04**  Clarify the meanings of invention and innovation.

- **STCO.05.04.a** Understand community and environmental needs and their long-term impact. (i.e., not in my back yard vs. imminent domain).
- **STCO.05.04.b** Understand the definitions of invention and innovation. (i.e., Invention is a process of turning ideas and imagination into devices and systems and Innovation is the process of modifying an existing product or system to improve it).

**STCO.06**  Understand and demonstrate the attributes of design by applying the design process and
assessing the impact of bringing a product to market.

**STCO.06.01** Understand and apply tools, materials and processes of technology.

**STCO.06.01.a** Use tools to manipulate materials through the design cycle.

**STCO.06.01.b** Apply criteria and constraints of materials, processes and tools to a design.

**STCO.06.02** Use the attributes of design.

**STCO.06.02.a** Understand that design is a creative planning process that leads to useful products and systems.

**STCO.06.02.b** Explain how the requirements of a design, such as criteria, constraints, and efficiencies sometimes compete with each other.

**STCO.06.03** Utilize the design process.

**STCO.06.03.a** Demonstrate the design process by defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, and exploring possibilities.

**STCO.06.03.b** Select an approach, develop a design proposal, make a model or prototype, test and evaluate the design using specifications, refine the design, create or make it, and communicate processes and results.

**STCO.06.03.c** Understand that the design needs to be continually checked and critiqued, and the ideas of the design must be redefined and improved.

**STCO.06.04** Understand the impact of products.

**STCO.06.04.a** Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and environment.

**STCO.06.04.b** Use assessment techniques, such as trend analysis and experimentation, to make decisions about the future development of technology.

**STCO.07** Understand and demonstrate engineering design by applying the design process and assessing the impact of systems.

**STCO.07.01** Understand and apply tools, materials and processes of technology.

**STCO.07.01.a** Use tools to evaluate and select materials and processes for the design cycle.

**STCO.07.02** Use engineering principles.

**STCO.07.02.a** Understand that modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.

**STCO.07.02.b** Explain that it involves the knowledge of the mathematical and natural sciences that are gained by study, experience and practice.
STCO.07.03  Understand the engineer’s role in the design process.

STCO.07.03.a  Understand the engineering profession has developed well tested sets of rules and design principles that provide a systematic approach as well as an ability to quantify the design process in order to improve efficiency.

STCO.07.03.b  Demonstrate the ability to collaborate and work effectively with others.

STCO.07.03.c  Use teamwork and leadership skills effectively.

STCO.07.04  Understand the impact of systems.

STCO.07.04.a  Evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.

STCO.07.04.b  Use verbal and non verbal techniques to communicate information.

STCO.08  Apply tools, materials and processes to manipulate and connect our designed world through the technology areas.

STCO.08.01  Understand and demonstrate the knowledge and skills required in Biotechnology.

STCO.08.01.a  Identify and distinguish among medical technologies used in prevention and rehabilitation, vaccines and pharmaceuticals, medical and surgical procedures, genetic engineering, and the systems within which health is protected and maintained.

STCO.08.02  Understand and demonstrate the knowledge and skills required in Agriculture.

STCO.08.02.a  Demonstrate an understanding that agriculture includes a combination of businesses that use a wide array of products and systems to produce, process, and distribute food and beverages, medicine, energy, the environment and genetic engineering.

STCO.08.03  Understand and demonstrate the knowledge and skills required in Power and Energy.

STCO.08.03.a  Differentiate among the major forms of power to determine the optimal source for solving a real world application (thermal, radiant, electrical, mechanical, chemical, nuclear, renewable and non renewable).

STCO.08.03.b  Understand that power systems must have a source of energy, a process and loads.

STCO.08.04  Understand and demonstrate the knowledge and skills required in Communication.

STCO.08.04.a  Demonstrate how information and communication systems allow information to be transferred from human to human, human to machine, machine to human, and machine to machine.

STCO.08.04.b  Use technological knowledge and processes to communicate using symbols, measurement, conventions, icons, graphic images, and languages that
incorporate a variety of visual, auditory, and tactile stimuli.

**STCO.08.05** Understand and demonstrate the knowledge and skills required in Transportation.

**STCO.08.05.a** Understand the role that transportation plays in the operation of other technologies, such as manufacturing, construction, communication, health and safety, and agriculture.

**STCO.08.05.b** Explain how the design of intelligent and non-intelligent transportation systems depend on many processes and innovative techniques.

**STCO.08.05.c** Demonstrate how transportation vehicles utilize subsystems that function together for the system to work effectively (e.g., structural propulsion, suspension, guidance, control, and support).

**STCO.08.06** Understand and demonstrate the knowledge and skills required in Manufacturing.

**STCO.08.06.a** Identify types of manufacturing systems, (i.e. customized production, batch production, and continuous production).

**STCO.08.06.b** Categorize durable goods and non-durable goods.

**STCO.08.06.c** Differentiate among the individual qualities of materials (i.e., natural, synthetic, or mixed).

**STCO.08.06.d** Demonstrate how a mass production system and/or an assembly line incorporate interchangeable parts that increase the efficiency of the outcome.

**STCO.08.07** Understand and demonstrate the knowledge and skills required in Construction.

**STCO.08.07.a** Distinguish and explain how buildings and structures generally contain a variety of subsystems as well as a subsystem of large infrastructures.

**STCO.08.07.b** Explain the interchangeable systems of structural innovations.

**STCO.08.07.c** Demonstrate sustainable practices used in modern construction.

**STCO.09** Understand and demonstrate the importance of health, safety and environmental management systems in organizations and the importance of professional ethics and legal responsibilities.

**STCO.09.01** Develop an awareness of and apply safety, health and environmental practices using ethical and legal standards.

**STCO.09.01.a** Apply appropriate safety and health practices when developing plans, projects, processes, or solving complex problems (e.g., OSHA, Fire Codes, Hazmat, etc).

**STCO.09.01.b** Identify existing or potential hazards to existing or assigned plans, projects or processes.

**STCO.09.01.c** Apply ethical and legal standards as they pertain to projects.
Glossary

absorbed
A feature, sketch, or annotation that is contained in another item (usually a feature) in the FeatureManager design tree. Examples are the profile sketch and profile path in a base-sweep, or a cosmetic thread annotation in a hole.

align
Tools that assist in lining up annotations and dimensions (left, right, top, bottom, and so on). For aligning parts in an assembly, see mate.

alternate position view
A drawing view in which one or more views are superimposed in phantom lines on the original view. Alternate position views are often used to show range of motion of an assembly.

anchor point
(1) The end of a leader that attaches to the note, block, or other annotation. See attachment point. (2) Sheet formats contain anchor points for a bill of materials, a hole table, a revision table, and a weldment cut list.

annotation
A text note or a symbol that adds specific design intent to a part, assembly, or drawing. Specific types of annotations include note, hole callout, surface finish symbol, datum feature symbol, datum target, geometric tolerance symbol, weld symbol, balloon, and stacked balloon. Annotations that apply only to drawings include center mark, annotation centerline, area hatch, and block.

appearance callouts
Callouts that display the colors and textures of the face, feature, body, and part under the entity selected and are a shortcut to editing colors and textures.

area hatch
A crosshatch pattern or fill applied to a selected face or to a closed sketch in a drawing. See crosshatch.

assembly
A document in which parts, features, and other assemblies (sub-assemblies) are mated together. The parts and sub-assemblies exist in documents separate from the assembly. For example, in an assembly, a piston can be mated to other parts, such as a connecting rod or cylinder. This new assembly can then be used as a sub-assembly in an assembly of an engine. The extension for a SolidWorks assembly file name is .SLDASM. See sub-assembly.
attachment point

The end of a leader that attaches to the model (to an edge, vertex, or face, for example) or to a drawing sheet. See anchor point.

axis

A straight line that can be used to create model geometry, features, or patterns. An axis can be made in a number of different ways, including using the intersection of two planes. See temporary axis, reference geometry.

B

balloon

Labels parts in an assembly, typically including item numbers and quantity. In drawings, the item numbers are related to rows in a bill of materials (BOM). See stacked balloon.

base

The first solid feature of a part.

baseline dimensions

Sets of dimensions measured from the same edge or vertex in a drawing. See ordinate dimensions.

bend

A feature in a sheet metal part. A bend generated from a filleted corner, cylindrical face, or conical face is a round bend; a bend generated from sketched straight lines is a sharp bend.

bevel

See chamfer.

bill of materials

A table inserted into a drawing to keep a record of the parts used in an assembly.

blend

See fillet.

block

A user-defined annotation that you can use in parts, assemblies, and drawings. A block can contain text, sketch entities (except points), and area hatch, and it can be saved in a file for later use as, for example, a custom callout or a company logo.
BOM

See bill of materials.

bottom-up design

An assembly modeling technique where you create parts and then insert them into an assembly. See top-down design.

bounding box

An imaginary box created by SolidWorks that completely encloses a model, component, or drawing view.

broken-out section

A drawing view that exposes inner details of a drawing view by removing material from a closed profile, usually a spline.

C

cavity

See mold.

center mark

A cross that marks the center of a circle or arc.

centerline

A centerline marks, in phantom font, an axis of symmetry in a sketch or drawing.

chamfer

Bevels a selected edge or vertex. You can apply chamfers to both sketches and features.

child

A dependent feature related to a previously-built feature. For example, a chamfer on the edge of a hole is a child of the parent hole.

click-click

As you sketch, if you click and then release the pointer, you are in click-click mode. Move the pointer and click again to define the next point in the sketch sequence.

click-drag
As you sketch, if you click and drag the pointer, you are in click-drag mode. When you release the pointer, the sketch entity is complete.

closed profile

Also called a closed contour, it is a sketch or sketch entity with no exposed endpoints; for example, a circle or polygon.

collapse

The opposite of explode. The collapse action returns an exploded assembly's parts to their normal positions.

Collision Detection

An assembly function that detects collisions between components when components move or rotate. A collision occurs when an entity on one component coincides with any entity on another component.

component

Any part or sub-assembly within an assembly

configuration

A variation of a part or assembly within a single document. Variations can include different dimensions, features, and properties. For example, a single part such as a bolt can contain different configurations that vary the diameter and length. See design table.

ConfigurationManager

Located on the left side of the SolidWorks window, it is a means to create, select, and view the configurations of parts and assemblies.

constraint

See relation.

construction geometry

The characteristic of a sketch entity that the entity is used in creating other geometry but is not itself used in creating features. See reference geometry.

continuity

Continuity defines the junction point between two curves or surfaces. A higher continuity implies a less visible junction point. G0, G1, and G2 continuity is independent of the parameterization of the curve or surface. C0, C1, and C2 continuity is dependent on the parameterization of the curve or surface. In general, C continuity is more stringent than G
continuity. For example, C2 continuity always implies G2 continuity, and C1 continuity always implies G1 continuity, but not vice versa.

Curves or surfaces that meet are said to have continuity of G0, or contact continuity. Curves or surfaces that are tangent have a continuity of G1, or tangent continuity. Curves or surfaces for which the rate of change of the radius of curvature is the same where they meet have a continuity of G2, also described as curvature continuous. You can use curvature continuous in creating face blend fillets. A loft with side tangency is an example of level G1.

If the junction point of two curves or surfaces is G2 curvature continuous, continuity may not be C2 or even C1 because the curves or surfaces may be parameterized such that at equal change of parameter near the junction, the parameterized point on one curve or surface may move more than the parameterized point on the other curve or surface. However, if the curves or surfaces that meet are parameterized such that the amount of movement for each point is the same, then the junction continuity is both C1 and C2 as well as G1 and G2.

**coordinate system**

A system of planes used to assign Cartesian coordinates to features, parts, and assemblies. Part and assembly documents contain default coordinate systems; other coordinate systems can be defined with reference geometry. Coordinate systems can be used with measurement tools and for exporting documents to other file formats.

**cosmetic thread**

An annotation that represents threads.

**crosshatch**

A pattern (or fill) applied to drawing views such as section views and broken-out sections.

**curvature**

Curvature is equal to the inverse of the radius of the curve. The curvature can be displayed in different colors according to the local radius (usually of a surface).

**cut**

A feature that removes material from a part by such actions as extrude, revolve, loft, sweep, thicken, cavity, and so on.

**D**

**dangling**

A dimension, relation, or drawing section view that is unresolved. For example, if a piece of geometry is dimensioned, and that geometry is later deleted, the dimension becomes dangling.

**Defeature**
With the Defeature tool, you can remove details from a part or assembly and save the results to a new file in which the details are replaced by dumb solids (that is, solids without feature definition or history). You can then share the new file without revealing all the design details of the model.

degrees of freedom

Geometry that is not defined by dimensions or relations is free to move. In 2D sketches, there are three degrees of freedom: movement along the X and Y axes, and rotation about the Z axis (the axis normal to the sketch plane). In 3D sketches and in assemblies, there are six degrees of freedom: movement along the X, Y, and Z axes, and rotation about the X, Y, and Z axes. See under defined.

derived part

A derived part is a new base, mirror, or component part created directly from an existing part and linked to the original part such that changes to the original part are reflected in the derived part.

derived sketch

A copy of a sketch, in either the same part or the same assembly, that is connected to the original sketch. Changes in the original sketch are reflected in the derived sketch.

Design Clipart

Using SolidWorks Search, Design Clipart searches specific folders, finds and dissects files, and extracts data that you can reuse in SolidWorks.

Design Library

Located in the Task Pane, the Design Library provides a central location for reusable elements such as parts, assemblies, and so on.

design table

An Excel spreadsheet that is used to create multiple configurations in a part or assembly document. See configuration.

detached drawing

A drawing format that allows opening and working in a drawing without loading the corresponding models into memory. The models are loaded on an as-needed basis.

detail view

A portion of a larger view, usually at a larger scale than the original view.
A linear dimension line references the dimension text to extension lines indicating the entity being measured. An angular dimension line references the dimension text directly to the measured object.

**DimXpertManager**

Located on the left side of the SolidWorks window, it is a means to manage dimensions and tolerances created using DimXpert for parts.

**DimXpert for parts**

A set of tools that applies dimensions and tolerances to parts according to the requirements of the ASME Y.14.41-2003 standard.

**DisplayManager**

The DisplayManager lists the appearances, decals, lights, scene, and cameras applied to the current model. From the DisplayManager, you can view applied content, and add, edit, or delete items. When PhotoView 360 is added in, the DisplayManager also provides access to PhotoView options.

**dock point**

A point on an annotation, shown by a dashed red square, where you can attach a multi-jog leader.

**document**

A file containing a part, assembly, or drawing.

**draft**

The degree of taper or angle of a face, usually applied to molds or castings.

**drawing**

A 2D representation of a 3D part or assembly. The extension for a SolidWorks drawing file name is .SLDDRW.

**drawing sheet**

A page in a drawing document.

**driven dimension**

See reference dimension.

**driving dimension**
Also referred to as a model dimension, it sets the value for a sketch entity. It can also control distance, thickness, and feature parameters.

**Dynamic Clearance**

An assembly function that detects the clearance between components when the components move or rotate. The clearance is the minimum distance between any entity on one component to any entity on another component.

**E**

**edge**

A single outside boundary of a feature.

**edge flange**

A sheet metal feature that combines a bend and a tab in a single operation.

**envelope**

A reference component that you use to select components based on their positions relative to the envelope volume. Envelopes are ignored in assembly operations such as bill of materials and mass properties.

**equation**

Creates a mathematical relation between sketch dimensions, using dimension names as variables, or between feature parameters, such as the depth of an extruded feature or the instance count in a pattern.

**exploded view**

Shows an assembly with its components separated from one another, usually to show how to assemble the mechanism.

**export**

Save a SolidWorks document in another format for use in other CAD/CAM, rapid prototyping, web, or graphics software applications.

**extension line**

The line extending from the model indicating the point from which a dimension is measured.

**extrude**

A feature that linearly projects a sketch to either add material to a part (in a base or boss) or remove material from a part (in a cut or hole).
face

A selectable area (planar or otherwise) of a model or surface with boundaries that help define the shape of the model or surface. For example, a rectangular solid has six faces. See surface.

fasteners

See Smart Fasteners.

feature

An individual shape that, combined with other features, makes up a part or assembly. Some features, such as bosses and cuts, originate as sketches. Other features, such as shells and fillets, modify a feature’s geometry. However, not all features have associated geometry. Features are always listed in the FeatureManager design tree. See surface, out-of-context feature.

feature lines

In ScanTo3D, feature lines form the boundaries between regions. You can edit feature lines in the Automatic Surface CreationPropertyManager.

FeatureManager design tree

Located on the left side of the SolidWorks window, it provides an outline view of the active part, assembly, or drawing.

fill

A solid area hatch or crosshatch. Fill also applies to patches on surfaces.

fillet

An internal rounding of a corner or edge in a sketch, or an edge on a surface or solid.

fillet corner

A corner where exactly three filleted edges meet at one vertex.

Fit tolerance

The tolerance between a hole and a shaft.

forming tool

Dies that bend, stretch, or otherwise form sheet metal to create such form features as louvers, lances, flanges, and ribs.
fully defined

A sketch where all lines and curves in the sketch, and their positions, are described by dimensions or relations, or both, and cannot be moved. Fully defined sketch entities are shown in black.

G

gеometric tolerance

A set of standard symbols that specify the geometric characteristics and dimensional requirements of a feature.

global variable

A variable that you define, for use in equations, custom properties, and so on.

graphics area

The area in the SolidWorks window where the part, assembly, or drawing appears.

Grid Systems

You can use Grid Systems to guide placement of structural members, locate equipment, or provide visual reference to the overall design.

guide curve

A 2D or 3D curve used to guide a sweep or loft.

H

handle

An arrow, square, or circle that you can drag to adjust the size or position of an entity (a feature, dimension, or sketch entity, for example).

helix

A curve defined by pitch, revolutions, and height. A helix can be used, for example, as a path for a swept feature cutting threads in a bolt.

hem

A sheet metal feature that folds back at the edge of a part. A hem can be open, closed, double, or tear-drop.

HLR
(hidden lines removed) A view mode in which all edges of the model that are not visible from the current view angle are removed from the display.

HLV

(hidden lines visible) A view mode in which all edges of the model that are not visible from the current view angle are shown gray or dashed.

hole table

A table that lists the size and location (from a specified origin datum) of specified holes in a drawing view.

hollow

See shell.

I

import

Open files from other CAD software applications into a SolidWorks document.

in-context feature

A feature with an external reference to the geometry of another component; the in-context feature changes automatically if the geometry of the referenced model or feature changes.

inferencing

The system automatically creates (infers) relations between dragged entities (sketched entities, annotations, and components) and other entities and geometry. This is useful when positioning entities relative to one another.

instance

An item in a pattern or a component in an assembly that occurs more than once. Blocks are inserted into drawings as instances of block definitions.

Instant3D

Functionality that lets you quickly create and modify model geometry using drag handles and rulers.

interference detection

A tool that displays any interference between selected components in an assembly.

iso-parametric curves
Curves that follow constant UV directions.

**J**

**jog**

(1) A sheet metal feature that adds material to a part by creating two bends from a sketched line. (2) A sketch tool that adds jogs to sketches.

**K**

**knit**

A tool that combines two or more faces or surfaces into one. The edges of the surfaces must be adjacent and not overlapping, but they cannot ever be planar. There is no difference in the appearance of the face or the surface after knitting.

**L**

**layer**

A layer in a drawing can contain dimensions, annotations, geometry, and components. You can toggle the visibility of individual layers to simplify a drawing or assign properties to all entities in a given layer.

**layout sketch**

A sketch that contains important sketch entities, dimensions, and relations. You reference the entities in the layout sketch when creating new sketches, building new geometry, or positioning components in an assembly. This allows for easier updating of your model because changes you make to the layout sketch propagate to the entire model.

**leader**

A solid line from an annotation (note, dimension, and so on) to the referenced feature.

**library feature**

A frequently used feature, or combination of features, that is created once and then saved for future use.

**lightweight**

A part in an assembly or a drawing has only a subset of its model data loaded into memory. The remaining model data is loaded on an as-needed basis. This improves performance of large and complex assemblies. See resolved.
A straight sketch entity with two endpoints. A line can be created by projecting an external entity such as an edge, plane, axis, or sketch curve into the sketch.

**linked dimensions**

See shared values.

**loft**

A base, boss, cut, or surface feature created by transitions between profiles.

**lofted bend**

A sheet metal feature that produces a roll form or a transitional shape from two open profile sketches. Lofted bends often create funnels and chutes.

**M**

**mass properties**

A tool that evaluates the characteristics of a part or an assembly such as volume, surface area, centroid, and so on.

**mate**

A geometric relationship, such as coincident, perpendicular, tangent, and so on, between parts in an assembly. See SmartMates.

**mate reference**

Specifies one or more entities of a component to use for automatic mating. When you drag a component with a mate reference into an assembly, the software tries to find other combinations of the same mate reference name and mate type.

**Mates folder**

A collection of mates that are solved together. The order in which the mates appear within the Mates folder does not matter.

**mirror**

(1) A mirror feature is a copy of a selected feature, mirrored about a plane or planar face. (2) A mirror sketch entity is a copy of a selected sketch entity that is mirrored about a centerline. If the original feature or sketch is modified, the mirrored copy is updated to reflect the change.

**miter flange**

A sheet metal feature that joins multiple edge flanges together and miters the corner.
model
3D solid geometry in a part or assembly document. If a part or assembly document contains multiple configurations, each configuration is a separate model.

model dimension
A dimension specified in a sketch or a feature in a part or assembly document that defines some entity in a 3D model.

model item
A characteristic or dimension of feature geometry that can be used in detailing drawings.

model view
A drawing view of a part or assembly.

mold
A set of manufacturing tooling used to shape molten plastic or other material into a designed part. You design the mold using a sequence of integrated tools that result in cavity and core blocks that are derived parts of the part to be molded.

Motion Studies
Motion Studies are graphical simulations of motion and visual properties with assembly models. Analogous to a configuration, they do not actually change the original assembly model or its properties. They display the model as it changes based on simulation elements you add.

multibody part
A part with separate solid bodies within the same part document. Unlike the components in an assembly, multibody parts are not dynamic.

N

native format
DXF and DWG files remain in their original format (are not converted into SolidWorks format) when viewed in SolidWorks drawing sheets (view only).

non-intersection contour
Also called a profile, it is a sketch in which entities do not cross each other. For example, a rectangle is a non-intersecting contour, whereas a cross intersects itself.
OLE object

(Object Linking and Embedding) A Windows file format. You can embed OLE objects in SolidWorks documents.

open profile

Also called an open contour, it is a sketch or sketch entity with endpoints exposed. For example, a U-shaped profile is open.

ordinate dimensions

A chain of dimensions measured from a zero ordinate in a drawing or sketch.

origin

The model origin appears as three gray arrows and represents the (0,0,0) coordinate of the model. When a sketch is active, a sketch origin appears in red and represents the (0,0,0) coordinate of the sketch. Dimensions and relations can be added to the model origin, but not to a sketch origin.

out-of-context feature

A feature with an external reference to the geometry of another component that is not open. See feature.

over defined

A sketch is over defined when dimensions or relations are either in conflict or redundant.

overlay

See alternate position view.

P

parameter

A value used to define a sketch or feature (often a dimension).

parent

An existing feature upon which other features depend. For example, in a block with a hole, the block is the parent to the child hole feature.

part
A single 3D object made up of features. A part can become a component in an assembly, and it can be represented in 2D in a drawing. Examples of parts are bolt, pin, plate, and so on. The extension for a SolidWorks part file name is .SLDPRT. See multibody part.

path

A sketch, edge, or curve used in creating a sweep or loft.

pattern

A pattern repeats selected sketch entities, features, or components in an array, which can be linear, circular, or sketch-driven. If the seed entity is changed, the other instances in the pattern update.

Physical Dynamics

An assembly tool that displays the motion of assembly components in a realistic way. When you drag a component, the component applies a force to other components it touches. Components move only within their degrees of freedom.

pierce relation

Makes a sketch point coincident to the location at which an axis, edge, line, or spline pierces the sketch plane.

planar

Entities that can lie on one plane. For example, a circle is planar, but a helix is not.

plane

Flat construction geometry. Planes can be used for a 2D sketch, section view of a model, a neutral plane in a draft feature, and others.

point

A singular location in a sketch, or a projection into a sketch at a single location of an external entity (origin, vertex, axis, or point in an external sketch). See vertex.

predefined view

A drawing view in which the view position, orientation, and so on can be specified before a model is inserted. You can save drawing documents with predefined views as templates.

profile

A sketch entity used to create a feature (such as a loft) or a drawing view (such as a detail view). A profile can be open (such as a U shape or open spline) or closed (such as a circle or closed spline).
projected dimension

If you dimension entities in an isometric view, projected dimensions are the flat dimensions in 2D. See true dimension.

projected view

A drawing view projected orthogonally from an existing view.

PropertyManager

Located on the left side of the SolidWorks window, it is used for dynamic editing of sketch entities and most features.

R

RealView

A hardware (graphics card) support of advanced shading in real time; the rendering applies to the model and is retained as you move or rotate a part.

rebuild

Tool that updates (or regenerates) the document with any changes made since the last time the model was rebuilt. Rebuild is typically used after changing a model dimension.

reference dimension

A dimension in a drawing that shows the measurement of an item, but cannot drive the model and its value cannot be modified. When model dimensions change, reference dimensions update.

reference geometry

Includes planes, axes, coordinate systems, and 3D curves. Reference geometry is used to assist in creating features such as loft, sweeps, drafts, chamfers, and patterns. See construction geometry.

referenced document

Any document that is referenced by another, typically part documents associated with an assembly or drawing documents associated with part or assembly documents.

relation

A geometric constraint between sketch entities or between a sketch entity and a plane, axis, edge, or vertex. Relations can be added automatically or manually.

relative view
A relative (or relative to model) drawing view is created relative to planar surfaces in a part or assembly.

reload

Refreshes shared documents. For example, if you open a part file for read-only access while another user makes changes to the same part, you can reload the new version, including the changes.

reorder

Reordering (changing the order of) items is possible in the FeatureManager design tree. In parts, you can change the order in which features are solved. In assemblies, you can control the order in which components appear in a bill of materials.

replace

Substitutes one or more open instances of a component in an assembly with a different component.

resolved

A state of an assembly component (in an assembly or drawing document) in which it is fully loaded in memory. All the component's model data is available, so its entities can be selected, referenced, edited, used in mates, and so on. See lightweight.

revision table

A table that lists the revisions of a drawing.

revolve

A feature that creates a base or boss, a revolved cut, or revolved surface by revolving one or more sketched profiles around a centerline.

rip

A sheet metal feature that removes material at an edge to allow a bend.

rollback

Suppresses all items below the rollback bar.

round

See fillet.

round bend
See bend.

Routing Library Manager

The Routing Library Manager can be opened independently of the SolidWorks application, and groups several functions together.

S

section

Another term for profile in sweeps.

section line

A line or centerline sketched in a drawing view to create a section view.

section scope

Specifies the components to be left uncut when you create an assembly drawing section view.

section view

A section view (or section cut) is (1) a part or assembly view cut by a plane, or (2) a drawing view created by cutting another drawing view with a section line.

seed

A sketch or an entity (a feature, face, or body) that is the basis for a pattern. If you edit the seed, the other entities in the pattern are updated.

shaded

Displays a model as a colored solid. See HLR, HLV, and wireframe.

shared values

Also called linked dimensions, these are named variables that you assign to set the value of two or more dimensions to be equal.

sharp

A hard corner of a profile; any two contiguous sketch entities that do not have a tangent or equal curvature relation with each other.

sharp bend

See bend.
sheet

See drawing sheet.

sheet format

Includes page size and orientation, standard text, borders, title blocks, and so on. Sheet formats can be customized and saved for future use. Each sheet of a drawing document can have a different format.

shell

A feature that hollows out a part, leaving open the selected faces and thin walls on the remaining faces. A hollow part is created when no faces are selected to be open.

silhouette edge

The curve representing the extent of a cylindrical or curved face when viewed from the side.

sketch

A collection of lines and other 2D objects on a plane or face that forms the basis for a feature such as a base or a boss. A 3D sketch is non-planar and can be used to guide a sweep or loft, for example.

Smart Fasteners

Automatically adds fasteners (bolts and screws) to an assembly using the SolidWorks Toolbox library of fasteners.

SmartMates

An assembly mating relation that is created automatically. See mate.

solid sweep

A cut sweep created by moving a tool body along a path to cut out 3D material from a model. See sweep.

spiral

A flat or 2D helix, defined by a circle, pitch, and number of revolutions.

spline

A sketched 2D or 3D curve defined by a set of control points.

split line
Projects a sketched curve onto a selected model face, dividing the face into multiple faces so that each can be selected individually. A split line can be used to create draft features, to create face blend fillets, and to radiate surfaces to cut molds.

stacked balloon

A set of balloons with only one leader. The balloons can be stacked vertically (up or down) or horizontally (left or right).

standard 3 views

The three orthographic views (front, right, and top) that are often the basis of a drawing.

stereolithography

The process of creating rapid prototype parts using a faceted mesh representation in STL files.

sub-assembly

An assembly document that is part of a larger assembly. For example, the steering mechanism of a car is a sub-assembly of the car.

suppress

Removes an entity from the display and from any calculations in which it is involved. You can suppress features, assembly components, and so on. Suppressing an entity does not delete the entity; you can unsuppress the entity to restore it.

surface

A zero-thickness planar or 3D entity with edge boundaries. Surfaces are often used to create solid features. Reference surfaces can be used to modify solid features. See face.

sweep

Creates a base, boss, cut, or surface feature by moving a profile (section) along a path. For cut-sweeps, you can create solid sweeps by moving a tool body along a path.

T

tangent arc

An arc that is tangent to another entity, such as a line.

tangent edge

The transition edge between rounded or filleted faces in hidden lines visible or hidden lines removed modes in drawings.
Task Pane

Located on the right-side of the SolidWorks window, the Task Pane contains SolidWorks Resources, the Design Library, and the File Explorer.

template

A document (part, assembly, or drawing) that forms the basis of a new document. It can include user-defined parameters, annotations, predefined views, geometry, and so on.

temporary axis

An axis created implicitly for every conical or cylindrical face in a model.

thin feature

An extruded or revolved feature with constant wall thickness. Sheet metal parts are typically created from thin features.

TolAnalyst

A tolerance analysis application that determines the effects that dimensions and tolerances have on parts and assemblies.

top-down design

An assembly modeling technique where you create parts in the context of an assembly by referencing the geometry of other components. Changes to the referenced components propagate to the parts that you create in context. See bottom-up design.

translator

Software that converts a file from one format to another.

triad

Three axes with arrows defining the X, Y, and Z directions. A reference triad appears in part and assembly documents to assist in orienting the viewing of models. Triads also assist when moving or rotating components in assemblies.

true dimension

If you dimension entities in an isometric view, true dimensions give you accurate model values. See projected dimension.

U

unabsorbed
A sketch or annotation that is not contained in a feature in the FeatureManager design tree. An example of an unabsorbed sketch is a layout sketch in an assembly. See absorbed.

under defined

A sketch is under defined when there are not enough dimensions and relations to prevent entities from moving or changing size. See degrees of freedom.

UV

Horizontal and vertical lines of the underlying parameterization of a curve.

V

vertex

A point at which two or more lines or edges intersect. Vertices can be selected for sketching, dimensioning, and many other operations.

viewports

Windows that display views of models. You can specify one, two, or four viewports. Viewports with orthogonal views can be linked, which links orientation and rotation.

virtual sharp

A sketch point at the intersection of two entities after the intersection itself has been removed by a feature such as a fillet or chamfer. Dimensions and relations to the virtual sharp are retained even though the actual intersection no longer exists.

W

weldment

A multibody part with structural members.

weldment cut list

A table that tabulates the bodies in a weldment along with descriptions and lengths.

wireframe

A view mode in which all edges of the part or assembly are displayed. See HLR, HLV, shaded.

witness line

See extension line.

X
**X display**

The size of the X in a chamfer dimension with two numbers, such as 1 X 45° (Length X Angle), 45° X 1 (Angle X Length) or 1 X 1 (Length X Length).

**Zebra stripes**

Simulate the reflection of long strips of light on a very shiny surface. They allow you to see small changes in a surface that may be hard to see with a standard display.