

Table 6.20

Measurement of roundness by Dial gauge deflections of 10-mm Diameter Aluminium (Al) Round Bar After Straightening
Mean values of Dial Gauge Deflection Readings after straightening of 10 mm Aluminium (Al) round bar x 0.01 mm

| | Angles in Degrees | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-------------------|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------------------|
| Length in cm | 0° | 15° | 30° | 45° | 60° | 75° | 90° | 105° | 120° | 135° | 150° | 165° | 180° | 195° | 210° | 225° | 240° | 255° | 270° | 285° | 300° | 315° | 330° | 345° | STD DEV (mm) |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | 152 | 152 | 153 | 153 | 154 | 155 | 156 | 156 | 157 | 156 | 155 | 154 | 153 | 150 | 147 | 146 | 146 | 146 | 146 | 147 | 149 | 151 | 152 | 152 | 0.036 |
| 17 | 137 | 138 | 138 | 139 | 140 | 141 | 142 | 142 | 142 | 141 | 141 | 140 | 139 | 138 | 137 | 136 | 136 | 135 | 134 | 136 | 138 | 139 | 140 | 139 | 0.022 |
| 20 | 141 | 141 | 141 | 142 | 142 | 144 | 145 | 145 | 144 | 143 | 142 | 140 | 138 | 136 | 135 | 134 | 134 | 134 | 135 | 137 | 139 | 140 | 142 | 142 | 0.036 |
| 23 | 143 | 143 | 143 | 143 | 143 | 143 | 143 | 143 | 143 | 142 | 141 | 140 | 138 | 137 | 136 | 136 | 136 | 136 | 137 | 139 | 141 | 142 | 144 | 144 | 0.029 |
| 26 | 145 | 145 | 146 | 145 | 145 | 145 | 145 | 144 | 142 | 141 | 140 | 139 | 138 | 136 | 135 | 135 | 136 | 136 | 137 | 140 | 143 | 144 | 145 | 145 | 0.04 |
| 29 | 141 | 140 | 140 | 140 | 140 | 139 | 138 | 137 | 135 | 135 | 134 | 133 | 132 | 131 | 130 | 130 | 130 | 131 | 132 | 135 | 138 | 140 | 141 | 141 | 0.04 |
| 32 | 144 | 143 | 142 | 141 | 140 | 139 | 138 | 136 | 134 | 134 | 133 | 133 | 133 | 132 | 131 | 132 | 133 | 134 | 136 | 139 | 142 | 143 | 144 | 144 | 0.046 |
| 35 | 148 | 147 | 147 | 145 | 143 | 140 | 138 | 136 | 134 | 133 | 132 | 131 | 131 | 131 | 131 | 132 | 134 | 136 | 138 | 141 | 145 | 147 | 149 | 148 | 0.067 |
| 38 | 148 | 146 | 145 | 142 | 140 | 137 | 135 | 132 | 128 | 127 | 127 | 126 | 126 | 126 | 126 | 129 | 132 | 134 | 136 | 140 | 144 | 146 | 149 | 148 | 0.083 |
| 41 | 152 | 150 | 149 | 146 | 143 | 139 | 136 | 132 | 129 | 127 | 126 | 125 | 125 | 126 | 127 | 129 | 132 | 135 | 139 | 143 | 148 | 150 | 152 | 152 | 0.101 |
| 44 | 156 | 154 | 153 | 150 | 146 | 143 | 140 | 135 | 131 | 129 | 127 | 126 | 126 | 126 | 126 | 128 | 130 | 134 | 137 | 142 | 146 | 151 | 155 | 155 | 0.111 |
| 47 | 157 | 156 | 155 | 152 | 150 | 146 | 142 | 137 | 132 | 129 | 126 | 125 | 125 | 126 | 127 | 129 | 131 | 135 | 139 | 144 | 149 | 153 | 157 | 157 | 0.121 |
| 50 | 153 | 152 | 151 | 149 | 146 | 143 | 140 | 135 | 130 | 128 | 126 | 124 | 123 | 123 | 124 | 125 | 127 | 131 | 134 | 140 | 146 | 148 | 151 | 152 | 0.111 |
| 53 | 153 | 152 | 152 | 150 | 148 | 144 | 141 | 137 | 134 | 131 | 128 | 127 | 126 | 126 | 126 | 127 | 129 | 132 | 135 | 140 | 145 | 147 | 149 | 151 | 0.1 |
| 56 | 150 | 149 | 148 | 147 | 146 | 143 | 141 | 138 | 135 | 133 | 131 | 131 | 132 | 130 | 129 | 129 | 130 | 132 | 134 | 139 | 144 | 146 | 148 | 148 | 0.076 |
| 59 | 149 | 148 | 148 | 146 | 145 | 144 | 143 | 140 | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 132 | 133 | 135 | 137 | 140 | 143 | 145 | 147 | 148 | 0.058 |
| 62 | 145 | 145 | 145 | 143 | 142 | 140 | 139 | 136 | 134 | 133 | 132 | 131 | 130 | 129 | 129 | 129 | 130 | 132 | 135 | 138 | 141 | 143 | 145 | 145 | 0.061 |
| 65 | 148 | 147 | 146 | 145 | 144 | 142 | 141 | 138 | 136 | 134 | 133 | 132 | 131 | 130 | 130 | 130 | 130 | 132 | 135 | 139 | 143 | 144 | 146 | 146 | 0.065 |
| 68 | 151 | 150 | 150 | 148 | 147 | 144 | 142 | 138 | 135 | 133 | 131 | 131 | 130 | 130 | 129 | 130 | 131 | 134 | 138 | 141 | 144 | 147 | 150 | 151 | 0.082 |
| 71 | 151 | 150 | 150 | 148 | 146 | 143 | 140 | 136 | 133 | 130 | 128 | 127 | 126 | 126 | 126 | 127 | 128 | 131 | 134 | 139 | 143 | 146 | 148 | 149 | 0.092 |
| 74 | 155 | 154 | 154 | 152 | 150 | 147 | 145 | 141 | 137 | 133 | 130 | 128 | 127 | 126 | 126 | 127 | 128 | 131 | 135 | 139 | 144 | 146 | 149 | 151 | 0.104 |
| 77 | 153 | 153 | 153 | 152 | 151 | 149 | 147 | 143 | 140 | 137 | 134 | 132 | 131 | 130 | 130 | 130 | 130 | 133 | 136 | 140 | 145 | 147 | 149 | 151 | 0.088 |
| 80 | 148 | 149 | 150 | 150 | 150 | 149 | 148 | 144 | 141 | 139 | 136 | 133 | 130 | 128 | 126 | 126 | 126 | 128 | 130 | 133 | 137 | 140 | 143 | 145 | 0.088 |
| 83 | 153 | 154 | 156 | 156 | 157 | 155 | 154 | 151 | 147 | 143 | 138 | 133 | 129 | 126 | 124 | 123 | 123 | 125 | 128 | 133 | 138 | 142 | 145 | 149 | 0.123 |
| 86 | 110 | 107 | 104 | 104 | 103 | 107 | 111 | 118 | 124 | 131 | 137 | 141 | 145 | 146 | 147 | 146 | 146 | 142 | 139 | 135 | 130 | 125 | 120 | 115 | 0.16 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| 89 | 112 | 109 | 106 | 106 | 106 | 108 | 111 | 117 | 123 | 128 | 133 | 137 | 140 | 142 | 143 | 142 | 141 | 139 | 136 | 132 | 128 | 125 | 121 | 117 | 0.134 |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|

Mean values of Dial Gauge Deflection Readings after straightening of 10 mm Aluminium (Al) round bar x 0.01 mm

| | Angles in Degrees | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|-------------------|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------------------|
| Length in cm | 0° | 15° | 30° | 45° | 60° | 75° | 90° | 105° | 120° | 135° | 150° | 165° | 180° | 195° | 210° | 225° | 240° | 255° | 270° | 285° | 300° | 315° | 330° | 345° | STD DEV (mm) |
| 92 | 116 | 114 | 113 | 112 | 112 | 114 | 117 | 122 | 127 | 131 | 135 | 137 | 140 | 141 | 141 | 141 | 141 | 139 | 137 | 134 | 131 | 127 | 122 | 119 | 0.109 |
| 95 | 115 | 114 | 113 | 113 | 113 | 116 | 120 | 124 | 129 | 132 | 135 | 137 | 139 | 139 | 139 | 138 | 137 | 134 | 132 | 129 | 126 | 124 | 121 | 118 | 0.096 |
| 98 | 103 | 103 | 103 | 104 | 105 | 113 | 122 | 127 | 133 | 136 | 139 | 139 | 139 | 137 | 136 | 133 | 131 | 128 | 126 | 123 | 120 | 118 | 116 | 110 | 0.13 |
| 101 | 119 | 118 | 118 | 119 | 120 | 123 | 126 | 131 | 135 | 138 | 141 | 142 | 142 | 140 | 138 | 136 | 134 | 131 | 129 | 126 | 124 | 122 | 121 | 120 | 0.086 |
| 104 | 107 | 107 | 106 | 112 | 118 | 122 | 126 | 130 | 135 | 138 | 141 | 141 | 141 | 140 | 138 | 136 | 133 | 130 | 128 | 125 | 123 | 121 | 119 | 113 | 0.115 |
| 107 | 117 | 116 | 115 | 117 | 118 | 122 | 125 | 129 | 133 | 135 | 137 | 138 | 139 | 138 | 137 | 134 | 132 | 129 | 127 | 124 | 122 | 120 | 119 | 117 | 0.083 |
| 110 | 119 | 118 | 118 | 118 | 119 | 123 | 128 | 132 | 137 | 140 | 143 | 144 | 144 | 143 | 142 | 140 | 138 | 135 | 132 | 130 | 127 | 125 | 122 | 121 | 0.095 |
| 113 | 118 | 117 | 117 | 118 | 119 | 123 | 128 | 133 | 138 | 141 | 144 | 145 | 146 | 144 | 142 | 139 | 137 | 134 | 130 | 127 | 124 | 122 | 120 | 119 | 0.103 |
| 116 | 146 | 144 | 143 | 140 | 137 | 133 | 130 | 127 | 125 | 122 | 120 | 118 | 117 | 118 | 120 | 125 | 129 | 134 | 139 | 139 | 140 | 143 | 146 | 146 | 0.101 |
| 119 | 152 | 150 | 148 | 145 | 143 | 140 | 138 | 135 | 132 | 130 | 129 | 128 | 127 | 127 | 127 | 130 | 133 | 137 | 142 | 146 | 151 | 153 | 155 | 153 | 0.097 |

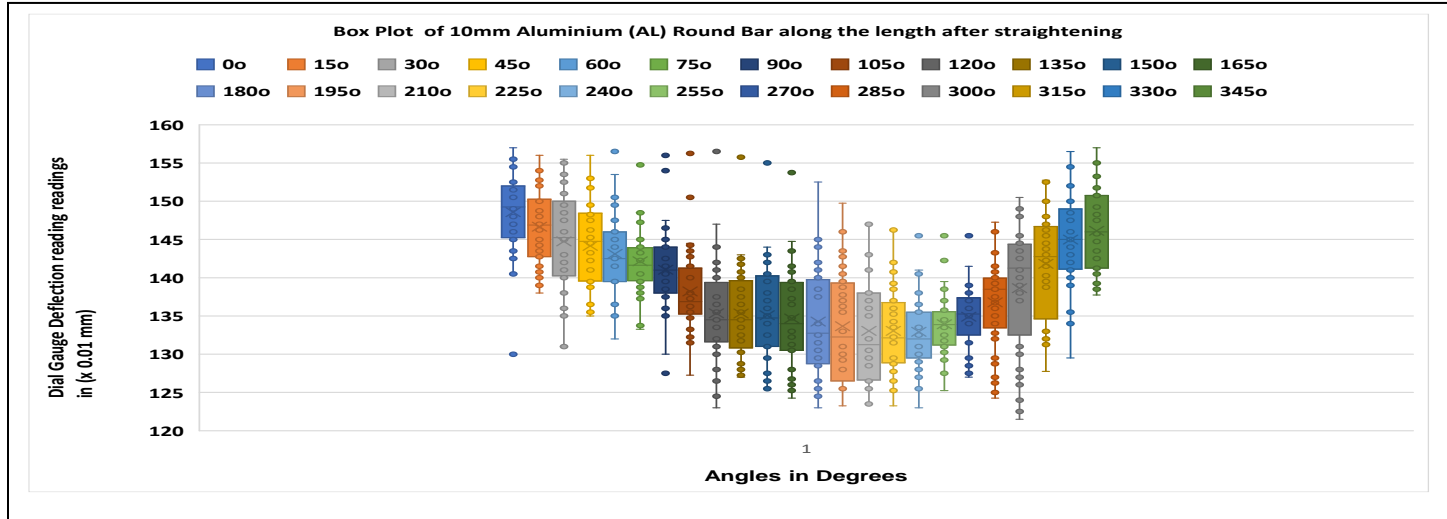


Figure 6.25(a): Box Plot of dial gauge readings dataset of mean values of 10-mm diameter Aluminium (Al) round bar before straightening

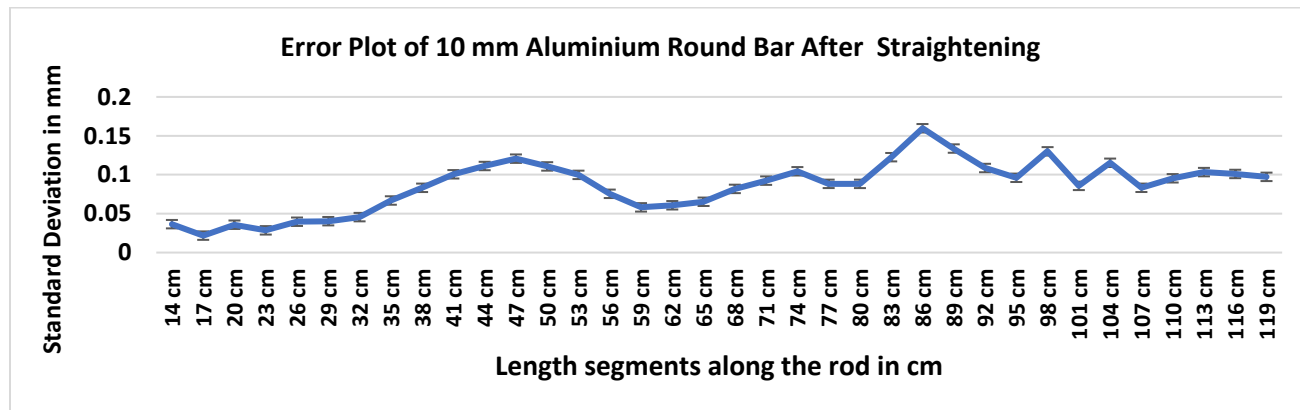


Figure 6.25(b): Error Plot of dial gauge readings on 10 mm Aluminium Round Bar after straightening