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A study to determine the minimum AutoCad command set for computer-aided drafting in the Las Vegas area

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A STUDY TO DETERMINE THE MINIMUM AUTOCAD COMMAND SET FOR COMPUTER AIDED DRAFTING IN THE LAS VEGAS AREA

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ABSTRACT

A Study To Determine The Minimum AutoCAD Command Set For Computer Aided Drafting In The Las Vegas Area

By

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The purpose of this study was to identify the computer aided drafting (CAD) commands most frequently used in the industrial application of the thirteenth release of the software product AutoCAD, vended by AutoDESK. Respondents were located within the Las Vegas drafting community and nearby areas. The outcome of this study was used to identify commands needed to operate the software at a desired level of competency and to identify any relationship between the release thirteen commands used by the respondents and commands available in the previous release of the software.

A questionnaire was delivered to 90 businesses engaged in drafting in a variety of disciplines. Twenty-two usable questionnaires were returned. The respondents rated the use of each command on a five-point likert type scale based on the likelihood of use every time a respondent opened a drawing session. Frequency distributions and descriptive statistics were calculated on each command to determine the percentage of respondents that indicated actual use of the command(s) each time they opened a drawing

session. The command list was then sorted in descending order based on percentage of respondent usage.

Surveys showed that all of the respondents selected seven commands that all twenty-two respondents used each time a drawing session was opened. All of the respondents selected forty-five commands that were never used when a drawing session was opened. All forty-five commands not used involved three-dimensional drafting and solid modeling. Furthermore, analysis of the surveys revealed 50% or more of the respondents used 95 of the available commands. This amounted to less than 35% of the total commands available in AutoCAD R13. All 95 of the commands involved two-dimensional drafting. Of the number of commands identified, 91% of them were available in release twelve of AutoCAD. Results of the surveyed sample suggested that AutoCAD R13 system variables were seldom used.

It was recommended that those commands selected by 50% or more of the respondents be presented to students in beginning level CAD classes. It was further recommended that the remaining commands not addressed in beginning level CAD classes be presented to students in advance level CAD classes.

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This graduate student wishes to express his appreciation to Dr. Cliff McClain for his hard work and devotion to his students. He encouraged me to enroll in the graduate program at UNLV and calmed all my fears concerning my abilities of completing such a program. I also wish to thank Leslie Shipp for her encouragement in this project. When the work seemed overwhelming, she helped me to see how close to the finish line I was and gave me the support that I needed to complete my goal. She also proofread my material for syntax and grammar. Furthermore, I wish to thank David Roebke for his encouragement, supplying a sample thesis, and prayers towards the completion of this project. Special thanks to Eugene Bond and Jean Roebke who were instrumental in my transition from Corel Word Perfect to Microsoft Word. Lastly, I wish to thank the committee members for their service on the Examining Committee. As the student population grows, life in the university community is increasingly fast-paced and arduous. Adjusting one's time schedule to meet the needs of the student body demonstrates commitment and loyalty to the same.

CHAPTER 1

INTRODUCTION OF THE PROBLEM

Introduction

As our society moves away from this century of automation through information based systems and into the new millennia, education must change at a faster pace (Merickel, 1990). Because of the rapid influx of technological innovations, computer technology has had a pronounced effect on nearly every facet of society especially industry and education (Wang, 1993). Computer-Aided Design (CAD) is especially undergoing rapid growth and change (Goss, 1990).

The use of Computer-Aided Design and Drafting (CADD) in technology with increased competitiveness and improved quality and efficiency has proliferated throughout the drafting industry (Wang 1993). Drafting is a fundamental communication technique used in the construction industry to visually demonstrate, exemplify or elucidate projects (Hales, 1991). Consequently, competitive companies and institutions that use drafting as a form of communication have been watching the growing field of CADD looking for a CADD system that will best fulfill their needs. However, some organizations have been unwilling to implement the use of a CADD system, which raises concerns regarding the following:

1. Difficulties in estimating the rate of return on the relatively high initial capital costs involved in setting up CADD workstations.

2. Training employees in the use of a CADD workstation.
3. Upgrading software.
4. Providing upgrade training for the operators.

With these difficulties, companies can not afford to ignore the challenge of technological change (Beatty, 1986).

Gow's (1991) prediction that CADD would replace traditional drafting in many diverse industries and that the changeover from traditional drafting to CADD would reach the 90% to 100% level has come to pass. Consequently, university/college programs are utilizing computer graphics and computer applications in an effort to keep pace with advancing technology. However, as software upgrades and revisions are produced, drafting technology educators must adjust the CADD curriculum to encompass new developments in the field (Diez, 1990; Pedras & Hoggard, 1985). Simply outlining a textbook or copying the CADD curriculum from another university/college program is not enough for developing a curriculum that will meet unique local drafting community needs.

As demand for CADD operators increases within the community, effective CADD instruction becomes more important. Volumes of literature are available informing the instructor about the capabilities of CADD and its varying degrees of effectiveness, however, there are few works produced in professional journals or research studies that provide clear direction regarding curriculum development in the CADD discipline (Wang, 1993).

In 1985 the Community College of Southern Nevada (CCSN) began the process of implementing a Computer Aided Drafting (CAD) curriculum. By 1990 the program

was in place. DACUM studies within the community surrounding CCSN and advisory committee members from that community suggested that in order to adequately prepare the CADD operator of tomorrow, the AutoCAD software product itself would be the best choice from which to develop a curriculum. Holloway (1987) and Laird (1985) identified problems that plagued successful development of CADD programs at universities and colleges as a consequence of shortcomings in experience and technical expertise of advisors, inadequate facilities and funding, as well as difficulties in finding qualified instructors. CCSN was not an exception to Laird's observation.

Problem Statement

At the time of this study, factors affecting the success of the Computer Aided Drafting and Design (CADD) program at the Community College of Southern Nevada (CCSN) had not been systematically identified and described. Administrators and instructors lacked much of the information needed to make decisions about local CADD curriculum. One of those factors was minimum competent knowledge of the command set used in the operation of the AutoCAD software product.

The minimum AutoCAD command set required for successful operation of this software package must be identified to adequately prepare the AutoCAD operator for employment within the local community. Once identified it should be provided to those responsible for the CADD curriculum as a tool to aid in curriculum development.

Purpose of the Study

This study was intended to provide data for the Community College of Southern Nevada computer aided drafting program for use in curriculum development. Specifically, this study was to identify and analyze those commands used in the industrial

application of AutoCAD, within the local drafting community, which were needed to reach a desired level of competency with regard to the use of the AutoCAD software product. Furthermore, a secondary purpose of this study was to stimulate the development of a mechanism within the CCSN CADD curriculum development process that would regularly identify command sets used within the industrial community at large.

Significance of the Study

Investigating the AutoCAD help files reveals that there are 533 various commands and system variables used in the operation of the software package. Competency in the use of all of these commands and system variables is not a requirement for the entry-level operator. However, if a list of the commands required for entry level operation of AutoCAD could be developed, then this list could be used to expedite the development of a competency based curriculum at the Community College of Southern Nevada. Moreover, having such a list available would streamline articulation agreements between local high schools and the college as well as transfer credits between the college and the University of Nevada, Las Vegas.

At the time of the study there was no record available that would indicate that a survey of the local drafting community has ever been accomplished by the Community College of Southern Nevada. Such a survey should be implemented on a regular basis due to the constant changes and upgrades in the AutoCAD software product. As Addison (1988) stated:

> For the drafting instructor, it is an exciting and challenging time of new theory and new techniques which must be continually woven into the course of

> instruction. While embracing these changes, those responsible for the curriculum must develop appropriate curriculum goals and objectives, must continue to focus on the real competencies required by their graduates in industry, and must choose those instructional processes which will best help students reach their goals. (p. 20)

During the past ten years, the rapid deployment of CADD software releases has not slowed. The popularity of CADD use in the drafting community has made its instruction in engineering and technology schools a high priority. Unfortunately, very few schools have cohesive CADD curricula. Students, who graduate from those schools without a good understanding of fundamental command knowledge in the operation of CADD, may find themselves at a disadvantage in the job market (Hsu & Sinha, 1992).

Educational accountability has focused on the quality of teaching. Muller (1986) indicated that an educator should ask, "Am I as current as I could be? Are my courses sharply focused on those content areas which relate to the student's needs? How can I catch up?" In relation to the rapid development of CADD releases, these questions became significant.

Upgrade classes, sabbatical leaves for work-study and the identification of commands used in the operation of AutoCAD are key factors to improve CADD instruction. Staying one step ahead of the students in knowledge of the operation of AutoCAD is an inappropriate method with regard to the conduct of an instructor. The instructor must have an understanding of what it takes to operate AutoCAD in the work environment before he or she can provide competent instruction in the use of AutoCAD.

Kicklighter (1985) indicated that industrial technology programs such as CADD can grow and improve, even if university enrollments are declining, by constantly revising and updating the curriculum. Identifying a current list of the commands needed for minimum competency in the operation of AutoCAD would be paramount in the revision and updating process of the CADD curriculum at the Community College of Southern Nevada.

Definitions of Terms

The following terms were defined to clarify their usage(s) in the context of this study.

Artificial dichotomy: An artificial dichotomy results when scaled responses are placed into two categories (Borg & Gall, 1989).

AutoCAD: A general purpose Computer Aided Design and Drafting software application used on a computer system and vended by *AutoDESK*.

AutoCAD R12: AutoCAD release 12, the twelfth software release of AutoCAD

AutoCAD R13: AutoCAD release 13, the thirteenth software release of AutoCAD

AutoCAD Training Center (ATC): A training center sponsored by *AutoDESK* for specialized training regarding AutoCAD. Training is restricted to curriculum supplied by AutoDESK. Instructors must prove minimum qualification. Including but not limited to several years operating AutoCAD in a professional environment, successfully passing the AutoCAD Level II certification examination, and several years of experience providing training with respect to AutoCAD.

AutoCAD Level II Certification Examination: An examination that tests proficiency with the latest release of AutoCAD software. These examinations measure one's mastery of AutoCAD concepts and drawing skills using AutoCAD.

AutoLISP: A version of a widely used programming language known as LISP. LISP is and acronym for LISt Processing. AutoLISP is used within AutoCAD for creating custom commands and automated procedures.

Computer Aided Design and Drafting (CADD): A combination of design methodology and drafting technology facilitated through the use of a computer system with appropriate software.

Command Set: The body of commands available within AutoCAD that the drafter can use to complete a set of drawings.

Computer Aided Drafting: Synonymous with Computer Aided Design and Drafting.

CAD: An acronym for Computer Aided Drafting or Computer Aided Design, which was defined as computer hardware, software and peripheral devices used to produce graphic images (Hsu & Sinha, 1992).

CADD System: The combination of a computer, software, and related peripheral equipment used for computer aided design and drafting.

DACUM: Developing a curriculum; a formalized process for curriculum development by which a panel of experts, in the discipline for which the curriculum is being developed, are interviewed and a list of outcomes generated.

Drawing session: A period of time in which a CADD operator accesses drawing files for creation or making changes using AutoCAD.

Entity: A line, arc, circle, or other element drawn in CADD. Entities are elements or parts of a drawing that make up the whole.

Greater Las Vegas Area: The area defined by occupation of the city of Las Vegas, Las Vegas townships, City of Henderson, and Boulder City, all of which are in Clark County, Nevada.

Hardware: The mechanical, magnetic, electrical, and electronic devices from which a computer is constructed.

Industrial Technology (IT) programs: Two and four year programs industry designed to prepare the student for employment within industry with an appropriate balance of studies drawn from a variety of related disciplines.

Local Community: Synonymous with greater Las Vegas area.

Operator: A person who uses the AutoCAD software product to produce CAD drawings.

Primitive Entities: Those entities created through (a) the use of the following AutoCAD commands: "Line", "Arc", and "Circle" or (b) the use of editing commands that make changes in lines, arcs, and circles.

Primitive Commands: The AutoCAD commands "Line", "Arc", and "Circle".

Software: Synonymous with Computer Software.

Solid Modeling: A process whereby AutoCAD is used to create a three dimensional solid model of an object. Materials are assigned to different parts of the model as required. Simulations are then performed to extract engineering information.

Third Party Software: Software produced by vendors other than the vender of AutoCAD that work in conjunction with AutoCAD in order to increase productivity and efficiency in the operation of AutoCAD towards a drafting goal. For example AutoArchitect is a

software product, produced by SoftDESK, that plugs into AutoCAD in order to provide tools that streamline the production of drawings in the field of architecture.

Three-Dimensional Drafting: Drafting that results in placing objects along the X, Y, and Z-axis of the AutoCAD drafting environment.

Limitations of the Study

The following limitations were applied to guide this study in completion of the investigation:

1. This survey was limited to a defined time frame and administered one time for the singular purpose of gathering information used to generate a list tabulating the frequency of usage of each AutoCAD command and system variable.
2. This study did not generate a methodology for the purpose of identifying why a particular AutoCAD command or system variable was or was not used.
3. This study did not identify what type of hardware the operator used.
4. The study was limited to the implementation of AutoCAD software usage within the greater Las Vegas area.
5. The geographic domain of the study was limited to the local drafting community. Surveys or questionnaires targeting other communities, universities, or colleges were neither developed nor implemented.
6. The questionnaire depended upon self-reported data as well as subjective opinions.
7. The respondents to the questionnaire were limited to those who were identified as CADD operators with one or more years of experience in the use of AutoCAD.

Delimitation of the Study

The number of surveys returned was far lower than anticipated. There was less than a 30% response. Some surveys were not included in analysis because the respondents filling them were not using release thirteen. Consequently, only twenty-two surveys were analyzed.

Many of the businesses contacted indicated that they were using the latest release of AutoCAD but were not using release thirteen. At the time of the survey, release thirteen had been available to the general public for less than six months. Consequently, several businesses were not using release thirteen because opportunities for upgrade training, as yet, had not been developed. Because so few businesses had upgraded to release thirteen, it limited the number of potential respondents.

Outcomes

The study identified the frequency of usage for each AutoCAD command and system variable by the respondents. A list was generated that ordered the commands from most used to least used. In addition to a ranked order of the commands the list supplied information regarding percentage of usage of each command and whether or not that command was a carryover from AutoCAD R12.

The results of the study will be used by instructors and administrators of the CADD program at the Community College of Southern Nevada to modify CADD curriculum in such a way to help insure degree program relevance to the local community. The results will also be supplied to the Clark County School District, Occupational Education Division, as an aid to develop CADD curriculum that will articulate with the Community College of Southern Nevada CADD program.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

The purpose of this study was to identify commands used in the industrial application of AutoCAD, through respondents to the survey instrument, within the local drafting community, which were needed to reach a minimum desired level of competency with regard to the use of the AutoCAD software product. Previous reviews of literature in this area of study have significantly stimulated the initial development of this review. Consequently, they deserved to be mentioned here. They are works done by Wang (1993), Huang (1988), Laird (1988), and Spann (1990). The focus of this literature review has been divided into four sections: a brief history of CAD, research on CAD competencies, training on CAD, and the summary.

A Brief History of CAD

Byles (1985) indicated that CAD had its beginnings in the mid 1950s through a consortium of aerospace companies called the Aircraft Industries Association. Engineers at General Motors used the program tool generated by Aircraft Industries Association to create CAD batch language for producing loft lines. He further pointed out that the next generation of CAD software did not appear until CAD systems became commercially available during the late 1960s.Jefferis and Jones (1994) wrote that

computers started becoming available to large firms that could afford their hefty price tags in the early 1980s. While mechanical and electrical engineering firms started using CAD, architects did not because computers could not produce drawings with an artistic flair. However, by the mid 1980s, prices had dropped and programs had been developed that could produce drawings with enough artistic flair to satisfy many architectural firms. Consequently, by the late 80s many architects had discovered that computers would have a place in their office. Bertoline (1985) reported that:

> Since the late 70s there has been a dramatic increase in the number of CAD systems on the market and in the number of industries using them. No one event produced this increase in CAD, but there are a number of important reasons. Contributing to the increased use of CAD by industry are the rapid developments in the microcomputer due to improved microprocessor technology, the dropping cost of memory, and the increased number of venders supplying CAD. Another major reason for the growth in CAD is competition among rival companies both in the United States and abroad. Industries are finding that CAD must be used in order to remain competitive in such fields as electronics.
>
> The decrease in turnaround time in design and increases in productivity are two ways that CAD can make a company more competitive. CAD is and will continue to be the most productive method for drafter-designers to perform their job. (p. 26-27)

Eiteljorg (1996) agreed with Bertoline in that, with the advent of IBM's AT desktop computer system in the early 1980s, software packages designed to run on these systems came into being. AutoCAD was one such software package. Later, as computer

technology became increasingly sophisticated, more powerful computer processing hardware was created permitting the development of complicated functions within AutoCAD that were not possible in earlier versions of the software package. When major changes in features and operation of AutoCAD were produced, a new revision of the software was presented to the public. At the time of this study, the AutoCAD software product had undergone thirteen revisions. Research on CAD Competencies

Because of the changes in AutoCAD, it became necessary to insure that operators be provided with education regarding a list of commands needed in order to keep up with competition. Furthermore, one of the ways to increase the likelihood of gaining a reasonable rate of return on an investment in a CAD workstation would be to insure that operators would be able to perform at some minimum level of competence. Bell & Erekson (1991) pointed out that to accomplish this goal, contemporary curriculum must reflect technology while meeting the educational needs of a diverse student population.

Wang (1993) indicated that there were three approaches to teaching CAD, each requiring its own set of competencies. The first approach was in regard to programming, concentrating on data structures and the design of user interfaces. The second approach concerned the mathematical principles used in representation of curves and surfaces. The last approach was based on current CAD systems and the need to provide appropriate training on that system. According to Michell and Ligget (1986), this approach would be the most desired methodology for operators of CAD, CAD educators, and CAD system venders.

Wang (1993) further pointed out that a competent CAD operator must be able to effectively use the working commands of a CAD system as well as customize the CAD

working environment by developing macros for later use allowing increased productivity of the system. Developing macros is a process by which an operator would link several AutoCAD commands together under a new command name. In order to accomplish this, a clear understanding of the AutoCAD command structure would be required. Addison (1988) stated that:

> For the drafting instructor, it is an exciting and challenging time of new theory and new techniques, which must be continually woven into the course of instruction. While embracing these changes, those responsible for the curriculum must develop appropriate curriculum goals and objectives, must continue to focus on the real competencies required by their graduates in industry, and must choose those instructional processes in which will best help students reach their goal. (p 20)

Flechsig and Seamans (1987) pointed out that the purpose of each computer aided drafting class was to teach students to select, modify, and apply the computer commands necessary to draw the required assignment.

Training on CAD.

Wang (1993) pointed out that several members of the education community (MIT, Iowa State, and the University of Pennsylvania) responded to the development of computer-aided design and drafting systems by beginning to develop programs in the early 1960s. According to Wang (1993):

> Rensselaer Polytechnic Institute established its Center for Interactive computer graphics; Carnegie-Mellon University started both the Design Research Center and the robotics Institute in 1974; Cornell University developed a

> computer graphics instructional facility; and Brigham Young, Lehigh, and Purdue Universities excelled in computer aided manufacturing education and research endeavors. Carnegie-Mellon University began offering a Master's degree program in computer aided design in the late 1970s. (p 19,20)

Bollinger (1987) related that CAD instruction in colleges and universities throughout the United States had advanced significantly in the decade of the '80s and the advancement was due to the development of microcomputer CAD. According to Wang (1993), Bollinger confirmed the results of two surveys implemented by the Association of Computer Aided Design in Architecture in which all schools and colleges of architecture in North America were polled about their use of CAD in 1984 and 1986. In the 1984 poll sixty percent of the institutions had CAD capabilities, whereas in 1986, eighty-four percent of the schools had CAD capabilities.

Summary of Literature

The review of literature suggested that the need for colleges and universities to constantly update the curriculum is vital to the success of their CADD programs. Moreover, teachers should keep the focus of the curriculum on the particular skills and competencies that are required by industry from the CAD operator (Addison, 1988). With the proliferation of more complicated computer systems into the industrial society comes the spawning of more revisions of AutoCAD, each of which are increasingly more sophisticated. Moreover, expecting a student to become competent in the use of all of the AutoCAD commands available to the user is unrealistic. Furthermore, providing instruction in the use of all of the available commands within a timeline that would permit timely graduation from a degree program regarding CAD operation is just as

unrealistic. Consequently, a subset of the available commands was identified as a list of commands in which an operator should have competency in order to perform at entry level in a vocation as a draftsperson.

CHAPTER 3

METHODS AND PROCEDURES

Introduction

The primary purpose of this study was to identify commands most frequently used in the industrial application of AutoCAD, among respondents to the survey instrument, within the local drafting community, which were needed to reach a desired level of competency with regard to the use of the AutoCAD R13. Consequently, a descriptive research design was utilized. Descriptive research involves collecting data in order to answer questions concerning the current status of the subject of the study; it determines and reports the way things are (Gay 1992). The chapter is divided into five major areas of interest: population identification, development of the questionnaire, validation of the questionnaire, collection of the data, and analysis of the data.

Identification of the Population

The population for this study included 120 businesses located in the greater Las Vegas area to include Las Vegas townships, Henderson, and Boulder City. The businesses included in the population were those businesses which indicated through telephone interview that they had AutoCAD operators in their employ. The names and phone numbers of businesses were obtained by researching the local telephone directory yellow pages under the following subjects: architects, general contractors, civil,

structural, mechanical and electrical engineers, research and development organizations, gaming development organizations, and major hotels. Also some names and phone numbers of businesses were solicited from students enrolled in the CAD program at the Community College of Southern Nevada who were willing to provide them.

Development of the Questionnaire

One survey was used for this study. It was designed to determine the frequency each command and system variable available in the AutoCAD software product was used by AutoCAD operators. The survey instrument consisted of a multiple page questionnaire divided into three major areas of interest. The first area concerned AutoCAD command usage. The second area concerned AutoCAD system variable usage. The third area concerned the use of third party software applications available for use with AutoCAD.

Items for the instrument were generated from a list of all of the AutoCAD commands and system variables obtained from the computer help files. The list of items was then compared with the software operation manual to insure that no commands or system variables were missed. Each command and system variable was individually placed in a question format asking the subject to respond to a Likert-type format, ranging from "agree strongly" to "strongly disagree" (Appendix B).

After the command list questions, questions were posed regarding the following:

1. The type of drafting discipline performed.
2. The use of third party software.
3. The type of operating system used.

4. The use of AutoLISP. The use of AutoLISP would be an indicator of advanced skills in the operation of AutoCAD.

Validation of the Instrument

The survey was presented to a panel of five members who were asked to check for ambiguity, confusion, and poorly prepared items. The panel members were selected from the following criteria:

1. They were not in the population to be sampled in the survey.
2. Their professional responsibility was in the area of CADD in that they not only provided instruction in this area, but worked as draftspersons in the community as well.
3. They had been employed as operators of AutoCAD software for at least five years.
4. They had been employed as instructors of AutoCAD software for at least one year at a certified AutoCAD Training Center.

A memo was sent to each member asking that they attend a meeting concerning the validation of a survey instrument that was to be presented to the local drafting community. The questionnaire was distributed to each member during the meeting. They were asked to review each item on the questionnaire and return it at their earliest convenience. The members were asked to provide comments and suggestions regarding content relevance, clarity, and appropriateness of the items.

The panel members chose to examine the survey immediately and offered their suggestions at the close of the meeting. The only negative comment regarding the instrument was that it was lengthy. However, the members of the panel agreed that it

would be impossible to provide a short survey that would provide items addressing each of the available commands in AutoCAD. The instrument was approved for final printing and distribution to the population (Appendix B).

Collection of the Data

Once the sampling population was identified, supervisors at the business locations were called and asked if they would permit the senior AutoCAD operator to fill out the survey. If the supervisors were willing to permit the employee to fill out the survey, then the senior operator was contacted and asked if he/she would be willing to be a subject in a survey. Nearly all of the businesses were willing to permit their employees to fill out the survey. However, less than 100 operators were willing to fill it out due to time constraints.

The survey was distributed to the subjects. A cover letter was included to provide instructions as to how to fill out the survey and indicate a timeline for its return. None of the surveys were returned within the requested timeline. The timeline was adjusted to allow for return of questionnaires. Over the course of the adjusted time period, several follow up calls were made. At the close of the adjusted time period, 22 of the 90 surveys distributed were returned adequately filled out for use in data analysis.

Analysis of the Data

A value was assigned to each response on the scale in order to determine the likelihood that a command was used during a drawing session. Values were set as follows: Agree strongly = 1, Agree = 2, Undecided = 3, Disagree = 4, Strongly disagree = 5 (Appendix B). Data were tabulated into Microsoft Excel, compiled and analyzed. Microsoft Excel is a spread sheet program with a statistical analysis package similar to

the Statistical Package for the Social Sciences (SPSS). This analysis software package was chosen over SPSS because its user interface permitted greater ease for entering data. A frequency distribution was used for each item. The information presented the absolute frequency (number of responses) and the relative frequency (percentage of usage) of all data. Mean, median, standard deviation, variance, kurtosis, and skew were calculated on all data. A ranked order was then generated producing a listing of all AutoCAD commands and system variables from most used to least used by the respondents.

This list was then compared to a list of the AutoCAD commands from the previous release of the software product to determine if the command was available to the respondent before they upgraded to AutoCAD R13. The list from the previous release of AutoCAD was generated from help files and operation manuals in the same way as the list of commands from the current release.

Furthermore, each survey was analyzed to determine what percentage of the available command set each respondent used in order to provide an indicator as to the number of commands required for minimum competency. In order to accomplish this, an artificial dichotomy of the survey items was generated. An artificial dichotomy results when scaled responses are placed into two categories (Borg & Gall, 1989). Any answer that resulted in a choice of "Agree" or "Agree strongly" was considered as being a selected command and choices in the remaining three possibilities were considered as being a non selected command. The dichotomized results were then analyzed using the statistical analysis features available in Microsoft Excel.

The frequency analysis feature of Microsoft Excel was used to organize the command list in ranges of percentage of operator usage. The ranges were set in 10%

intervals 0% to 100%. That is, any command that was identified as being a selected command by all of the respondents was placed into the 100% category. If the command was identified as a selected command by 90% to 99% of the respondents, it was placed in the 90% category. This pattern continued down through the 10% category. Any command that was identified as never being selected was placed in the 0% category.

All of the commands that fell in a particular percentage range were then identified to determine whether or not they were a carryover from the previous release of AutoCAD. Once the commands were identified, then a percentage of commands carried over from the previous release of AutoCAD was calculated. For example, several commands fell in the range where 90% to 99% of the operators agreed or agreed strongly that the command was used each time they opened a drawing session in AutoCAD R13. Of those several commands, what percentage of them were carryovers from the previous release of AutoCAD?

The methods that were used to analyze the AutoCAD R13 commands were also applied to AutoCAD R13 system variables.

Summary of Methods and Procedures

Based on panel member comments no revisions were made on the survey instrument. The surveys were distributed to the population. No follow up letters were mailed. However, follow up phone calls were made in order to recover as many surveys as possible. Of all of the business that indicated they used AutoCAD R13 and had employees that were willing to fill out the survey, twenty-two of them returned the survey within the adjusted time period. The data obtained from the responses to the

survey were compiled through Microsoft Excel, a spreadsheet program, and statistical calculations were applied to each response.

CHAPTER 4

FINDINGS

Introduction

The primary purpose of this study was to identify commands most frequently used in the industrial application of AutoCAD among respondents to the survey instrument within the local drafting community. Identifying commands most frequently used would aid the development of a minimum competency list of commands. A secondary purpose was to identify the relationship, if any, between the release thirteen commands used by the respondents and commands carried over from release twelve. As the operation of AutoCAD requires the use of commands and system variables, the findings have been divided into two sections, the findings regarding AutoCAD commands, and the findings regarding AutoCAD system variables.

Findings Regarding AutoCAD Commands

Out of all of the possible AutoCAD R13 commands available for use, none of the respondents used all of them. Microsoft Excel was used to generate descriptive statistics regarding the percentage of commands used by each respondent out of the total commands available. Any commands that the respondent chose "Agree Strongly" or "Agree" was considered a selected command. The total number of selected commands by respondents were then divided by the total number of available commands. The result

was then multiplied by 100 to produce a percentage. The descriptive statistics regarding the percentage of commands selected by the respondents are listed in Table 1.

Table 1 Descriptive Statistics: Percentage of Commands Used

Statistic	Value
Mean	34.11%
Standard Error	2.36%
Median	34.63%
Mode	23.70%
Standard Deviation	0.1107
Sample Variance	0.0122
Kurtosis	-0.1546
Skewness	0.0353
Range	42.59%
Minimum	12.22%
Maximum	54.81%
Count	22

The respondent that used the most commands only used 55% of those available. The respondent that used the least percentage of commands available used 12%. On the average, respondents used only 34% of all of the AutoCAD R13 commands available to them.

Selection of commands

Out of all of the possible AutoCAD R13 commands available, selection was indicated by 100% of the respondents with regard to using the Line, Zoom, Save, Erase, Fillet, Pan, and Insert commands each time they engaged in a drafting session. All of the commands in the aforementioned list are available in the AutoCAD R12 command set. 77% of the respondents chose "Agreed strongly" concerning the use of the Zoom and line commands while 23% chose "Agreed." Of the respondents, 68% chose "Agreed strongly" with regard to the use of Erase, Fillet, Pan and the Insert commands in every drafting session while 32% "Agreed" that they used those commands each time they entered a drawing session. Since drawings generally have many arcs and circles it was surprising that the primitive commands, "Arc", and "Circle" were not unanimously chosen in the "Agree" or "Agree strongly" categories.

A frequency distribution was generated placing the number of commands in ranges of percentage of respondents selecting the command. There were only seven commands in which 100% of the respondents selected the command. Twenty-six commands fell in the range where 90% to 99% of the respondents selected the command. Fourteen commands fell in the range where 80% to 89% of the respondents selected the command. Ten commands fell in the range where 70% to 79% of the respondents selected the command. Fourteen commands fell in the range where 60% to 69% of the respondents selected the command. Twenty-four commands fell in the range where 50% to 59% of the respondents selected the command. Twenty-two commands fell in the range where 40% to 49% of the respondents selected the command. Twelve commands fell in the range where 30% to 39% of the respondents selected the command. Twenty-

four commands fell in the range where 20% to 29% of the respondents selected the command. Twenty-five commands fell in the range where 10% to 19% of the respondents selected the command. Fourty-seven commands fell in the range where 1% to 9% of the respondents selected the command. Forty-five commands fell in the range where none of the respondents selected the command (Appendix C).

Fifty percent or more of the respondents indicated selection of 95 AutoCAD R13 commands used during a drafting session. This amounted to 34% of the available commands.

Non-selection of commands

If none of the respondents chose "Agree strongly" or "Agree" with respect to a command then the command was considered not selected. Out of all of the possible AutoCAD R13 commands, forty-five of them were not selected. Of those commands, only nine of them were carryovers from release twelve. All of the commands not chosen were commands required to perform three-dimensional drafting and solid modeling.

AutoCAD R13 command usage and availability in AutoCAD R12.

A relationship between the percentage of operators using a particular command from AutoCAD R13 and the likelihood of that command being a carryover from the previous release of AutoCAD was established.

If the respondent choose "Agreed strongly" or "Agreed" with respect to a particular command being used each time a drawing session was opened, then that command was considered as being selected by the respondent. For each command, a percentage indicating the number of respondents out of the 22 respondents that selected the command was calculated.

Of all of the commands that fell within the 100% range, all of them were available in the previous release of AutoCAD. Of all of the commands that fell within the 90% to 99% range, 96% of them were carryovers from the previous release of AutoCAD. Of all of the commands that fell within the 80% to 89% range, 100% of them were carryovers from the previous release of AutoCAD. Of all of the commands that fell within the 70% to 79% range, 90% of them were carryovers from the previous release of AutoCAD. Of all of the commands that fell within the 60% to 69% range, 92% of them were carryovers from the previous release of AutoCAD. Of all of the commands that fell within the 50% to 59% range, 79% of them were carryovers from the previous release of AutoCAD. Of all of the commands that fell within the 40% to 49% range, 64% of them were carryovers from the previous release of AutoCAD. Of all of the commands that fell within the 30% to 39% range, 41% of them were carryovers from the previous release of AutoCAD. Of all of the commands that fell within the 20% to 29% range, 58% of them were carryovers from the previous release of AutoCAD. Of all of the commands that fell within the 10% to 19% range, 46% of them were carryovers from the previous release of AutoCAD. Of all of the commands that fell within the 1% to 9% range, 36% of them were carryovers from the previous release of AutoCAD. Of all of the commands that fell within the 0% range, 20% of them were carryovers from the previous release of AutoCAD.

Findings Regarding AutoCAD System Variables

Out of all of the possible AutoCAD R13 system variables available for modification, none of the respondents used all of them. Microsoft Excel was used to generate descriptive statistics regarding the percentage of system variables used by each respondent out of the total number of variables available for modification. Any system

variable that the respondent chose "Agree Strongly" or "Agree" was considered a selected variable. The total number of selected variables were then divided by the total number of variables available to the respondent. The result was then multiplied by 100 to produce a percentage. The descriptive statistics regarding the percentage of system variables selected by the respondents are listed in Table 2.

Table 2 Descriptive Statistics: Percentage of System Variables Used

Statistic	Value
Mean	9.11%
Standard Error	2.73%
Median	6.11%
Mode	6.29%
Standard Deviation	0.1281
Sample Variance	0.0164
Kurtosis	10.9624
Skewness	3.1109
Range	58.51%
Minimum	0.0%
Maximum	58.52%
Count	22

The respondent that used the most system variables used 59% of those available. This respondent indicated the employment of AutoLISP programming in the modification

of the AutoCAD command set. Since the manipulation of AutoCAD system variables are a critical part of AutoLISP programming, it would be expected that response regarding the use of system variables, with regard to this respondent, would be high. The respondent that used the least percentage of commands available did not use any of them. On the average, respondents used only 9% of all of the AutoCAD R13 system variables available to them.

Only five of the system variables available in AutoCAD R13 were selected. All five of the system variables selected had to do with display control, annotation and plotting of drawings. Sixteen of the 22 respondents used less than 10% of the system variables available to them. Consequently, extensive analysis was not performed on the system variable responses because of low usage by the respondents.

Years of Experience Versus Percentage of Total Commands Used

There was minimal correlation between the percentage of total AutoCAD R13 commands used and the years of experience using AutoCAD reported by the respondents. All of the respondents had experience in using both AutoCAD R12 and release thirteen. A respondent who reported using the software for one year reported indicated the use of only 15% of the available commands, while another one-year veteran reported using 30% of the command set. A respondent who reported using AutoCAD for four years had used only 12% of the command set. One respondent who reported using AutoCAD for two years indicated the use of 44% of the available commands in AutoCAD R13. The highest percentage of command use, 58%, was derived from the survey that a five-year user of AutoCAD had returned. The data do not support a correlation between the percentage of commands used versus years of experience.

AutoCAD R13 Command Usage and Third Party Packages.

The relationship between percentage of total AutoCAD commands used and the usage of third party packages added to AutoCAD by the respondents is as follows. Seven of the twenty-two respondents used third party packages. The range of percentage of AutoCAD commands used for those who used third party packages was from 26% to 55%. The range of percentages for those who did not use a third party package was from 12% to 54%.

With one exception, all of those using a third package indicated having five years of experience using AutoCAD. This would suggest that there may be a relationship between years of experience in the use of AutoCAD and the likelihood of using a third party package. Further investigation into this potential relationship would seem to be warranted. The one respondent that was the exception indicated two years of experience using AutoCAD and employed thirty one percent of the available AutoCAD commands and one percent of the available system variables.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter summarizes the procedures followed for this study, presents the findings of the study along with the associated conclusions made by the researcher, and makes recommendations based on the findings and conclusions of this report.

Summary

The primary purpose of this study was to identify commands most frequently used in the industrial application of AutoCAD among respondents to the survey instrument, within the local drafting community, which were needed to reach a desired level of competency with regard to the use of the AutoCAD software product. A secondary purpose was to identify the relationship, if any, between the release thirteen commands used by the respondents and commands carried over from release twelve.

Information for this study was obtained through the use of surveys sent to 90 businesses located in the greater Las Vegas area. The names and phone numbers of business were obtained by researching the local telephone directory yellow pages under the following subjects: architects, general contractors, civil, structural, mechanical and electrical engineers, research and development organizations, gaming development organizations, and major hotels. Names and numbers of business were also obtained from students enrolled in the CAD program at the Community College of Southern

Nevada who were willing to provide them. Twenty-two usable surveys were returned within one year from the date of initial distribution.

Extent of AutoCAD R13 Command Usage.

None of the respondents used all of the available AutoCAD R13 commands. Mean percentage of command usage of all of the respondents was 34%. This amounted to slightly more than one-third of the entire command set. A single respondent used just over 10% of the available commands while another respondent used 55% percent of them. With one exception, all respondents indicated that they used less than half of the available release thirteen commands each time they opened a drawing session.

100% of the respondents indicated that they used the Line, Zoom, Save, Erase, Fillet, Pan, and Insert commands each time they opened a drawing session. All of these commands were available in the previous release of AutoCAD. It was interesting to note that neither "Quit" nor "End" was selected. Use of these of one of these two commands would be required in order to end a drafting session. "Quit" was selected by 82% of the respondents and "End" was selected by 68% of the respondents. Furthermore, it was interesting to note that the primitive commands "Arc" and "Circle" were not in the list. However, they do appear in the range discussed in the following paragraph.

Ninety to ninety-nine percent of the respondents selected the following as commands used each time they opened a drawing session: Break, Copy, Layer, Leader, Linetype, Mirror, Move, Open, Osnap, Plot, Purge, Redraw, Regen, Scale, Trim, Arc, Change, Chprop, Extend, List, Ltscale, Offset, Ortho, Pline, Stretch, and Wblock. Only one of these commands was not a carryover from the previous release of AutoCAD.

Therefore, 96% of the commands used by 90% to 99% of the respondents were carryover from release twelve.

Eighty to eighty-nine percent of the respondents selected the following as commands used each time they opened a drawing session: Block, Circle, Dtext, Explode, Pedit, Rotate, Style, Undo, Dist, Hatch, Menu, Oops, Quit, Quit, and Saveas. All of them are available in release twelve.

Seventy to seventy-nine percent of the respondents selected the following as commands used each time they opened a drawing session: Ddinsert, Dim, Intersect, Redo, Snap, Array, Chamfer, Load, U, and Xplode. Ninety percent of these commands were available in AutoCAD R12.

Sixty to sixty-nine percent of the respondents selected the following as commands used each time a drawing session is encountered: Attedit, Bhatch, Color, Ddedit, Dimedit, End, Files, Limits, New, Qsave, Point, Text, View, and View. Ninety-two percent of them were available in AutoCAD R12.

Fifty to fifty-nine percent of the respondents selected the following as commands used each time they opened drawing session: Area, Blipmode, Config, Ddatte, Ddmodify, Ddosnap, Dimcontinue, Dimstyle, Dimtedit, Divide, Dragmode, Donut, Ellipse, Grid, Polygon, Pspace, Redrawall, Regenall, Rename, Select, Setvar, Shell, Ucsicon, and Units. Seventy-nine percent of them were available in release tweleve.

Of the commands selected by 40% to 49% of the respondents 64% of them were carried over from release twelve. Of the commands selected by 30% to 39% of the respondents, 42% were available in release twelve. Of the commands selected by 20% to 29% of the respondents, 58% of them were available in release twelve. Of the commands

selected by 10% to 19% of the respondents, 46% were available in release twelve. Of the commands selected by 1% to 9% of the respondents, 36% were available in release twelve. Of the 45 commands not selected by any of the respondents, 20% of them were carried over from release twelve.

Conclusions

On the basis of the data presented in the study the following conclusions appear warranted:

1. None of the respondents used the entire command set available to them.
2. On the average, respondents used less than 35% of the command set available to them.
3. Respondents were more likely to use a command from the previous release of AutoCAD than use a new one available in release thirteen.
4. Respondents tended to choose two-dimensional drafting commands over three-dimensional drafting commands.
5. Time in service using AutoCAD had little impact on the respondent's choice of commands use during a drafting session.
6. The use of third party software had little impact on the choices of commands used during a drafting session.

Recommendations

Of the respondents, the average user of AutoCAD used less than 35% of the commands available in release thirteen. It is interesting to note that 50% or more of the respondents chose 95 commands that they would use each time they opened a drafting session. This amounts to 35% of the available command set. Commands analyzed as

most used by the respondents were commands required for two-dimensional drafting. Consequently, the following recommendations are presented:

1. Instruction should be provided for all of the commands available in AutoCAD R13. However, the 95 most commonly used commands could be introduced to the learner in beginning level classes. By doing so, it could increase the likelihood of employability in the drafting community within the greater Las Vegas area. Lesser-used commands could be taught in upper level classes.
2. Analysis of the data indicated that the commands used by the respondents during a drawing session were more likely to be ones carried over from release twelve than commands unique to AutoCAD R13. Of the 95 commands selected by 50% of the respondents, 92% of those commands were carried over from AutoCAD R12. If a curriculum were in place to provide training in AutoCAD R12, any curriculum changes required for training in AutoCAD R13 would be minimal. Updating the curriculum on regular intervals would not be difficult and would be in the best interest of the learner.
3. A study of CADD programs at other colleges and universities should be performed.
4. A population should be identified and surveyed on a regular schedule in order to follow trends in AutoCAD command usage. The survey used in this study would work, but there is a better way. AutoCAD has a mechanism by which it automatically keeps a log of all commands used during a drafting session. With proper programming technique, this log can be gathered automatically, tabulated, and data stored for later analysis. Consequently, the operator of the

CAD station would not have to take time out of his/her schedule to fill out a survey. Moreover, the researcher could avoid pitfalls involving the ability of the respondent to remember frequency of command usage and pitfalls involving respondent bias.

1. The information provided in this study should be made available to all instructors and administrators of the CADD program at the community college.
2. The information provided in this study should be made available to all secondary education drafting instructors and to the curriculum department of the Clark County School District.

APPENDIX A

QUESTIONNAIRE

AutoCAD R13 Command Use Survey

By

David J. Brodersen

Graduate Student

University of Nevada, Las Vegas

AutoCAD Curriculum Research Project

Survey

Prepared by

David J. Brodersen

Graduate Student

University of Nevada, Las Vegas

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HOW TO USE THIS BOOK

Thank you for taking the time out of your busy schedules to fill out this survey. The following instructions will need to be followed explicitly in order to assure an accurate response.

- **Do Not Sign This Survey.**
- There are two types of response methods in this survey; see the next page for directions
- Please circle appropriate responses completely.
- Circle each response individually when more than one answer is offered.
- Please answer all questions.
- Avoid "guessing" at the answer(s).
- If you cannot answer a question fully, please follow up as much as practical to obtain an answer.
- Since I am a graduate student, I have been given a deadline to complete this study and compile the results. Therefore I ask that you return this questionnaire as soon as possible in the envelope provided.
- Questions that ask you to agree or disagree are seeking out your personal experience with the use of AutoCAD drafting software. Do not base your response on the experience or opinion of another AutoCAD user.
- Company and Personal information are optional and should be placed only in the areas requesting that information at the end of the survey.

AUTOCAD COMMAND USE SURVEY

SAMPLE ANSWERS

Please circle **one** response only. Base your answer on your personal experience with AutoCAD only. Do not use an opinion other than your own.

Every time that I work on a drawing with AutoCAD I use the _____ command.

1. Frog Agree Strongly.....Agree ... Undecided.... Disagree .....Strongly Disagree

For those answers that require a written response, please print clearly.

If you need to contact me you may do so at:

Dave Brodersen
CCSN
700 College Dr.
Henderson, NV 89015

Voice: ..... (702) 564-7484
Fax:..... (702) 564-7596

Email ..... daveb@nevada.edu

AUTOCAD PRELIMINARY SURVEY

Please Circle the **Correct** answer or fill in the blanks as required.

---

1. **How many years have you been using AutoCAD?**

   0.1-1.9 2-2.9 3-3.9 4-4.9 5 and over

2. **What kind of drafting do you do?**

   Mechanical Architectural Civil Electronic

   Other: _____

3. **Do you use a third party add on to AutoCAD?** (Such as LandCADD, AutoArchitect, etc.)

   Yes No If yes, what is the package called?

   _____

4. **Do you use AutoLISP?**

   Yes No

5. **What operating system do you use?**

   DOS Windows **NT** Windows **3.1x** UNIX OS2

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I use the _____ command.

1. 3d .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
2. 3darray .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
3. 3dface .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
4. 3dmesh .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
5. 3dpoly .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
6. 3dsin .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
7. 3dsout .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
8. About .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
9. Acisin .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
10. Acisout .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
11. Align .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
12. Ameconvert .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
13. Aperture .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
14. Appload .....Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
15. Arc .....Agree Strongly .....Agree .....Undecided ..... Disagree Strongly Disagree
16. Area .....Agree Strongly .....Agree .....Undecided ..... Disagree Strongly Disagree
17. Array .....Agree Strongly .....Agree .....Undecided ..... Disagree Strongly Disagree
18. Ase .....Agree Strongly .....Agree .....Undecided ..... Disagree Strongly Disagree
19. Aseadmin .....Agree Strongly .....Agree .....Undecided ..... Disagree Strongly Disagree
20. Aseexport .....Agree Strongly .....Agree .....Undecided ..... Disagree Strongly Disagree
21. Aselinks .....Agree Strongly .....Agree .....Undecided ..... Disagree Strongly Disagree
22. Aserows .....Agree Strongly .....Agree .....Undecided ..... Disagree Strongly Disagree
23. Aseselect .....Agree Strongly .....Agree .....Undecided ..... Disagree Strongly Disagree
24. Asesqled .....Agree Strongly .....Agree .....Undecided ..... Disagree Strongly Disagree
25. Aseunload .....Agree Strongly .....Agree .....Undecided ..... Disagree Strongly Disagree
26. Attdef .....Agree Strongly .....Agree .....Undecided ..... Disagree Strongly Disagree
27. Attdisp .....Agree Strongly .....Agree .....Undecided ..... Disagree Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I use the _____ command.

28. Attedit ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
29. Attext ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
30. Attredef ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
31. Audit ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
32. Base ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
33. Bhatch ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
34. Blipmode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
35. Block ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
36. Boundary ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
37. Box ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
38. Break ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
39. Cal ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
40. Chamfer ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
41. Change ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
42. Chprop ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
43. Circle ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
44. Toc ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
45. Color ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
46. Compile ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
47. Cone ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
48. Config ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
49. Copy ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
50. Cylinder ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
51. Dblist ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
52. Ddattdef ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
53. Ddatte ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I use the _____ command.

54. Ddattext ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
55. Ddchprop ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
56. Ddcolor ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
57. Ddedit ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
58. Ddemodes ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
59. Ddgrips ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
60. Ddim ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
61. Ddinsert ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
62. Ddlmodes ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
63. Ddltype ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
64. Ddmodify ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
65. Ddosnap ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
66. Ddptype ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
67. Ddrename ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
68. Ddrmodes ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
69. Ddselect ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
70. Dducs ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
71. Dducsp ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
72. Ddunits ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
73. Ddview ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
74. Ddvpoint ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
75. Delay ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
76. Dim ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
77. Dimaligned ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
78. Dimangular ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
79. Dimbaseline ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I use the _____ command.

80. Dimcenter ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
81. Dimcontinue ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
82. Dimdiameter ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
83. Dimedit ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
84. Dimlinear ..... Agree Strongly ..... Agree Undecided Disagree ..... Strongly Disagree
85. Dimordinate ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
86. Dimoverride ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
87. Dimradius ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
88. Dimstyle ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
89. Dimtedit ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
90. Dist ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
91. Divide ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
92. Dlgcolor ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
93. Donut ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
94. Dragmode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
95. Dtext ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
96. Dview ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
97. Dxbin ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
98. Dxfin ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
99. Dxfout ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
100. Edge ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
101. Edgesurf ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
102. Elev ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
103. Ellipse ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
104. End ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
105. Erase ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I use the _____ command.

106. Explode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
107. Extend ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
108. Extrude ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
109. Files ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
110. Fill ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
111. Fillet ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
112. Filter ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
113. Gifin ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
114. Gloss ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
115. Gloss Trans ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
116. Graphscr ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
117. Grid ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
118. Group ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
119. Hatch ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
120. Hatchedit ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
121. Help ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
122. Hide ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
123. Id ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
124. Insert ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
125. Interfere ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
126. Intersect ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
127. Isoplane ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
128. Layer ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
129. Leader ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
130. Lengthen ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree
131. Light ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I use the _____ command.

132. Limits.....Agree Strongly.....Agree.....Undecided.....Disagree Strongly Disagree
133. Line.....Agree Strongly.....Agree.....Undecided.....Disagree Strongly Disagree
134. Linetype.....Agree Strongly.....Agree.....Undecided.....Disagree Strongly Disagree
135. List.....Agree Strongly.....Agree.....Undecided.....Disagree Strongly Disagree
136. Load.....Agree Strongly.....Agree.....Undecided.....Disagree Strongly Disagree
137. Logfileoff.....Agree Strongly.....Agree.....Undecided.....Disagree Strongly Disagree
138. Logfileon.....Agree Strongly.....Agree.....Undecided.....Disagree Strongly Disagree
139. Ltscale.....Agree Strongly.....Agree.....Undecided.....Disagree Strongly Disagree
140. Makepreview.....Agree Strongly.....Agree.....Undecided.....Disagree Strongly Disagree
141. Massprop.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
142. Matlib.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
143. Measure.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
144. Menu.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
145. Minsert.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
146. Mirror.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
147. Mirror3d.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
148. Mledit.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
149. Mline.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
150. Mlstyle.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
151. Move.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
152. Mslide.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
153. Mspace.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
154. Mtext.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
155. Mtprop.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
156. Multiple.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
157. Mview.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I use the _____ command.

158. Mvsetup .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
159. New .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
160. Offset .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
161. Oops .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
162. Open .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
163. Ortho .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
164. Osnap .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
165. Pan .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
166. Pcxin .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
167. Pedit .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
168. Pface .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
169. Plan .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
170. Pline .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
171. Plot .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
172. Point .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
173. Polygon .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
174. Preferences .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
175. Psdrag .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
176. Psfill .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
177. Psin .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
178. Psout .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
179. Pspace .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
180. Purge .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
181. Qsave .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
182. Qtext .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree
183. Quit .....Agree Strongly .....Agree .....Undecided .....Disagree .....Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I use the _____ command.

184. Ray ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
185. Rconfig ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
186. Recover ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
187. Rectang ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
188. Redefine ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
189. Redo ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
190. Redraw ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
191. Redrawall ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
192. Regen ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
193. Regenall ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
194. Regenauto ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
195. Region ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
196. Reinit ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
197. Rename ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
198. Render ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
199. Renderunload ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
200. Rendscr ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
201. Replay ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
202. Resume ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
203. Revolve ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
204. Revsurf ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
205. Rmat ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
206. Rotate ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
207. Rotate3d ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
208. Rpref ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
209. Rscript ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I use the _____ command.

210. Rulesurf.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
211. Save.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
212. Saveas.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
213. Saveasr12.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
214. Saveimg.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
215. Scale.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
216. Scene.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
217. Script.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
218. Section.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
219. Select.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
220. Setvar.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
221. Shade.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
222. Shape.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
223. Shell.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
224. Sketch.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
225. Slice.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
226. Snap.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
227. Solid.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
228. Spell.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
229. Sphere.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
230. Spline.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
231. Splinedit.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
232. Stats.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
233. Status.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
234. Stlout.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
235. Stretch.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I use the _____ command.

236. Style.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
237. Subtract.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
238. Tablet.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
239. Tabsurf.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
240. Text.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
241. Textscr.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
242. Tiffin.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
243. Time.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
244. Tolerance.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
245. Torus.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
246. Trace.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
247. Treestat.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
248. Trim.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
249. UAgree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
250. Ucs.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
251. Ucsicon.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
252. Undefine.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
253. Undo.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
254. Union.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
255. Units.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
256. View.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
257. Viewres.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
258. Vlconv.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
259. Vplayer.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree
260. Vpoint.....Agree Strongly.....Agree.....Undecided.....Disagree.....Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I use the _____ command.

261. Vports ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

262. Vslide ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

263. Wblock ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

264. Wedge ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

265. Xbind ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

266. Xline ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

267. Xplode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

268. Xref ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

269. Xrefclip ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

270. Zoom ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I manipulate the _____ variable.

271. Acadprefix.....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
272. Acadver.....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
273. Aflags .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
274. Angbase .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
275. Angdir.....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
276. Aperture .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
277. Area.....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
278. Attdia .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
279. Attmode .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
280. Attreq.....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
281. Auditctl .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
282. Aunits .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
283. Auprec .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
284. Backz .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
285. Blipmode .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
286. Cdate .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
287. Cecolor.....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
288. Celtscale .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
289. Celtype .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
290. Chamfera.....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
291. Chamferb.....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
292. Chamferc .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
293. Chamferd.....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
294. Chammode.....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
295. Circlerad .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree
296. Clayer .....Agree Strongly.....Agree.....Undecided .....Disagree .....Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I manipulate the _____ variable.

297. Cmdactive ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
298. Cmddia ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
299. Cmdecho ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
300. Cmdnames ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
301. Cmljust ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
302. Cmlscale ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
303. Cmlstyle ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
304. Coords ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
305. Cvport ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
306. Date ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
307. Dbmod ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
308. Dctcust ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
309. Dctmain ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
310. Delobj ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
311. Diastat ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
312. Dimalt ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
313. Dimaltd ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
314. Dimaltf ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
315. Dimalttd ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
316. Dimalttz ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
317. Dimaltu ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
318. Dimaltz ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
319. Dimapost ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
320. Dimaso ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
321. Dimasz ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
322. Dimaunit ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I manipulate the _____ variable.

323. Dimblk ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
324. Dimblk1 ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
325. Dimblk2 ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
326. Dimcen ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
327. Dimclrd ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
328. Dimclre ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
329. Dimclrt ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
330. Dimdec ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
331. Dimdle ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
332. Dimdli ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
333. Dimexe ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
334. Dimexo ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
335. Dimfit ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
336. Dimgap ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
337. Dimjust ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
338. Dimlfac ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
339. Dimlim ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
340. Dimpost ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
341. Dimrnd ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
342. Dimsah ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
343. Dimscale ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
344. Dimsd1 ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
345. Dimsd2 ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
346. Dimse1 ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
347. Dimse2 ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I manipulate the _____ variable.

348. Dimsho ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
349. Dimsoxd ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
350. Dimstyle ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
351. Dimtad ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
352. Dimtdec ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
353. Dimtfac ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
354. Dimtih ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
355. Dimtix ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
356. Dimtm ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
357. Dimtofl ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
358. Dimtoh ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
359. Dimtol ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
360. Dimtolj ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
361. Dimtp ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
362. Dimtsz ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
363. Dimtvp ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
364. Dimtxsty ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
365. Dimtxt ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
366. Dimtzin ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
367. Dimunit ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
368. Dimupt ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
369. Dimzin ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
370. Dispsilh ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
371. Distance ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
372. Donutid ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I manipulate the _____ variable.

373. Donutod ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

374. Dragmode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

375. Dragp1 ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

376. Dragp2 ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

377. Dwgcodepage .... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

378. Dwgname ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

379. Dwgprefix ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

380. Dwgtitled ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

381. Dwgwrite ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

382. Edgemode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

383. Elevation ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

384. Expert ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

385. Explmode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

386. Extmax ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

387. Extmin ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

388. Facetres ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

389. Fflimit ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

390. Filedia ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

391. Filletrad ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

392. Fillmode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

393. Fontalt ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

394. Fontmap ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

395. Frontz ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

396. Gridmode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

397. Gridunit ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

398. Gripblock ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I manipulate the _____ variable.

399. Gripcolor ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
400. Griphot ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
401. Grips ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
402. Gripsize ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
403. Handles ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
404. Highlight ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
405. Hpang ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
406. Hpbound ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
407. Hpdouble ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
408. Hpname ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
409. Hpscale ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
410. Hpspace ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
411. Insbase ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
412. Insname ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
413. Isolines ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
414. Lastangle ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
415. Lastpoint ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
416. Lenslength ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
417. Limcheck ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
418. Limmax ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
419. Limmin ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
420. Locale ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
421. Loginname ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
422. Ltscale ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
423. Lunits ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
424. Luprec ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I manipulate the _____ variable.

425. Maxactvp ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
426. Maxsort ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
427. Menuctl ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
428. Menuecho ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
429. Menuname ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
430. Mirrtext ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
431. Modemacro ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
432. Mtexted ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
433. Offsetdist ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
434. Orthomode ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
435. Osmode ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
436. Pdmode ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
437. Pdsize ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
438. Pellipse ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
439. Perimeter ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
440. Pfacevmax ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
441. Pickadd ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
442. Pickauto ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
443. Pickbox ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
444. Pickdrag ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
445. Pickfirst ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
446. Pickstyle ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
447. Platform ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
448. Plinegen ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
449. Plinewid ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
450. Plotid ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I manipulate the _____ variable.

451. Plotrotmode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
452. Plotter ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
453. Polysides ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
454. Popups ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
455. Projmode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
456. Psltscale ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
457. Psprolog ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
458. Psquality ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
459. Qtextmode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
460. Rasterpreview .... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
461. Re-init ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
462. Regenmode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
463. Riaspect ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
464. Ribackg ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
465. Riedge ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
466. Rigamut ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
467. Rigrey ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
468. Rithresh ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
469. Savefile ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
470. Savename ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
471. Savetime ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
472. Screenboxes ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
473. Screenmode ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
474. Screensize ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
475. Shadedge ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree
476. Shadedif ..... Agree Strongly ..... Agree ..... Undecided ..... Disagree ..... Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I manipulate the _____ variable.

477. Shpname ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
478. Sketchinc ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
479. Skpoly ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
480. Snapang ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
481. Snapbase ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
482. Snapisopair ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
483. Snapmode ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
484. Snapstyl ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
485. Snapunit ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
486. Sortents ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
487. Splframe ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
488. Splinesegs ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
489. Splinetype ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
490. Surftab1 ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
491. Surftab2 ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
492. Surftype ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
493. Surfu ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
494. Surfv ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
495. Syscodepage ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
496. Tabmode ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
497. Target ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
498. Tdcreate ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
499. Tdindwg ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
500. Tdupdate ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
501. Tdusrtimer ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
502. Tempprefix ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I manipulate the _____ variable.

503. Texteval ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
504. Textfill ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
505. Textqlty ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
506. Textsize ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
507. Textstyle ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
508. Thickness ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
509. Tilemode ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
510. Tracewid ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
511. Treedepth ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
512. Treemax ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
513. Trimmode ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
514. Ucsfollow ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
515. Ucsicon ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
516. Ucsname ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
517. Ucsorg ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
518. Ucsxdir ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
519. Ucsydir ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
520. Undoctl ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
521. Undomarks ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
522. Unitmode ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
523. Viewctr ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
524. Viewdir ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
525. Viewmode ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
526. Viewsize ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
527. Viewtwist ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree
528. Visretain ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree

AutoCAD R13 - Command Use Survey

Every time that I work on a drawing with AutoCAD I manipulate the _____ variable.

529. Vsmax..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree

530. Vsmin ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree

531. Worlducs ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree

532. Worldview ..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree

533. Xrefctl..... Agree Strongly .....Agree .....Undecided ..... Disagree .....Strongly Disagree

Optional Information

The following items are optional. You need not answer if you wish.

1. My position and duties:

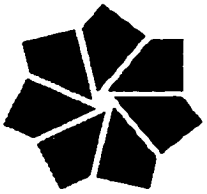
2. Company Name and Mailing Address:

3. Where you learned to use AutoCAD:

4. Additional Comments:

APPENDIX B

COVER LETTER



COMMUNITY COLLEGE of SOUTHERN NEVADA

Professor David J. Brodersen, AAS, BS
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Computer Aided Drafting Survey of AutoCAD R13 command usage.

Date~

Name~
Address~
City~, State~ Zip~

One of the key issues when developing curriculum is identifying a set of outcomes to be achieved by the end of a given class. In order to identify outcomes that are up to date, research is performed regarding AutoCAD command usage in the local community. In order to accomplish this end, the following survey has been delivered to you for complection as per our telephone conversation. A four week time line has been budgeted for the distribution, completion, and return of all surveys. When you have completed your survey, place it in the envelope provided and contact me. I will come and pick it up.

Thank you for volunteering to fill out this survey. Information gleaned from the survey will help tremendously in curriculum development within the CAD program at the Community College of Southern Nevada.

_____

David J. Brodersen,
Professor CCSN

cc: Dr. James Pomeroy,
Department Chair

ENCLOSURES: AUTOCAD RELEASE THIRTEEN SURVEY.

APPENDIX C

COMMANDS CHOSEN BY RESPONDENTS

COMMANDS CHOSEN BY RESPONDENTS

The following is a list of commands chosen by the respondents broken down by percentages of respondents choosing the command. Any command that is a carryover from the previous release of AutoCAD is underlined.

100% of the respondents selected the following as commands used each time a drawing session is encountered:

Erase, Fillet, Insert, Line, Pan, Save, and Zoom.

90% to 99% of the respondents selected the following as commands used each time a drawing session is encountered: Break, Copy, Layer, Leader, Linetype, Mirror, Move, Open, Osnap, Plot, Purge, Redraw, Regen, Scale, Trim, Arc, Change, Chprop, Extend, List, Ltscale, Offset, Ortho, Pline, Stretch, and Wblock.

80% to 89% of the respondents selected the following as commands used each time a drawing session is encountered: Block, Circle, Dtext, Explode, Pedit, Rotate, Style, Undo, Dist, Hatch, Menu, Oops, Quit, Quit, and Saveas.

70% to 79% of the respondents selected the following as commands used each time a drawing session is encountered: Ddinsert, Dim, Intersect, Redo, Snap, Array, Chamfer, Load, U, and Xplode.

60% to 69% of the respondents selected the following as commands used each time a drawing session is encountered: Attedit, Bhatch, Color, Ddedit, Dimedit, End, Files, Limits, New, Qsave, Point, Text, View, and View.

50% to 59% of the respondents selected the following as commands used each time a drawing session is encountered: Area, Blipmode, Config, Ddatte, Ddmodify, Ddosnap, Dimcontinue, Dimstyle, Dimtedit, Divide, Dragmode, Donut, Ellipse, Grid, Polygon, Pspace, Redrawall, Regenall, Rename, Select, Setvar, Shell, Ucsicon, and Units.

40% to 49% of the respondents selected the following as commands used each time a drawing session was encountered: Appload, Attdef, Attext, Ddim, Ddlmodes, Dimaligned, Dimangular, Dimcenter, Dimdiameter, Dimlinear, Dimradius, Dview, Hatchedit, Id, Measure, Mspace, Multiple, Mview, Solid, Ucs, Viewres, and Vports.

30% to 39% of the respondents selected the following as commands used each time a drawing session was encountered: Aperture, Ddchprop, Ddgrips, Ddltype, Ddview, Dimbaseline, Filter, Preferences, Qtext, Regenauto, Saveasr12, and Spline.

20% to 29% of the respondents selected the following as commands used each time a drawing session was encountered: Attredef, Audit, Base, Box, Cal, Ddattdef, Ddattext, Ddemodes, Ddptype, Ddselect, Ddunits, Dimordinate, Fill, Hide, Mtext, Mvsetup, Recover, Script, Spell, Splinedit, Status, Tablet, and Time.

10% to 19% of the respondents selected the following as commands used each time a drawing session was encountered: Align, Attdisp, Boundary, Ddcolor, Ddrename, Dducsp, Ddvpoint, Dimoverride, Dxfin, Dxfout, Extrude, Help, Lengthen, Minsert, Mline, Mslide, Ray, Rectang, Redefine, Reinit, Shape, Tolerance, Vpoint, Vslide, and Xrefclip.

10% to 19% of the respondents selected the following as commands used each time a drawing session was encountered: 3d, 3dpoly, Ameconvert, Ase, Aseadmin, Aseexport, Aselinks, Aserows, Aseselect, Asesqled, Aseunload, Compile, Dblist,

Ddrmodes, Dducs, Dlgcolor, Edgesurf, Graphscr, Group, Interfere, Isoplane, Mledit, Mlstyle, Mtprop, Plan, Psdrag, Psfill, Psin, Psout, Rconfig, Render, Rotate3d, Section, Shade, Sketch, Sphere, Stats, Subtract, Textscr, Tiffin, Toc, Trace, Undefine, Union, Vplayer, Wedge, and Xline.

None of the respondents selected the following as commands used each time a drawing session was encountered: 3darray, 3dface, 3dmesh, 3dsin, 3dsout, About, Acisin, Acisout, Cone, Cylinder, Delay, Dxbin, Edge, Gifin, Gloss Transparent Command, Gloss Command Line Area, Light, Logfileoff, Logfileon, Makepreview, Massprop, Matlib, Mirror3d, Pcxin, Pface, Region, Renderunload, Rendscr, Replay, Resume, Revolve, Revsurf, Rmat, Rpref, Rscript, Rulesurf, Saveimg, Scene, Slice, Stlout, Tabsurf, Torus, Treestat, Vlconv, and Xbind.

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Degrees:

Associate in Applied Science, Electronic Engineering Technology, 1985
Graduated with High Honors
Community College of Southern Nevada

Associate of General Studies, 1989
Graduated with High Honors
Community College of Southern Nevada

Associate of Arts, 1990
Graduated with High Honors
Community College of Southern Nevada

Bachelor of Science, Secondary Education, 1993
Graduated Magna Cum Laude
University of Nevada, Las Vegas

Associate in Applied Science, Drafting Technology, CAD Emphasis, 1995
Graduated with High Honors
Community College of Southern Nevada

Special Honors and Awards:

Awarded AutoCAD Software R12 from AutoDESK, 1992
Winner of the Program Partner Training Competition in Lecture Delivery

Certificate of Appreciation – Clark County School District, 1988
For aid rendered to Drafting Students

Biographee in Who's Who in American Education, 4th Edition

Biographee in Who's Who in America, 48th Edition

Induction into Phi Theta Kappa National Honor Society, 1988

Induction into the Golden Key National Honor Society, 1985

Publications:

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Brodersen, D. J. (1994) The Wonderful World of Internet, AutoDESK Learning Curve, March/April Issue

Thesis Title: A Study To Determine The Minimum AutoCAD Command Set For Computer Aided Drafting In The Las Vegas Area.

Thesis Examination Committee:

Chairperson, Dr. Clifford McClain, Ph. D.
Committee Member, Dr. Paul Meacham, Ph. D.
Committee Member, Sterling Saddler, Ph. D.
Graduate Faculty Representative, Porter Troutman, Ed. D.

IMAGE EVALUATION TEST TARGET (QA-3)

150mm

6"

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