

## **Computer-Aided Design (Second Acquisition) (CAD2)**

### **1.0 Purpose and Functionality**

CAD2 is a major, shore-based infrastructure enhancement initiative to drastically improve and more fully automate all design, development, and engineering activities accomplished by the Navy during the acquisition, production, and support of military defense systems. This CALS program involves computer hardware and software for design, analysis, modeling, simulation, documentation, data transfer, and data management, as well as the necessary technical services to maximize utility of these tools for the Navy.

The CAD2 program provides the necessary off-the-shelf equipment, software, and support services to replace time consuming manual drafting and obsolete Computer-Aided Design/Computer Aided Manufacturing/Computer Aided Engineering (CAD/CAM/CAE) capabilities with modern computer-assisted technology. This concept also enhances the interoperability capabilities of the engineering community, Navy, DoD, and contractors. This system will be employed to create, manage, and use engineering analysis data, engineering drawings, technical reports, technical manuals, technical orders, bid packages, manufacturing data, product models, and work packages.

The Second Acquisition is organized as four separate contracts, each supporting a major functional Navy application tailored to serve as a focal point for accomplishing the engineering missions of the respective SYSCOMS and subordinate activities. All four contracts are fairly similar in their basic system requirements. Each system calls for an open architecture that provides flexibility of use, integration with other systems, and future technical upgrades and enhancements. The same basic standards are invoked for data interchange and system operation in each of the CAD2 contracts, including POSIX, GOSIP, IGES, PDES, SGML, and CGM. The NAVSEA, NAVAIR/SPAWAR, and NAVFAC systems will possess extensive geometric modeling and graphics applications, including three-dimensional wireframe, surface and solids modeling, and sufficient integrations to certain application packages to allow the use of common models in those packages. Table 1 provides a comparison of the products and services provided under each of these three contracts. The NAVSUP CAD2 program is responsible for technical manual publishing, and has been implemented as the Automated Document Management and Publishing System (ADMAPS) (see section "ADMAPS").

Table 1. Comparison of Products Available from the CAD2 Contracts

<b>PRODUCTS</b>	<b><u>NAVSEA CAD-2</u></b>	<b><u>NAVFAC CAD-2</u></b>	<b><u>NAVAIR CAD-2</u></b>
Workstations	X	X	X
Servers	X	X	X
Monitors	X	X	X
Memory/Processor	X	X	X
Graphics/Upgrades	X	X	X
Disks/Tape Systems	X	X	X
Scanning	X	X	
Printers/Plotters	X	X	X
Misc. Hardware	X	X	X
Communication/Networking	X	X	X
System Nucleus	X	X	X
Translators	X	X	
Plotting	X	X	
RDBMS	X	X	
Scanning/Raster Editing	X	X	
Publishing	X	X	X
AEC		X	
Civil Engineering		X	
GIS		X	
Mapping		X	
Utilities			
Engineering Analysis	X	X	X
Electrical Engineering	X	X	
Mechanical	X	X	X
Manufacturing	X		X
Structural Engineering	X	X	
Geometric Modeling	X	X	X
Electronics	X		X
Training	X	X	X
Support Services	X	X	X
Travel	X	X	X

## 2.0 System Description

### 2.1 NAVAIR/SPAWAR CAD2

In 1994, the U.S. Navy awarded the \$398 million Naval Air Systems Command/Space and Naval Warfare Systems Command (NAVAIR/SPAWAR) single-supplier contract to Intergraph Corporation. The NAVAIR/SPAWAR CAD-2 contract provides computer-aided systems and services for electronic and mechanical design, manufacturing, and engineering (CAD/CAM/CAE) to the NAVAIR and SPAWAR communities. The government is provided with a total design solution including hardware, software, maintenance, training, and technical support services. The 12-year contract is divided into two periods. The first is an eight-year period for purchasing hardware, software, support services, hardware maintenance, and training. The four additional years will be used to purchase hardware maintenance, technical services, software support, and training.

The basic CAD2 workstation consists of a combination of the following hardware and software items, which will be tailored based on the tasks to be performed.

#### Hardware:

TD-30 Workstation (including 100MHz Pentium, CD-ROM, NT Client Access License, NFS Client, IPLOT Client)

16MB, 32MB, and/or 64MB memory

17" or 21" Monitor

High Speed Parallel Interface

Power Supply and Conditioner

#### Software:

SPARC System Software Baseline

Solaris X86 Media Kit

Silicon Graphics System Software Baseline

InterPlot Screencopy Submit for X-Windows

InterPlot IPLOT Client

InterPlot Client Facility for IPLOT on SPARCstations

Intergraph's OSF/Motif Validated GUI for SPARCs

EDA Baseline

Additional software can be purchased to perform the following functions:

- Geometric modeling and graphics applications
- Aero-mechanical engineering analysis
- Avionics system design
- Manufacturing applications

Detailed system information can be found in the NAVAIR/SPAWAR CAD-2 Intergraph Buyer's Guide Addendum, which is available as an Electronic Buyer's Guide and can be downloaded from Intergraph's Bulletin Board Service (BBS). The Internet address is:

<http://www.intergraph.com/federal/>.

## 2.2 NAVSEA CAD2

On April 8, 1991, the U.S. Navy contracted Intergraph to provide Computer-Aided Design and Computer-Aided Manufacturing (CAD/CAM) systems and services to support the design, construction, maintenance, overhaul, alteration, and repair of Navy ships and shipboard systems. The Navy Information Technology Acquisition Center (ITAC) awarded the contract in support of the Naval Sea Systems Command (NAVSEA) portion of the Department of the Navy's CAD-2 program to acquire products and services. The 12-year \$362.4 million contract provides workstations and mechanical design software to support maintenance and logistics for ships, craft, shipboard weapons systems, guided missiles, mines, and torpedoes. The DoD can order Intergraph hardware and software components during the first eight years of the contract. They can order technical and software support services for an additional four years.

The contract includes a broad spectrum of commercial off-the-shelf CAD/CAM hardware, of which the primary units are a family of CAD/CAM workstations. The other hardware categories are graphics displays, mass storage devices, peripherals such as plotters and printers, communications, and environmental power. These units form a set of modular components that are selected by the user to create a system tailored for the activity's requirements. The contract includes software for geometric modeling, drafting, ship design, analysis, manufacturing, database management, data interchange, and network communications. A basic set of CAD/CAM software is included with each workstation with the other software packages ordered separately.

The basic CAD2 workstation consists of a combination of the following hardware and software items, which will be tailored based on the tasks to be performed.

### Hardware:

TD-30 or TD-40 Intergraph workstation with Solaris or Windows NT

TDZ-300 and TDZ-400 Pentium workstations

File Servers

17", 21", or 27" monitor

Memory upgrades - 8MB, 16MB, 32MB, 64MB, 128MB

Tape Drive

CD-ROM Drive

Optical Jukebox

Optical Drive

Scanner

Plotter

Printer

Software:

Operating systems - Solaris or Windows NT  
ADA Compiler  
C Compiler  
FORTRAN Compiler  
Math Subroutine Library  
PHIGS Library  
Figaro X Runtime system  
GKS Library  
MS-DOS Environment  
OSF/Motif  
IGES Translators  
Raster Translator

Additional software can be purchased to perform the following functions:

- Geometric Modeling
- Structural Design
- Piping Design and Analysis
- HVAC Design
- Finite Element Analysis and Modeling
- Kinematic and Dynamic Analysis
- Electrical/Electronics Design
- PCB Design and Thermal Analysis
- Automatic Placement
- Manufacturing Applications (e.g., Basic and Distributive Numerical Control)

Detailed system information can be found in the NAVSEA CAD-2 Intergraph Buyer's Guide, which is available as an Electronic Buyer's Guide and can be downloaded from Intergraph's Bulletin Board Service (BBS). The Internet address is: <http://www.intergraph.com/federal/>.

### **2.3 NAVFAC CAD2**

Intergraph was awarded the Naval Facilities Engineering Command (NAVFAC) contract in 1993. This 12-year contract provides computer-aided design and drafting, geographic information systems, and computer-aided facility management to support Navy and other Department of Defense and civilian agency facilities engineering requirements. Intergraph shares the Facilities CAD-2 contract with Cordant, Inc. of Reston, Va. The contract is divided into two periods. The first is an eight-year period for the purchase of hardware, software, and support services, as well as any technology improvements added during this period. Following this eight-year period, four additional years will be dedicated to the purchase of support services, maintenance, software support, and training.

The basic CAD2 workstation consists of a combination of the following hardware and software items, which will be tailored based on the tasks to be performed.

Intergraph Hardware:

TD-30 and TD-40 Intergraph Workstations  
TDZ-300 and TDZ-400 Workstations

17", 21", and 27" monitors  
Tape Drive  
CD-ROM Drive  
Optical Jukebox  
Graphics Tablet  
Graphics Digitizer  
Photo Recorder  
Plotters  
Printers  
Drawing Scanner and Aperture Card Scanner

Intergraph Software:

Operating systems - Windows NT and CLIPPER UNIX (CLIX)  
MS-DOS Environment  
CADD5 4X Translator  
C Compiler  
FORTRAN Compiler  
LISP Compiler  
PHIGS  
Graphics Kernel System (GKS)  
ADA Compiler  
InterPlot software for Windows NT

Cordant Hardware:

SUN SPARCstation 5/70, 5/110, 20/50, 20/61, or 20/71 with 17", 20", or 26" monitor  
Everex SP/90 or DP/133 Pentium System with 17" or 21" monitor  
BTG Advanced Windows NT 275 MHz Workstation with 17" or 21" monitor  
SUN SPARCcenter or SUN SPARCserver (file servers)  
SUN SPARCstation 8MB, 16MB, 32MB, or 64MB memory upgrades  
Tape Backup drive  
CD-ROM drive  
Optical disk drive  
Optical Jukebox  
Graphics Tablet  
Graphics Digitizer  
Graphics Photo Recorder

Cordant Software:

SUN SunPC Emulator  
SUN C SPARCcompiler  
SUN FORTRAN SPARCcompiler  
Lucid Common LISP  
Design Power Design++  
NAG Library  
Template Graphics FIGARO  
Visual Engineering Visual GKS+  
Microtools Assistant III Fortran Conversion Tools  
DDC-I ADA Compiler  
SUN CoPilot  
SUN NeWSprint

Jukebox Software  
Various Communications software

Additional software can be purchased from either company to perform the following functions:

- Engineering Information Management
- GIS, Mapping, and Environmental Engineering
- Architectural Engineering
- Civil Engineering
- Space and Facilities Management
- Structural Engineering
- Electrical Engineering
- Mechanical Engineering
- Engineering Analysis
- Document and Project Management

Detailed system information can be found in the NAVFAC CAD-2 Buyer's Guides, which can be downloaded from either Intergraph's or Cordant's Internet Homepage. The e-mail addresses are: <http://www.intergraph.com/federal/> and <http://www.ideal.com/cordant/>.

### **3.0 Deployment**

#### **3.1 NAVAIR/SPAWAR CAD2**

CAD2 has been deployed at the following sites:

- NAWC Indianapolis
- NADEP Cherry Pt.
- NAWC Pt. Mugu
- NAWC China Lake
- NSWC Crane
- NADEP North Island
- NADEP JAX
- NAVAIR HQ
- Scott AFB

The following sites have money and plans to implement NAVAIR CAD2:

- McClellan AFB
- NRAD
- Army Huntsville

### 3.2 NAVSEA CAD2

The following list includes the UIC codes for activities that have purchased CAD2 workstations. The number in parentheses ( ) after the code indicates the number of stations purchased as of 1/16/96. Note that all services and some contractors are included in this list.

ABERDE	(13)
ACECHI	(2)
ACELR	(1)
ACEPIT	(11)
ACESTP	(1)
ACEVIC	(1)
ACSTA	(2)
AECTUL	(2)
AEDHWV	(1)
AEDMOB	(1)
ANNVIL	(1)
BEAUMO	(1)
BROOKS	(2)
BUFFAL	(1)
CHATTA	(1)
DCSC	(11)
DESC	(2)
DFSC	(1)
DGSC	(2)
DISC	(4)
DLAHQ	(1)
DPSBRE	(1)
DPSC	(22)
DSSO	(2)
EGLIN	(4)
EVERET	(1)
FSTC	(3)
FTBELV	(1)
FTBRAG	(1)
FTCAMP	(1)
FTHOOD	(3)
FTJACK	(5)
FTMONM	(1)
FTSTEW	(1)
FTWORT	(6)
GDEB	(4)
GRIFFI	(32)
HAYWAR	(1)

HILL	(6)
IGRF	(12)
ILLINO	(1)
INGALL	(7)
KAPL	(2)
KELLY	(21)
KNGBAY	(4)
LAPOR	(1)
LUKE	(11)
M62204	(18)
M67004	(9)
MACON	(1)
MANTEC	(1)
MICOM	(49)
MISAWA	(20)
MTMCTE	(7)
N00024	(207)
N00102	(175)
N00151	(31)
N00164	(60)
N00167	(34)
N00173	(1)
N00174	(3)
N00181	(241)
N00191	(71)
N00197	(11)
N00221	(92)
N00251	(344)
N00253	(29)
N00311	(140)
N0464A	(4)
N48695	(73)
N60258	(106)
N60478	(6)
N60530	(1)
N60921	(4)
N61331	(3)
N62381	(3)
N62383	(3)
N62387	(4)
N62791	(10)
N63394	(12)
N64281	(5)
N65236	(1)
N65538	(1)
N65540	(170)
N65888	(4)
N66001	(1)
N66604	(21)
N68636	(4)

NEWOR	(1)
NEWARK	(6)
NEWNEW	(23)
OKLAHO	(1)
PATRIC	(2)
PICAT	(2)
PRC	(2)
PRCVA	(1)
RAMSTE	(1)
REDRIV	(17)
ROCKIL	(9)
ROCKWE	(3)
ROSLYN	(1)
SAIC	(3)
SALT	(1)
SCRA	(7)
SELECT	(4)
SM-ALC	(89)
SMDT25	(2)
SOUTH	(1)
ST LOU	(1)
ST PAU	(1)
TACOM	(1)
TINKER	(23)
TOBYHA	(1)
TULSA	(1)
USATA	(1)
VINTHI	(2)
WALLA	(3)
WILLOW	(1)
WOMACK	(2)
WORCES	(1)
WPAFB	(51)
WR-ALC	(14)
ZANESV	(1)