

Contents

| | | |
|-----|---|-----|
| 1 | Purpose | 1 |
| 2 | Maintenance work management | 12 |
| 2.1 | The conditions of work | 12 |
| 2.2 | Work frequency | 16 |
| 2.3 | Maintenance work box | 18 |
| 2.4 | Customers for maintenance | 21 |
| 2.5 | Pre-use maintenance | 22 |
| 2.6 | Work scheduling | 25 |
| 2.7 | Work prioritizing | 29 |
| 3 | Main methods and philosophies | 34 |
| 3.1 | Breakdown maintenance (maintenance work box B2) | 36 |
| 3.2 | Run to destruction (maintenance work box B1) | 38 |
| 3.3 | Pre-planned maintenance (maintenance work box A1) | 39 |
| 3.4 | Reliability-centered maintenance | 42 |
| 3.5 | Total productive maintenance (TPM) | 48 |
| 3.6 | Condition-based maintenance | 53 |
| 3.7 | Campaign maintenance | 73 |
| 4 | Regions of application | 82 |
| 5 | The maintenance toolbox | 85 |
| 5.1 | Computer-based systems | 86 |
| 5.2 | The equipment database | 101 |
| 5.3 | The maintenance plan | 103 |
| 5.4 | The work order system | 114 |
| 5.5 | Experts and disciplines | 120 |
| 5.6 | Resources | 125 |
| 5.7 | Status reporting | 126 |
| 5.8 | Shutdowns and projects | 128 |

| | | |
|------|--------------------------------------|-----|
| 5.9 | Data recording | 133 |
| 5.10 | Supervisor's information | 135 |
| 6 | Professional organizations | 138 |
| 7 | Maintenance and finance | 145 |
| 7.1 | Work order costs | 146 |
| 7.2 | Maintenance cost targets | 149 |
| 7.3 | Budgets | 152 |
| 7.4 | Optimum cost | 157 |
| 8 | Preparation and response | 162 |
| 8.1 | Replacement parts | 162 |
| 8.2 | Purchase order data | 165 |
| 8.3 | Work association | 169 |
| 8.4 | Packing, marking and inspection | 172 |
| 8.5 | Refurbished equipment | 174 |
| 8.6 | Obsolete components | 176 |
| 8.7 | Working life | 177 |
| 8.8 | Standing plans | 180 |
| 8.9 | The replacement machine | 182 |
| 9 | Maintenance and production | 186 |
| 9.1 | Downtime | 186 |
| 9.2 | Access to equipment | 189 |
| 9.3 | Equipment isolation | 191 |
| 9.4 | Work instructions | 197 |
| 9.5 | Authority and responsibility | 228 |
| 9.6 | Relations | 230 |
| 9.7 | Treatment of standbys | 234 |
| 9.8 | Construction projects | 238 |
| 10 | Maintenance and quality | 242 |
| 10.1 | Replacement goods inspection | 244 |
| 10.2 | Shelf life, handling and storage | 249 |
| 10.3 | Packing, shipment and transport | 251 |
| 10.4 | Site handling | 256 |
| 10.5 | The performance of outside repairers | 258 |
| 10.6 | Quality of maintenance work done | 261 |
| 10.7 | Temporary work | 264 |
| 10.8 | Local repairs | 267 |
| 11 | Maintenance and safety | 269 |
| 11.1 | Safety and maintenance work | 273 |

CONTENTS

vii

| | | |
|-------|-------------------------------------|-----|
| 11.2 | Safe access | 275 |
| 11.3 | Removing dangerous substances | 277 |
| 11.4 | Safety officer's perception | 279 |
| 11.5 | Safety of maintenance workers | 281 |
| 11.6 | Dangerous cleaning | 284 |
| 11.7 | Specific dangers | 285 |
| 11.8 | Worker resistance | 290 |
| 11.9 | The permit to work | 291 |
| 11.10 | Electrical safety | 298 |
| 12 | Safety-critical systems | 304 |
| 12.1 | The basic dilemma | 305 |
| 12.2 | Changing regulations | 308 |
| 12.3 | Safety-critical elements | 313 |
| 12.4 | Ladder of criticality | 314 |
| 12.5 | Verification | 317 |
| 13 | Performance evaluation | 318 |
| 13.1 | The progress position | 321 |
| 13.2 | Cost of progress | 325 |
| 13.3 | The planned to unplanned ratio | 325 |
| 13.4 | Management reporting | 329 |
| 14 | Health and safety publications | 333 |
| 15 | Acknowledgements | 336 |
| 16 | Standards and related organizations | 338 |
| 17 | Bibliography | 352 |
| 18 | Glossary | 355 |
| | Editorial Index | 379 |
| | Advertiser Index | 390 |