

AutoCAD LT 2006

for Designers

***A comprehensive textbook
on AutoCAD LT***

CADCIM Technologies

*525 St. Andrews Drive
Scherverville, IN 46375
USA
(www.cadcim.com)*

Contributing Author

Sham Tickoo

Professor

*Department of Manufacturing Engineering Technologies
Purdue University Calumet
Hammond, Indiana
U.S.A*





CADCIM Technologies

AutoCAD LT 2006® for Designers Sham Tickoo

Published by CADCIM Technologies, 525 St Andrews Drive, Schererville, IN 46375 USA. Copyright © CADCIM Technologies. All rights reserved. No part of this publication may be reproduced or distributed in any form or by any means, or stored in the database or retrieval system without the prior permission of CADCIM Technologies.

ISBN 1-932709-14-2

Cover designer: *Deepak Maini*
Technical editors: *Deepak Maini and Rishi Kumar Patel*
Copy editor: *Pragya Kataria*
Cover illustration: *Created by Deepak Maini using AutoCAD LT and Photoshop software*
Typeface: *10/12 New Baskerville Bt*

NOTICE TO THE READER

Publisher does not warrant or guarantee any of the products described in the text or perform any independent analysis in connection with any of the product information contained in the text. Publisher does not assume, and expressly disclaims, any obligation to obtain and include information other than that provided to it by the manufacturer.

The reader is expressly warned to consider and adopt all safety precautions that might be indicated by the activities herein and to avoid all potential hazards. By following the instructions contained herein, the reader willingly assumes all risks in connection with such instructions.

The Publisher makes no representation or warranties of any kind, including but not limited to, the warranties of fitness for particular purpose or merchantability, nor are any such representations implied with respect to the material set forth herein, and the publisher takes no responsibility with respect to such material. The publisher shall not be liable for any special, consequential, or exemplary damages resulting, in whole or part, from the reader's use of, or reliance upon, this material.

www.cadcim.com

Table of Contents

Preface	xix
Dedication	xxiii

AutoCAD LT Part I

Chapter 1: Introduction to AutoCAD LT

Starting AutoCAD LT	1-2
AutoCAD LT Screen Components	1-2
Drawing Area	1-2
Command Window	1-3
Status Bar	1-4
Status Bar Tray Options	1-5
Invoking Commands in AutoCAD LT	1-7
AutoCAD LT Dialog Boxes	1-11
Starting a New Drawing	1-12
Open a Drawing	1-14
Start from Scratch	1-14
Use a Template	1-14
Use a Wizard	1-14
Saving Your Work	1-20
Save Drawing As Dialog Box	1-22
Automatic Timed Save	1-24
Creation of Backup Files	1-24
Changing Automatic Timed Saved and Backup Files Into AutoCAD LT Format	1-25
Using the Drawing Recovery Manager to Recover Files*	1-25
Closing a Drawing	1-26
Opening an Existing Drawing	1-26
Opening an Existing Drawing Using the Select File Dialog Box	1-26
Opening an Existing Drawing Using the Startup Dialog Box	1-28
Opening an Existing Drawing using the Drag and Drop Method	1-28
Quitting AutoCAD LT	1-29
Dynamic Input Mode*	1-29
Enable Pointer Input	1-29
Enable Dimensional Input where possible	1-31
Show command prompting and command input near the crosshairs	1-32
Drafting Tooltip Appearance	1-32
Creating and Managing Workspaces*	1-33
Creating a New Workspace	1-34
Modifying the Workspace Settings	1-34
AutoCAD LT's Help	1-35
Additional Help Resources	1-38

Chapter 2: Getting Started with AutoCAD LT

Drawing Lines in AutoCAD LT	2-2
Coordinate Systems	2-6
Absolute Coordinate System	2-6
Relative Coordinate System	2-9
Direct Distance Entry	2-14
Erasing Objects	2-16
Canceling and Undoing a Command	2-17
Object Selection Methods	2-17
Drawing Circles	2-20
Basic Display Commands	2-25
Setting Units	2-27
Setting Limits of the Drawing	2-34
Introduction to Plotting Drawings	2-38
Modifying AutoCAD LT Settings Using the Options Dialog box	2-43

Chapter 3: Starting With the Advanced Sketching

Drawing Arcs	3-2
Drawing Rectangles*	3-13
Drawing Ellipses	3-18
Drawing Elliptical Arcs	3-21
Drawing Regular Polygons	3-25
Drawing Polylines	3-27
Drawing Donuts	3-33
Drawing Points	3-35
Drawing Infinite Lines	3-38
Drawing XLINE	3-39
Drawing RAY	3-41
Writing a Single Line Text	3-42

Chapter 4: Working with Drawing Aids

Understanding the Concept and Use of Layers	4-2
Working with Layers	4-3
LINETYPE Command	4-17
LWEIGHT Command	4-17
Object Properties	4-19
Properties Toolbar	4-19
PROPERTIES Palette	4-20
Global and Current Linetype Scaling	4-22
LTSCALE Factor for Plotting	4-22
Working with the DESIGNCENTER	4-24

Drafting Settings Dialog Box	4-25
Drawing Straight Lines Using the Ortho Mode	4-30
Working with Object Snaps	4-31
Running Object Snap Mode	4-44
Using AutoTracking	4-47
Function and Control Keys	4-48

Chapter 5: Editing Sketched Objects-I

Creating a Selection Set	5-2
Editing Sketches	5-8
Moving the Sketched Objects	5-8
Copying the Sketched Objects	5-9
Copying Objects Using the Base Point	5-9
Pasting Contents from the Clipboard	5-10
Pasting Contents Using the Original Coordinates	5-11
Offsetting the Sketched Objects*	5-11
Rotating Sketched Objects	5-13
Scaling Sketched Objects	5-15
Filleting Sketches	5-17
Chamfering Sketches	5-21
Trimming Sketched Objects	5-24
Extending Sketched Objects	5-27
Stretching Sketched Objects	5-30
Lengthening Sketched Objects	5-31
Arraying Sketched Objects	5-33
Rectangular Array	5-34
Polar Array	5-36
Mirroring Sketched Objects	5-39
Breaking Sketched Objects	5-41
Measuring Sketched Objects	5-43
Dividing Sketched Objects	5-44
Joining Sketches Objects*	5-45

Chapter 6: Editing Sketched Objects-II

Editing With Grips	6-2
Types of Grips	6-2
Adjusting Grip Settings	6-3
Editing Objects with Grips	6-5
Stretching Objects with Grips (Stretch Mode)	6-5
Moving Objects with Grips (Move Mode)	6-7
Rotating Objects with Grips (Rotate Mode)	6-8
Scaling Objects with Grips (Scale Mode)	6-10
Mirroring Objects with Grips (Mirror Mode)	6-12

Loading Hyperlinks	6-13
Editing Gripped Objects	6-13
Changing the Properties Using the PROPERTIES Palette	6-14
Changing Properties using Grips	6-14
Matching Properties of Sketched Objects	6-15
Quick Selection of Sketched Objects	6-16
Managing Contents Using the DESIGNCENTER	6-18
Making Inquiries About Objects and Drawings	6-24
Measuring the Area of the Objects	6-25
Measuring the Distance between Two Points	6-28
Identifying the Location of a Point on the Screen	6-29
Listing Information about Objects	6-30
Checking Time-Related Information	6-31
Displaying Drawing Properties	6-31

Chapter 7: Controlling the Drawing Display and Creating Text

Basic Display Options	7-2
Redrawing the Screen	7-2
Regenerating The Drawing	7-2
Zooming Drawings	7-3
Panning Drawings	7-11
Creating Views	7-13
Aerial View	7-16
Creating Text	7-18
Writing Single Line Text	7-18
Entering Special Characters	7-24
Creating Multiline Text*	7-25
Editing Text	7-39
Editing Text Using the DDEDIT Command	7-39
Editing Text Using the PROPERTIES Palette	7-40
Modifying the Scale of the Text	7-40
Modifying the Justification of the Text	7-41
Inserting Table in the Drawing	7-41
Creating a New Table Style	7-43
Setting a Table Style Current	7-48
Modifying a Table Style	7-48
Modifying Tables	7-48
Substituting Fonts	7-53
Creating Text Styles	7-54
Determining Text Height	7-56
Checking Spellings	7-57
Text Quality and Text Fill	7-58
Finding and Replacing Text	7-59

Chapter 8: Basic Dimensioning, Geometric Dimensioning, and Tolerancing

Need for Dimensioning	8-2
Dimensioning in AutoCAD LT	8-2
Fundamental Dimensioning Terms	8-3
Associative Dimensions	8-6
Definition Points	8-7
Selecting Dimensioning Commands	8-8
Creating Linear Dimensions	8-10
Creating Aligned Dimensions	8-14
Creating the Arclength Dimension*	8-16
Creating Rotated Dimensions	8-16
Creating Baseline Dimensions	8-17
Creating Continued Dimensions	8-18
Creating Angular Dimensions	8-20
Creating Diameter Dimensions	8-23
Creating Jogged Dimensions*	8-24
Creating Radius Dimensions	8-25
Generating Center Marks and Centerlines	8-25
Creating Ordinate Dimensions	8-27
Working With True Associative Dimensions	8-29
Removing the Dimension Associativity	8-29
Converting a Dimension into a True Associative Dimension	8-29
Drawing Leaders	8-30
Using Leader with the DIM Command	8-35
Geometric Dimensioning and Tolerancing	8-35
Geometric Characteristics and Symbols	8-36
Adding Geometric Tolerance	8-37
Complex Feature Control Frames	8-39
Combining Geometric Characteristics	8-39
Composite Position Tolerancing	8-41
Using Feature Control Frames with Leaders	8-42
Projected Tolerance Zone	8-42

Chapter 9: Editing Dimensions

Editing Dimensions Using Editing Tools	9-2
Editing Dimensions by Stretching	9-2
Editing Dimensions by Trimming and Extending	9-3
Flipping Dimension Arrow	9-5
Modifying the Dimensions	9-5
Editing Dimension Text	9-6
Updating Dimensions	9-8
Editing Dimensions with Grips	9-8

Editing Dimensions Using the PROPERTIES Palette	9-8
PROPERTIES Palette (Dimension)	9-8
PROPERTIES Palette (Leader)	9-10
Model Space and Paper Space Dimensioning	9-12

Chapter 10: Dimension Styles and Dimensioning System Variables

Using Styles and Variables to Control Dimensions	10-2
Creating and Restoring Dimension Styles	10-2
New Dimension Style Dialog Box	10-3
Controlling Dimension Text Format	10-11
Fitting Dimension Text and Arrowheads	10-15
Formatting Primary Dimension Units	10-18
Formatting Alternate Dimension Units	10-22
Formatting the Tolerances	10-25
Other Dimensioning Variables	10-28
Dimension Style Families	10-29
Using Dimension Style Overrides	10-32
Comparing and Listing Dimension Styles	10-33
Using Externally Referenced Dimension Styles	10-34

Chapter 11: Model Space Viewports, Paper Space Viewports, and Layouts

Model Space and Paper Space/Layouts	11-2
Model Space Viewports (Tiled Viewports)	11-2
Creating Tiled Viewports	11-2
Making a Viewport Current	11-5
Joining Two Adjacent Viewports	11-6
Paper Space Viewports (Floating Viewports)	11-7
Creating Floating Viewports	11-7
Temporary Model Space	11-8
Editing Viewports	11-10
Controlling the Display of the Objects in Viewports	11-10
Locking the Display in Viewports	11-10
Controlling the Display of Hidden Lines in Viewports	11-10
Manipulating the Visibility of Viewport Layers	11-11
Controlling Layers in the Viewports using the Layer Properties Manager Dialog box	11-13
Paper Space Linetype Scaling (PSLTSCALE System Variable)	11-14
Inserting Layouts	11-15
Inserting a Layout Using the Wizard	11-17
Defining Page Settings	11-18
Convert Distance Between Model Space and Paper Space	11-28

Chapter 12: Plotting Drawings

Plotting Drawings in AutoCAD LT	12-2
Plotting Drawings Using the Plot Dialog box	12-2
Adding Plotters	12-10
PLOTTERMANAGER Command	12-11
Editing Plotter Configuration	12-13
Importing PCP/PC2 Configuration Files	12-15
Setting the Plot Parameters	12-15
Working with Page Setups	12-15
Using Plot Styles	12-18
Adding a Plot Style	12-19
Plot Style Table Editor	12-22
Applying Plot Styles	12-26
Setting the Current Plot Style	12-27

Chapter 13: Hatching Drawings

Hatching	13-2
Hatching Drawings Using the Hatch box	13-3
Hatch Dialog box Options	13-5
Ray Casting	13-19
Hatching Drawings Using the TOOL PALETTES	13-23
Hatching Around Text, Dimensions, and Attributes	13-26
Editing Hatch Patterns	13-26
Ignoring Hatch pattern Entities While Snapping	13-28
Editing Hatch Boundary	13-30
Using Grips	13-30
Trimming the Hatch Patterns	13-31
Using AutoCAD LT Editing Commands	13-31
Hatching Blocks and Xref Drawings	13-32
Pattern Alignment During Hatching	13-32
Creating a Boundary Using Closed Loops	13-34
Other Features of Hatching	13-36

Chapter 14: Working with Blocks

The Concept of Blocks	14-2
Formation of Blocks	14-3
Converting Objects into a Block	14-5
Inserting Blocks Using the Insert Dialog Box	14-8
Inserting Blocks Using the Command Line	14-16
Insert Blocks Using the DESIGNCENTER	14-17
Using TOOL PALETTES to Insert Blocks	14-19
Adding Blocks in the TOOL PALETTES	14-21
Modifying Existing Blocks in the TOOL PALETTES	14-22

Dynamic Blocks	14-23
Standard Grip	14-23
Linear Grip	14-23
Rotation Grip	14-24
Flip Grip	14-24
Aignment Grip	14-25
Lookup Grip	14-25
Layers, Colors, Linetypes and Lineweights for Blocks	14-26
Nesting of Blocks	14-27
Creating Drawing Files Using the Write Block Dialog Box	14-29
Creating Drawing Files Using the Command Line	14-31
Defining the Insertion Base Point	14-32
Breaking Up a Block	14-33
Using the EPLODE Command	14-34
Using the XPLODE Command	14-34
Renaming Blocks	14-36
Deleting Unused Blocks	14-37

AutoCAD LT Part II

Chapter 15: Defining Block Attributes

Understanding Attributes	15-2
Defining Attributes	15-2
Editing Attribute Definition	15-8
Inserting Blocks with Attributes	15-9
ATTEXT Command for Attribute Extraction	15-12
Controlling Attribute Visibility	15-17
Editing Block Attributes	15-18
Editing Attributes Using the Edit Attributes Dialog box	15-18
Global Editing of Attributes	15-20
Inserting Text Files in the Drawing	15-27

Chapter 16: Understanding External References

External References	16-2
Dependent Symbols	16-2
Managing External References in a Drawing	16-4
The Overlay Option	16-13
Working With the XATTACH Command	16-17
Adding Dependent Symbols to a Drawing	16-19
Demand Loading	16-21

Chapter 17: Working with Advanced Drawing Options

Creating Double Lines	17-2
Creating Revision Clouds	17-6
Creating Wipeouts	17-7
Creating NURBS	17-8
Editing Splines	17-9

Chapter 18: Grouping and Advanced Editing of Sketched Objects

Working With the Group Manager	18-2
Selecting Groups	18-4
Cycling Through Groups	18-5
Changing Properties of an Object	18-6
Using the PROPERTIES Palette	18-6
Using the CHANGE Command	18-11
Using the CHPROP Command	18-14
Exploding Compound Objects	18-14
Editing Polylines	18-15
Editing a Single Polyline	18-16
Editing Multiple Polylines	18-29
Undoing Previous Commands	18-31
Reversing the Undo Operation	18-36
Renaming Named Objects	18-37
Removing Unused Named Objects	18-38
Setting Selection Modes Using the Options Dialog box	18-40

Student Projects	1
-------------------------	---

Index	1
--------------	---



The following chapters are available on the author's and publisher's Web site for free download. To download the free chapters, logon to

www.cadcim.com or

<http://technology.calumet.purdue.edu/met/tickoo/students/students.htm>

Chapter 19: Working With Data Exchange and Object Linking and Embedding

Chapter For Free Download

Chapter 20: The User Coordinate System

Chapter For Free Download

Chapter 21: Drawing and Viewing 3D Objects

Chapter For Free Download

Chapter 22: Template Drawings

Chapter For Free Download

Chapter 23: Script Files and Slide Shows

Chapter For Free Download

**Chapter 24: Creating Linetypes and Hatch
Patterns**

Chapter For Free Download

Preface

AutoCAD LT, developed by Autodesk Inc., is the most popular PC-CAD system available in the market. Over two million people in 80 countries around the world use AutoCAD LT to generate various kinds of drawings. In 1998 the market share of AutoCAD LT grew to 78 percent, making it the worldwide standard for generating drawings. Also, AutoCAD LT's open architecture has allowed third-party developers to write application software that has significantly added to its popularity. For example, the author of this book has developed a software package "SMLayout" for sheet metal products that generates flat layout of various geometrical shapes such as transitions, intersections, cones, elbows, and tank heads. Several companies in Canada and the United States are using this software package with AutoCAD LT to design and manufacture various products. AutoCAD LT has also provided facilities that allow users to customize AutoCAD LT to make it more efficient and therefore increase their productivity.

This book contains a detailed explanation of AutoCAD LT 2006 commands and how to use them to solve drafting and design problems. The book also unravels the customizing power of AutoCAD LT. Every AutoCAD LT command and customizing technique is thoroughly explained with examples and illustrations that make it easy to understand their function and application. At the end of each topic, there are examples that illustrate the function of the command and how it can be used in the drawing. When you are done reading this book, you will be able to use AutoCAD LT commands to make a drawing, create text, make and insert symbols, dimension a drawing, create 3D objects, write script files, define linetypes and hatch patterns, and write your own menus.

The book also covers basic drafting and design concepts such as sketching, adding text, and dimensioning principles that provide you with the essential drafting skills you need to solve drawing problems with AutoCAD LT. In the process, you will discover some new applications of AutoCAD LT that are unique and might have a significant effect on your drawings. You will also get a better idea of why AutoCAD LT has become such a popular software package and an international standard in PC-CAD. Please refer to the following table for conventions used in this text.

Convention

- Command names are capitalized and bold.
- A key icon appears when you should respond by pressing the ENTER or RETURN key.

Example

The **MOVE** command



Convention

- AutoCAD LT 2006 features in the text are designated by an asterisk symbol at the end of the feature.
- Command sequences are indented. The responses are indicated by boldface. The directions are indicated by italics and the comments are enclosed in parentheses.
- The command selection from the toolbars, menus, and Command prompt are enclosed in a shaded box.

Examples

JOIN Command*

Command: **MOVE**

Select object: **G**

Enter group name: *Enter a group name (the group name is group1)*

Toolbar:	Draw > Arc
Menu:	Draw > Arc
Command:	ARC

Free Teaching Resources for Faculty

The following teaching resources are available for free to faculty.

1. *Free online technical support by contacting techsupport@cadcim.com.*
2. *All drawing files used in illustrations, tutorials, and exercises in this book.*
3. *Customizable PowerPoint presentations for every chapter of the book.*
4. *Instructor's Guide with answers to review questions and solution to exercises.*
5. *Course outlines and class tests*
6. *Students projects.*

To access the Web site that contains these teaching resources, please contact the author, Prof. Sham Tickoo, at the following address:

tickoo@cadcim.com

OR

stickoo@calumet.purdue.edu

For Students: You can download additional chapters and special topics by accessing the publisher's Web site **www.cadcim.com**

For more information, please visit www.cadcim.com



DEDICATION

*To teachers, who make it possible to disseminate knowledge
to enlighten the young and curious minds
of our future generations*

*To students, who are dedicated to learning new technologies
and making the world a better place to live*

THANKS

*To the faculty and students of the MET Department of
Purdue University Calumet for their cooperation*

*To engineers of CADCIM Technologies,
especially Deepak Maini and Rishi Kumar Patel,
for their valuable help*

About the Authors

This textbook has been written jointly by Prof. Sham Tickoo and the CAD Engineers at CADCIM Technologies, USA.

Sham Tickoo is professor of Manufacturing Engineering at Purdue University Calumet, USA where he has taught design, drafting, CAD, and other engineering courses for over fifteen years. Before joining Purdue University, Prof. Tickoo had worked as a machinist, quality control engineer, design engineer, engineering consultant, and software developer. He has received a US patent for his invention “Self Adjusting Cargo Organizer for Vehicles”. Professor Tickoo also leads the team of authors at CADCIM Technologies to develop world-class teaching and learning resources for CAD/CAM and related technologies.

The team at CADCIM Technologies consists of engineering professionals, experienced authors, and editors who have extensive experience in CAD/CAM, manufacturing, design engineering, and education. CADCIM Technologies is one of the world’s leading providers of quality CAD/CAM textbooks. They also provide free teaching and learning resources to faculty and students. Working with the mission of providing reliable, cost-effective and competitive learning solutions to the manufacturing industry and educational institutions, the company has established an unrivalled market worldwide for its textbooks on CAD/CAM software such as UGS NX, CATIA, Solid Edge, SolidWorks, Pro/ENGINEER, Pro/ENGINEER Wildfire, Edge CAM, Autodesk Inventor, Autodesk Revit, and AutoCAD LT. Apart from being well appreciated for the simplicity of content, clarity of style, and the in-depth coverage of subject, the textbooks published by CADCIM have been translated in many languages including Italian, Japanese, Chinese, and Russian.

“We are determined to bring you the best teaching and learning resources. This is our mission and our promise to our readers”

**For more information, please visit www.cadcim.com
Or www.cadcimtech.com**

AutoCAD LT

Part I

Author's Web Sites

For Faculty: Please contact the author at stickoo@calumet.purdue.edu or tickoo@cadcim.com to access the Web site that contains the following.

1. PowerPoint presentations, programs, and drawings used in this textbook.
2. Syllabus, chapter objectives and hints, and questions with answers for every chapter.

For Students: You can download drawing-exercises, tutorials, programs, and special topics by accessing author's web site at www.cadcim.com or <http://technology.calumet.purdue.edu/met/tickoo/students/students.htm>. On this Web page scroll to the AutoCAD LT section and click on the AutoCAD LT 2006 textbook link.

