

INTRODUCTION	XVII
STUDY GOALS AND OBJECTIVES.....	XVII
REASONS FOR DOING THE STUDY	XVII
CONTRIBUTIONS OF THE STUDY AND FOR WHOM.....	XVII
SCOPE AND FORMAT	XVII
METHODOLOGY	XVIII
AUTHOR’S CREDENTIALS	XIX
RELATED BCC PUBLICATIONS	XIX
BCC ONLINE SERVICES.....	XX
 SUMMARY.....	 XXI
SUMMARY TABLE FRICTION PRODUCTS AND MATERIALS OUTLOOK, THROUGH 2008 (\$ MILLIONS).....	XXIII
SUMMARY FIGURE FRICTION PRODUCTS AND MATERIALS OUTLOOK, 1999- 2008 (\$ MILLIONS).....	XXIV
 TECHNOLOGICAL, ECONOMIC AND REGULATORY ENVIRONMENT.....	 1
OVERVIEW.....	1
HISTORY	1
TABLE 1 REASONS WHY THE FRICTION MATERIALS INDUSTRY SHOWED LITTLE CHANGE BEFORE THE MID 1960s	2
TABLE 2 REASONS WHY THE FRICTION MATERIALS INDUSTRY CHANGED IN THE MID 1960s.....	3
WHAT IS A FRICTION MATERIAL?.....	4
THE SCIENCE OF FRICTION.....	5
TEMPERATURE VARIATION OF THE FRICTIONAL COEFFICIENT	6
TESTING.....	7
PRODUCTION OF FRICTION MATERIALS	7
SOFT BATCH.....	7
MOLDING	8
TRUCK BLOCK	8
CURING	8
BONDING	8
INTEGRALLY MOLDED BRAKES	9
BRAKE INGREDIENTS.....	9
FIBERS IN COMPOSITES.....	9
THE EMPHASIS ON REDUCING COSTS	10
EMERGING TECHNOLOGIES.....	11
REGULATORY CONSIDERATIONS	12
HEALTH EFFECTS OF ASBESTOS.....	12
Health Effects of Asbestos (Continued).....	13
HISTORY OF ASBESTOS LEGISLATION	14
TABLE 3 PRODUCTS THAT CANNOT CONTAIN ASBESTOS AFTER 1996.....	15
TABLE 4 LIST OF PRODUCTS THAT CAN STILL CONTAIN ASBESTOS.....	16
THE USE OF ASBESTOS IN MATERIALS.....	17

THE FRICTION MATERIALS STANDARDS INSTITUTE (FMSI)	18
REGULATIONS DEALING WITH THE ENVIRONMENT	18
Regulations Dealing With the Environment (Continued)	19
REGULATIONS CONCERNING THE TRANSPORTATION INDUSTRIES.....	20
Increased Calls for Regulation of the Automotive Aftermarket	21
The Threat of Litigation.....	21
Formation of the Brake Manufacturers Council.....	22
ASBESTOS LITIGATION AND LIABILITY.....	23
Asbestos Litigation and Liability (Continued)	24
FRICTION MATERIALS	25
TABLE 5 GLOBAL FRICTION MATERIALS MARKET, THROUGH 2008 * (\$ MILLIONS)	25
TABLE 6 GLOBAL FRICTION MATERIALS REQUIREMENTS, THROUGH 2008 * (MILLION POUNDS).....	26
FRICTION PRODUCTS CONSTRUCTION.....	27
DRY FRICTION PRODUCTS.....	27
TABLE 7 COMPARISON OF THE FOUR TYPES OF DRY FRICTION PRODUCTS.....	27
NAO Friction Products.....	28
TABLE 8 COMPOSITION OF A TYPICAL NON-ASBESTOS ORGANIC FRICTION MATERIAL.....	29
TABLE 9 COMPARISON OF FIBERS USED IN NAO BRAKE PADS	29
TABLE 9 (CONTINUED).....	30
TABLE 10 ADVANTAGES AND DISADVANTAGES OF NAO BRAKE PADS AND BLOCKS.....	30
Semi-Metallic Friction Products	31
TABLE 11 TYPICAL INGREDIENTS IN A SEMI-METALLIC BRAKE PAD.....	32
TABLE 12 DIFFERENCES BETWEEN ORDINARY SEMI-METALLIC PADS AND HEAVY DUTY SEMI-METALLIC PADS.....	33
TABLE 13 ADVANTAGES AND DISADVANTAGES OF SEMI-METALLIC FRICTION PRODUCTS COMPARED WITH NAO FRICTION PRODUCTS.....	33
Low-Metallic Products.....	34
TABLE 14 TYPICAL INGREDIENTS IN A LOW METALLIC BRAKE PAD.....	34
TABLE 15 ADVANTAGES AND DISADVANTAGES OF LOW METALLIC FRICTION PRODUCTS.....	35
Friction Modifiers	36
TABLE 16 TYPES OF MATERIALS USED FOR FRICTION MODIFIERS.....	36
Resins	37
WET FRICTION PRODUCTS.....	38
TABLE 17 REASONS WHY THE WET PAPER FRICTION PRODUCTS MARKET SHOULD NOT INCREASE SIGNIFICANTLY.....	38
Paper Friction	39
TABLE 18 COMMONLY USED RAW MATERIALS IN PAPER-BASED FRICTION PRODUCTS.....	39
TABLE 19 ADVANTAGES AND DISADVANTAGES OF WET PAPER FRICTION MATERIALS COMPARED WITH DRY FRICTION PRODUCTS.....	40

<i>TABLE 20 REASONS WHY WET FRICTION MATERIALS ARE MORE DURABLE THAN DRY FRICTION PRODUCTS</i>	41
Sintered Metal	41
<i>TABLE 21 REASONS WHY SINTERED METAL FRICTION PRODUCTS ARE NOT USED IN TRUCK BRAKING APPLICATIONS</i>	42
ARAMID FIBERS	42
<i>TABLE 22 ADVANTAGES AND DISADVANTAGES OF ARAMID FIBER IN FRICTION PRODUCTS</i>	43
<i>TABLE 23 REASONS AGAINST USING ADDITIONAL ARAMID FIBER IN FRICTION MATERIALS</i>	44
<i>TABLE 24 GLOBAL OUTLOOK FOR ARAMID FIBERS IN FRICTION PRODUCTS, THROUGH 2008 (MILLIONS OF POUNDS)</i>	45
GLASS FIBERS	46
<i>TABLE 25 ADVANTAGES AND DISADVANTAGES OF E-GLASS IN FRICTION PRODUCTS</i>	47
<i>TABLE 26 DISADVANTAGES OF THE SMOOTHNESS OF E-GLASS FIBERS</i>	48
<i>TABLE 27 GLOBAL OUTLOOK FOR GLASS FIBERS IN FRICTION PRODUCTS, THROUGH 2008 (MILLION POUNDS)</i>	49
METAL FIBERS	49
<i>TABLE 28 GLOBAL OUTLOOK FOR METAL FIBERS IN FRICTION PRODUCTS, THROUGH 2008 (MILLIONS OF POUNDS)</i>	50
CARBON FIBERS.....	50
<i>TABLE 29 ADVANTAGES AND DISADVANTAGES OF CARBON-CARBON COMPOSITES</i>	51
<i>TABLE 30 GLOBAL OUTLOOK FOR CARBON FIBERS IN CARBON-CARBON FRICTION PRODUCTS, THROUGH 2008 (THOUSAND POUNDS)</i>	52
OTHER ADVANCED FIBERS	53
METAL MATRIX COMPOSITE FIBERS	53
<i>TABLE 31 GLOBAL OUTLOOK FOR METAL MATRIX COMPOSITE (MMC) FIBERS IN FRICTION PRODUCTS, THROUGH 2008 (THOUSAND POUNDS)</i>	54
PARTIALLY OXIDIZED POLYACRYLONITRILE FIBERS.....	54
<i>TABLE 32 GLOBAL OUTLOOK FOR PARTIALLY OXIDIZED POLYACRYLONITRILE FIBERS IN CARBON-CARBON FRICTION PRODUCTS, THROUGH 2008 (THOUSAND OF POUNDS)</i>	55
OTHER ADVANCED FIBERS	55
<i>TABLE 33 GLOBAL OUTLOOK FOR OTHER ADVANCED FIBERS IN FRICTION PRODUCTS, THROUGH 2008 (THOUSANDS OF POUNDS)</i>	56
Carbon-Silicon Carbide	56
Miscellaneous Advanced Fibers	57
ASBESTOS FIBERS	57
<i>TABLE 34 PROPERTIES OF ASBESTOS FIBERS</i>	58
<i>TABLE 35 COMPOSITION OF A TYPICAL ASBESTOS-BASED FRICTION MATERIAL</i>	59
<i>TABLE 36 ADVANTAGES AND DISADVANTAGES OF ASBESTOS-BASED FRICTION MATERIALS</i>	60
<i>TABLE 37 GLOBAL OUTLOOK FOR ASBESTOS FIBERS IN FRICTION PRODUCTS, THROUGH 2008 (MILLION POUNDS)</i>	61
PHENOLIC RESINS	62
<i>TABLE 38 ADVANTAGES AND DISADVANTAGES OF PHENOLIC RESIN</i>	63
PHENOLIC RESINS (CONTINUED)	64

TABLE 39 GLOBAL OUTLOOK FOR PHENOLIC RESINS IN FRICTION PRODUCTS, THROUGH 2008 (MILLIONS OF POUNDS).....	65
GRAPHITE.....	66
TABLE 40 GLOBAL OUTLOOK FOR GRAPHITE IN FRICTION PRODUCTS, THROUGH 2008 (MILLIONS OF POUNDS).....	66
WOLLASTONITE	67
TABLE 41 GLOBAL OUTLOOK FOR WOLLASTONITE IN FRICTION PRODUCTS, THROUGH 2008 (MILLIONS OF POUNDS).....	67
OTHER MATERIALS	68
TABLE 42 GLOBAL OUTLOOK FOR OTHER MATERIALS IN FRICTION PRODUCTS, THROUGH 2008 * (MILLION POUNDS)	69
OTHER MATERIALS (CONTINUED).....	70
FRICTION PRODUCTS AND MARKETS	71
OVERVIEW	71
TABLE 43 GLOBAL FRICTION PRODUCT MARKETS, THROUGH 2008 (MILLION DOLLARS).....	71
TABLE 44 FRICTION PRODUCTS APPLICATION MARKETS, THROUGH 2008 (MILLIONS OF DOLLARS).....	72
TRUCK DRY FRICTION PRODUCTS	73
TABLE 45 REGIONAL OUTLOOK FOR COMMERCIAL VEHICLES, THROUGH 2008 (MILLIONS OF VEHICLES)	74
Friction Product Selection.....	75
FRICTION MATERIALS	75
TABLE 46 APPLICATIONS OF FRICTION MATERIALS USED IN TRUCKS	75
FIGURE 1 AVERAGE PRICES FOR THE THREE GRADES OF FRICTION MATERIALS IN STANDARD APPLICATIONS	76
FIGURE 2 MARKET SHARES OF THE THREE GRADES OF FRICTION MATERIALS, 2003 (%).....	77
Safety Considerations.....	78
Brake Block vs. Lining	78
Jacob's Brake	79
CLUTCH FACINGS	80
MEDIUM TRUCK BRAKES.....	81
TABLE 47 PROBLEMS WITH AVAILABLE FRICTION MATERIALS IN MEDIUM TRUCK DRUM BRAKES	81
FIGURE 3 MEDIUM TRUCK BRAKES MARKET SHARE BY TYPE, 2003 (%).....	82
TABLE 48 FRICTION MATERIALS USED IN MEDIUM TRUCK APPLICATIONS	83
HEAVY DUTY TRUCKS	84
Aramid Brakes versus Other Brakes.....	85
OUTLOOK.....	86
TABLE 49 GLOBAL OUTLOOK FOR DRY FRICTION MATERIALS IN MEDIUM AND HEAVY-DUTY TRUCKS, THROUGH 2008 (MILLIONS OF POUNDS)	86
SUPPLIERS	87
Foundation Brakes	87
FIGURE 4 MARKET SHARES OF NORTH AMERICAN TRAILER AXLE PRODUCERS, 2003.....	88
Medium Trucks.....	88

<i>FIGURE 5 MARKET SHARES OF MAJOR FRICTION PRODUCT SUPPLIERS TO THE NORTH AMERICAN OEM MEDIUM TRUCK MARKET, 2003 (%)</i>	89
<i>FIGURE 6 MARKET SHARES OF MAJOR FRICTION PRODUCT SUPPLIERS TO THE NORTH AMERICAN MEDIUM TRUCK AFTERMARKET, 2003 (%)</i>	90
Large Trucks.....	90
<i>FIGURE 7 MAJOR DRUM BRAKE PRODUCERS FOR THE NORTH AMERICAN LARGE TRUCK MARKET, 2003 (%)</i>	91
<i>FIGURE 8 NORTH AMERICAN FRICTION PRODUCT SUPPLIERS TO LARGE TRUCK DRUM BRAKE AFTERMARKET, 2003 (%)</i>	92
AUTOMOTIVE DRY FRICTION PRODUCTS.....	93
A BRIEF HISTORY OF FRICTION PRODUCTS IN AUTOMOBILES	93
<i>TABLE 50 FACTORS NECESSITATING IMPROVEMENT IN AUTOMOBILE BRAKES</i>	94
<i>TABLE 51 AUTOMOBILE BUYERS' REQUIREMENTS FOR BRAKES</i>	95
DYNAMICS OF AUTOMOTIVE BRAKING.....	96
Market Forces Affecting Longevity of Brake Pads.....	96
Noise in Brake Pads	97
<i>TABLE 52 REASONS THAT BRAKE PADS CAUSE NOISE</i>	98
TYPES OF BRAKES	98
<i>TABLE 53 COMPARISON OF DISK VERSUS DRUM BRAKES</i>	99
Disk Brakes.....	99
<i>TABLE 54 DISTRIBUTION OF BRAKING FORCE IN AUTOMOBILES</i>	100
Drum Brakes.....	101
Automotive Brake Outlook.....	101
<i>TABLE 55 REGIONAL OUTLOOK FOR LIGHT VEHICLES, THROUGH 2008 (MILLIONS OF VEHICLES)</i>	101
<i>TABLE 56 LIGHT VEHICLE OEM DRY FRICTION MATERIAL OUTLOOK, THROUGH 2008 (MILLIONS OF DOLLARS)</i>	102
THE AUTOMOTIVE AFTERMARKET IN BRAKE PADS.....	103
Aftermarket Brake Use Patterns.....	103
<i>TABLE 57 EXPECTED LIFETIME DISTANCES OF VARIOUS TYPES OF FRICTION MATERIALS</i>	104
Aftermarket Materials Selection	104
Aftermarket Brake Outlook	105
<i>TABLE 58 LIGHT VEHICLE DRY FRICTION AFTERMARKET OUTLOOK, THROUGH 2008 (MILLIONS OF DOLLARS)</i>	105
AUTOMOTIVE BRAKE SUPPLIERS.....	105
Automotive OE Brakes.....	106
<i>FIGURE 9 NORTH AMERICAN SUPPLIER SHARES OF ORIGINAL EQUIPMENT FRICTION MATERIALS TO LIGHT VEHICLE MANUFACTURERS, 2003 (%)</i>	106
<i>FIGURE 9 (CONTINUED)</i>	107
Automotive Aftermarket Brakes.....	108
<i>TABLE 59 DIFFERENCES BETWEEN THE AUTOMOTIVE AFTERMARKET AND OE FRICTION MANUFACTURERS</i>	108
<i>TABLE 59 (CONTINUED)</i>	109
AVIATION/AEROSPACE DRY FRICTION.....	110
<i>TABLE 60 AVIATION/AEROSPACE FRICTION MATERIALS OUTLOOK, THROUGH 2008 (MILLIONS OF DOLLARS)</i>	110

Aviation/Aerospace Dry Friction (Continued)	111
INDUSTRIAL DRY FRICTION	112
TABLE 61 INDUSTRIAL DRY FRICTION MATERIAL OUTLOOK, THROUGH 2008 (MILLION DOLLARS).....	112
RAILWAY	113
OIL WELLS	114
CONSTRUCTION MACHINERY	114
APPLIANCES.....	115
INDUSTRIAL MACHINERY	116
WET FRICTION	117
AUTOMOTIVE WET FRICTION	118
TABLE 62 FRICTION MATERIAL COMPONENTS IN AUTOMATIC TRANSMISSIONS.....	118
TABLE 63 AUTOMOTIVE WET FRICTION MATERIAL OUTLOOK, THROUGH 2008 (MILLIONS OF DOLLARS).....	119
FIGURE 10 NORTH AMERICAN SUPPLIER SHARES OF AUTOMATIC TRANSMISSION WET PAPER FRICTION PRODUCTS FOR LIGHT VEHICLES, 2003 (%).....	120
CONSTRUCTION WET FRICTION	121
TABLE 64 CONSTRUCTION WET FRICTION MATERIAL OUTLOOK, THROUGH 2008 (MILLIONS OF DOLLARS).....	121
FIGURE 11 NORTH AMERICAN SUPPLIER SHARES OF AUTOMATIC TRANSMISSION WET PAPER FRICTION PRODUCT FOR CONSTRUCTION EQUIPMENT, 2003 (%).....	122
OTHER WET FRICTION	123
TABLE 65 COMPARISON OF MANUAL AND AUTOMATIC TRUCK TRANSMISSIONS.....	124
TABLE 66 OTHER WET FRICTION MATERIAL OUTLOOK, THROUGH 2008 (MILLIONS OF DOLLARS).....	124
FIGURE 12 NORTH AMERICAN SUPPLIER SHARES OF CLUTCH BUTTONS, 2003 (%).....	125
FIGURE 12 (CONTINUED)	126
FIGURE 13 NORTH AMERICAN SUPPLIER SHARES OF MEDIUM TRUCK TRANSMISSIONS, 2003 (%).....	127
AUTOMOTIVE CLUTCHES	127
Automotive Clutches (Continued).....	128
TABLE 67 ADVANTAGES AND DISADVANTAGES OF NEW VERSUS REBUILT CLUTCHES IN THE AFTERMARKET.....	129
INTERNATIONAL MARKETS.....	130
OVERVIEW.....	130
TABLE 68 REGIONAL OUTLOOK FOR FRICTION MATERIALS IN FRICTION PRODUCTS, THROUGH 2008 (MILLIONS OF POUNDS).....	130
TABLE 69 REGIONAL OUTLOOK FOR FRICTION PRODUCTS, THROUGH 2008 (MILLIONS OF DOLLARS).....	131
NORTH AMERICA	132
WESTERN EUROPE.....	132
TABLE 70 ADVANCES IN BRAKING SYSTEMS MADE POPULAR IN EUROPE.....	133
TABLE 71 DIFFERENCES BETWEEN THE NORTH AMERICAN AND EUROPEAN MARKETS	134

WESTERN EUROPE (CONTINUED)	135
JAPAN	136
REST OF THE WORLD	137
REST OF THE WORLD (CONTINUED)	138
FRICITION PRODUCTS AND MATERIALS INDUSTRY STRUCTURE.....	139
OVERVIEW.....	139
INDUSTRY HISTORICAL DEVELOPMENT	139
TABLE 72 <i>FRICITION MATERIALS/PRODUCTS VALUE CHAIN, THROUGH 2008</i> (MILLIONS OF DOLLARS).....	140
TABLE 73 <i>STRATEGIC ANALYSIS OF THE NORTH AMERICAN FRICTION</i> <i>MATERIALS MARKET</i>	140
INNOVATION AND RESEARCH AND DEVELOPMENT	141
TECHNOLOGICAL STRATEGIES.....	142
RESEARCH AND DEVELOPMENT FUNDING	142
FUTURE TRENDS IN RESEARCH AND DEVELOPMENT.....	143
MANUFACTURING STRATEGIES	143
SCALE ECONOMIES AND VERTICAL INTEGRATION	143
LABOR.....	144
COST STRUCTURE.....	145
FINANCIAL PERFORMANCE	145
MARKETING	146
PRICING AND BARGAINING POWER.....	146
MARKET SEGMENTATION	147
DIFFERENTIATION STRATEGIES	147
RELATIONS WITH OEM CUSTOMERS	148
GLOBAL MARKETING.....	149
DISTRIBUTION.....	150
OTHER MARKETING	151
OTHER CONSIDERATIONS.....	152
TYPES OF COMPANIES.....	153
CONCENTRATION	154
CONSOLIDATION.....	154
Consolidation (Continued).....	155
COMPANY PROFILES	156
ABS FRICTION CORPORATION	156
ACORDIS BV.....	157
ADVANCED FRICTION TECHNOLOGY	158
ADVANCED GLASSFIBER YARNS, LLC	159
ADVICS CO. LTD.....	159
AIRCRAFT BRAKING SYSTEMS CORPORATION.....	160
AKEBONO BRAKE INDUSTRY COMPANY LIMITED	161
Akebono Brake Industry Company Limited (Continued).....	162
AKZO NOBEL NV.....	163

ALL FRICTIONS COMPANY	164
ALLISON TRANSMISSION.....	164
ALTO PRODUCTS CORPORATION	165
AMERICAN METAL FIBERS INC.....	166
ANSTRO MANUFACTURING, INC.....	166
APTEC REIBTECHNIK GMBH.....	167
ARVINMERITOR INC.....	168
AVS BRAKE LININGS PVT LIMITED	169
AUSCO PRODUCTS INC.....	170
BENDIX COMMERCIAL VEHICLE SYSTEMS LLC.....	170
BIC AUTO PRIVATE LIMITED	171
BIC Auto Private Limited (Continued).....	172
BORGWARNER INC.....	173
ROBERT BOSCH GMBH	174
BRAKE PRO, LTD.	175
BREMBO GROUP.....	175
Brembo Group (Continued)	176
BREMSKERL REIBBELAGWERKE EMMERLING GMBH & CO. KG	177
CAPITAL TOOL AND DESIGN LIMITED.....	178
CARDOLITE CORPORATION.....	178
CARLISLE COMPANIES INCORPORATED.....	179
THE CARLYLE JOHNSON MACHINE COMPANY, LLC.....	180
CECO FRICTION PRODUCTS, INC.....	181
CERTAINTED CORPORATION	182
CHACO PRODUCTS LTD.	183
CHAMPION FRICTION COMPANY	183
CLEVELAND OAK, INC.....	184
THE CLINE COMPANY.....	185
CO-EFF FRICTION BANDS LTD.....	185
CONI-SEAL, INC.....	186
CONTINENTAL AG	186
DANA CORPORATION	187
Dana Corporation (Continued).....	188
DELPHI CORPORATION	189
E. I. DUPONT DE NEMOURS AND COMPANY	190
E. I. duPont de Nemours and Company (Continued).....	191
DYNOTHERM (PTY) LIMITED.....	192
EATON CORPORATION.....	192
ENGINEERING PLASTICS, INC.....	193
FANGTIAN INDUSTRIES CO., LTD.	194
FEDERAL-MOGUL CORPORATION.....	195
FENNER PRECISION PRODUCTS	196
FORMSPRAG CLUTCH	197

FUJIAN GUANLEAN AUTOMOTIVE PARTS INDUSTRY CO., LTD.....	198
GENERAL METALS POWDER COMPANY	198
GKN PLC.....	199
GKN Plc (Continued).....	200
GLOBAL MATERIAL TECHNOLOGIES, INC.	201
GOODRICH CORPORATION	202
GRAPHITE SALES, INC.	203
GREAT LAKES FRICTION PRODUCTS, INC.	203
Great Lakes Friction Products, Inc. (Continued).....	204
GUMMI USA, INC.	205
HALDEX AB.....	205
HEMISPHERES INTERNATIONAL MANUFACTURING COMPANY	206
HEXCEL CORPORATION	207
HINDUSTAN COMPOSITES LIMITED	208
HITCO CARBON COMPOSITES, INC.....	209
HOLLINGSWORTH & VOSE COMPANY	210
HONEYWELL INTERNATIONAL, INC.	211
Honeywell International, Inc. (Continued)	212
Honeywell International, Inc. (Continued)	213
Honeywell International, Inc. (Continued)	214
HYPER-THERM, INC.....	215
Hyper-Therm, Inc. (Continued)	216
Hyper-Therm, Inc. (Continued)	217
Hyper-Therm, Inc. (Continued)	218
HYUPRIP MACHINERY CO., LTD	219
INDUSTRIAL BRAKE & SUPPLY	219
INDUSTRIAL CLUTCH PARTS LIMITED.....	220
INTERNATIONAL BRAKE INDUSTRIES, INC.	220
JAPAN BRAKE INDUSTRIAL CO., LTD.....	221
KALE BALATA A.S.	222
KNORR-BREMSE AG.....	222
Knorr-Bremse AG (Continued)	223
KOREA BERAL.....	224
LOGAN CLUTCH CORPORATION.....	224
MACH III CLUTCH, INCORPORATED.....	225
MATERIALS SCIENCES CORPORATION.....	226
MERIDIAN LABORATORY	226
MESSIER-BUGATTI	227
Messier-Bugatti (Continued).....	228
MIBA AG	229
Miba AG (Continued)	230
MIDWEST BRAKE	231

MORSE AUTOMOTIVE CORPORATION.....	232
NAN HOANG TRAFFIC INSTRUMENT CO., LTD.	232
NINGBO XIANGSHENG FRICTION MATERIAL CO., LTD.	233
NISSHINBO INDUSTRIES, INC.....	233
Nisshinbo Industries, Inc. (Continued)	234
NUCAP INDUSTRIES INC.....	235
ORTLINGHAUS-WERKE GMBH.....	235
OWENS CORNING.....	236
PERFORMANCE FRICTION CORPORATION	237
PHOENIX FRICTION PRODUCTS, INC.	238
PMAUTOMOTIVE, INC.	238
POWER TRANSMISSION TECHNOLOGY, INC.	239
PPG INDUSTRIES, INC.....	240
RAYBESTOS PRODUCTS COMPANY	241
RAYTECH CORPORATION.....	242
Raytech Corporation (Continued).....	243
THE ROWLAND COMPANY	244
S & E INDUSTRIAL ADHESIVES CORPORATION	245
SB SANGSIN BRAKE.....	245
SCAN-PAC MANUFACTURING, INC.	246
SEPAC, INC.	247
SGL CARBON AG.....	247
STANDCO INDUSTRIES INC.....	248
TARONI & C. S.A.S.	249
TEIJIN LIMITED	250
Teijin Limited (Continued).....	251
THERMOSET, INC.....	252
TMD FRICTION BETEILIGUNGS GMBH & CO KG	253
TOKAI CARBON CO., LTD.....	254
TRIBCO INCORPORATED	255
TRW AUTOMOTIVE INC.	256
TRW Automotive Inc. (Continued).....	257
UNIFRAX CORPORATION.....	258
Unifrax Corporation (Continued).....	259
UNIVERSAL AUTOMOTIVE INDUSTRIES, INC.	260
UTIL INDUSTRIES, SPA.....	261
VESRAH COMPANY, INC.	261
WABTEC CORPORATION.....	262
WELLMAN PRODUCTS GROUP	263
WESTROCK COMPANY	264
WHEELING BRAKE BLOCK MANUFACTURING CO., INC.....	265
WINNARD LTD.	265
ZOLTEK COMPANIES, INC.....	266