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|  | **purpose** | **techniques** | **technologies** |
| **Computer Aid Design (CAD)** | designs a product and documents the design's process.  facilitates the manufacturing process by transferring detailed diagrams of a product.  can be used to produce 2D or 3D diagrams | vector-based graphics to illustrate the objects of traditional drafting.  produce raster graphics showing the overall appearance of designed objects. | Originally software for CAD systems was developed with computer languages such as [Fortran](https://en.wikipedia.org/wiki/Fortran) and [ALGOL](https://en.wikipedia.org/wiki/ALGOL) but with the advancement of [OOP](https://en.wikipedia.org/wiki/Object-oriented_programming) methods this has radically changed.  Typical modern systems are built around a number of key [C](https://en.wikipedia.org/wiki/C_(programming_language)) modules with their own [APIs](https://en.wikipedia.org/wiki/Application_programming_interface) |
| **Computer Aid Manufacture (CAM)** | facilitate and automate manufacturing processes.  modern CAM systems include real-time controls and robotics. | simple text file of G-code/M-codes.    sometimes many thousands of commands long, which are then transferred to a machine tool using a direct numerical control (DNC) program or in modern Controllers using a common USB Storage Device. | CAM is often linked with CAD for more enhanced and streamlined manufacturing, efficient design and superior machinery automation.  implements advanced productivity tools like simulation and optimization to leverage professional skills. |
| **Computer Aid Engineering (CAE)** | mathematical model written in a programming language using a set of algorithms that define the manufacturing processes (Analysis). | Pre-processing: defining the model and environmental factors to be applied to it.  Analysis solver  Post-processing of results: using visualization tools. | finite element analysis (FEA)  computational fluid dynamics (CFD)  multi-body dynamics (MBD)  optimization. |
| **Art and Animation** | creating moving images via the use of [computers](https://en.wikipedia.org/wiki/Computer)  enables to sequence a series of images to simulate movement, each image is like a frame in a movie. | Traditional Animation (frame by frame)  [motion capture](https://en.wikipedia.org/wiki/Motion_capture).  [keyframing](https://en.wikipedia.org/wiki/Keyframing).  Physically Based  Behavioral | 3D computer graphics.  though 2D computer graphics are still widely used for low bandwidth and faster real-time rendering needs. |
| **Medical** | Interpret pictures  modify Photographs and TV scans, to improve the picture quality, and visualizing effects. | Modeling of geometry and topology.  Editing of complex structures.  Simplification of physical models.  Image generation. | CT: Computed Tomography.  NMR: Nuclear Magnetic Resonans.  PET:Positron Emission Tomography.  USG: Ultrasonography. |
| **Simulators** | attempts to simulate an abstract model of a system. | The Monte Carlo method using random numbers. | mathematical model composed of equations that duplicate the functional relationships within the real system. |
| **Virtual Reality** | allow a user to interact with a computer-simulated environment.  The simulated environment can be like the real world, for example, simulations for pilot. | Simulation-based VR.  Avatar image-based VR.  Projector-based VR.  Desktop-based VR.  True immersive virtual reality. | modern VR are based on technology developed for [smartphones](https://en.wikipedia.org/wiki/Smartphones).  [photogrammetry](https://en.wikipedia.org/wiki/Photogrammetry) is used to combine high-resolution photographs for the creation of detailed 3D objects. |
| **GIS** | system designed to capture, store, manipulate, analyze, manage, and present spatial or [geographic data](https://en.wikipedia.org/wiki/Geographic_data). | Relating information from different sources.  GIS uncertainties.  Data representation.  Data capture.  Raster-to-vector translation. | digital information, for which various digitized data creation methods are used |