# Index

#### A CAD/CAPP/CAM/CNC, integration 231 - 245absolute vs. incremental 194 CAD/CAPP/CAM integration, case study agent-based technology 375 232 agent technology, applications 377 CAD data exchange 32-53 ANN 363 CAD kernals 33 ANN, process planning 366 CAD standards 32-53 ant colony optimization (ACO) 382 CAD system architecture 17 API programs 348 CAD systems, data exchange 248 APT effort 239 CAM/CNC integration 270 artificial neural network methods 362 cell-decomposition 97 automatically programmed tools (APT) circular interpolation 201 212 client tier implementation 319 automatic tool changer system 172 closed-loop machining (CLM) 297 CNC machine program 189 B CNC machines, axis and motion 179 CNC machine tool, principle elements 174 backward growing approach 98 CNC machine tools 165-187 base numerical control language (BNCL) CNC machine tools, schematics 183 241 CNC programming, intermediate languag-BCL effort 240 BNCL effort 241 CNC system, layered architecture 273 business logic tier, CAPP server 316 common/neutral translators 38 business logic tier implementation 320 computer-aided design (CAD) 1-31, 17 C computer-aided manufacturing 54-74, 67 computer-aided process planning 54-74 CAD, adding intelligence 26 concavity/convexity of a geometric entity CAD, computer hardware 27

99

concurrent environment 236
concurrent product modelling 232
constructive solid geometry 14
convex-hull algorithm 97
coordinate system 192
cutter radius compensation 198
cutting tool classification 154
cutting tools 154

### D

data-processing unit (DPU) 166
data access implementation methods 255
data exchange methods, comparing 49
data exchange using STEP 247
data tier, data model 318
data tier implementation 321
data translation/conversion, types 35
determining machining features 146
direct data translators 36
direct numerical control 178
dual kernel CAD systems 36
DXF 38

### $\mathbf{E}$

expert systems, applications 359 expert systems technology 355

#### F

FBD model 146 feature-based methodologies 86 feature definition 76 feature detection 92 feature generation 96 feature interactions 109-125 feature mapping 152 feature recognition 90-108 feature recognition, basic concepts 91 feature recognition, issues 99 feature recognition systems, classification 91 feature representation schemes 83 feature taxonomy 77 feature technology 75-89 file-transfer technique 348 finite elopement analysis (FEA) 1

function block-enabled integration 266–282 function block development kit (FBDK) 271 function block mapping unit 292 function blocks 266 fuzzy data decisions 139 fuzzy information 135 fuzzy logic 381

### G

G codes 204 genetic algorithm 369 genetic algorithm, applications 372 geometric modelling 1–31 geometric modelling approaches 2 geometry offsets 196

### H

history-based CAD 23 history-free CAD 23 horizontal machining centres 169 human-computer cooperative ant colony/ genetic algorithm (HCAGA) 382 human-machine interface 293

#### I

implicit features 151
indirect feature interactions 120
inspection system 304
integrate CAD with CAPP 252
integrate CAPP with CNC 254
integrate CAPP with CAM 252
integrated feature recognition 129
integrated feature technology 126–164
integrated machining 304
integration based on STEP standards
246–265
integration vs. interfacing 126
Internet-based integration 311–325
interpolation, programming methods 201

#### K

key enabling technologies 354–393 knowledge-based systems 355

Copyright © 2009, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

knowledge in product design and manufacturing 357 parabolic interpolation 203 L parallel machine tools 184 part programming, contemporary approach linear interpolation 201 210 linear motion 181 PDES 41 PDM's capabilities 327 M PDM, integrated and extended 337 PDM methodology, evolution 328 machine-control unit (MCU) 166 PDM systems, benfits 329 machine spindles 176 people-paper technique 348 machining allowances for different cuts Petri Nets (PNs) 382 142 macro process planning, genetic algorithms PLM, benefits 341 PLM, definition 338 PLM implementation 341 manufacturing control 71 PLM solution model 340 manufacturing plant, computer applications 68 PLM standardization 343 plus and minus 192 mapping design features to cutting tools process planning approaches 61 product data management (PDM) 326 mapping design features to machining product lifecycle management 338 features 149 product lifecycle management (PLM) 326 material-requirements planning (MRP) 69 program CNCs 188-230 material for cutting tools 170 program zero 193 M codes 208 prototype CNC system 275 method-level data 283 micro process planning, genetic algorithms R model-view-control (MVC) design pattern rotary motion 181 rotary motions A, B and C 180 MVC design pattern, implementation 277 S N Share-A-space 345 native machining facilities, modelling 285 slide drives 177 NC codes 204 solid modelling 11 NC programs, examples 208 spindle drives 176 NC words 189 STEP 42 neural nets 362 STEP-compliant system 312 numerical control, principles 166 STEP-NC 247 numerical controllers (NC) 166 STEP-NC data model 255 STEP-NC encoder 290 0 STEP-NCMtDm 287 STEP-NC pre-processor 290 offsets 195 STEP AP harmonization, integration 251 OMI data model 299 STEP standards, integration 246–265 on-machine inspection 297

surface features interactions 110 surface features 110 surface features vs. volumetric features 83 surface modelling 6

### T

task-level data 283 tooling systems 172 tool length compensation 197 trial machining 196 turret head 173 tweak features 151

# V

vertical machining centres 168 volume decomposition 98 volumetric feature interactions 116

# W

wear offsets 196 Web-based PDM 330 wire-frame modelling 2

# X

X axis of motion 180

# Y

Y axis of motion 180

# $\mathbf{Z}$

Z axis of motion 179