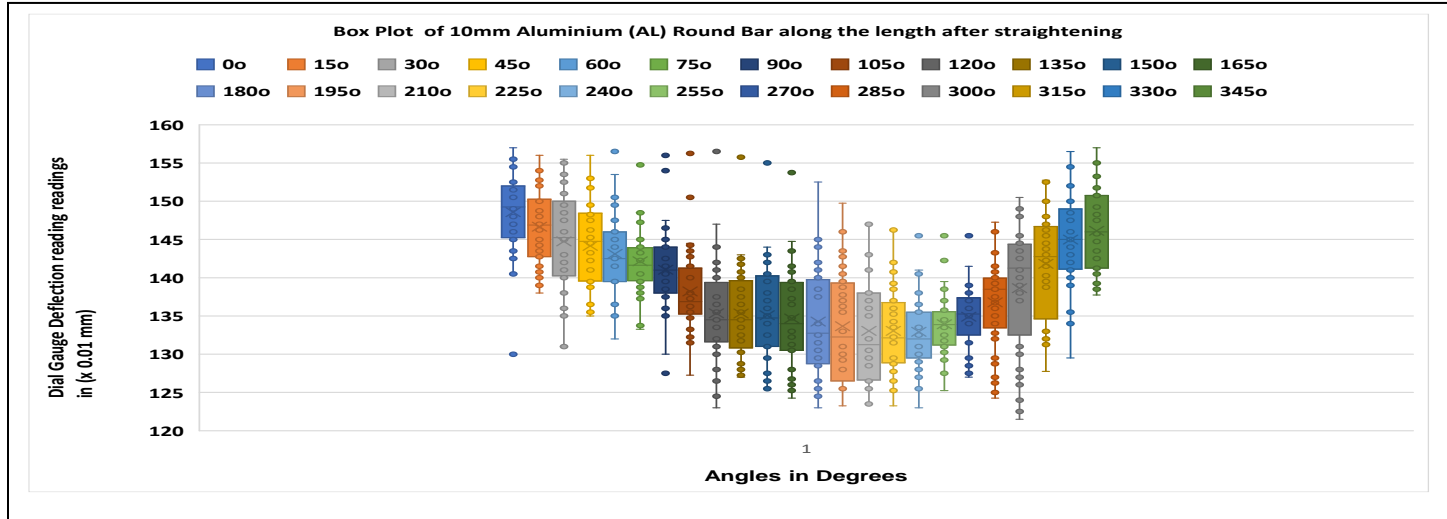


**Table 6.20 Measurement of roundness by Dial gauge deflections of 10-mm Diameter Aluminium (Al) Round Bar**  
**Mean values of Dial Gauge Deflection Readings after straightening of 10 mm Aluminium (Al) round bar x 0.01 mm**

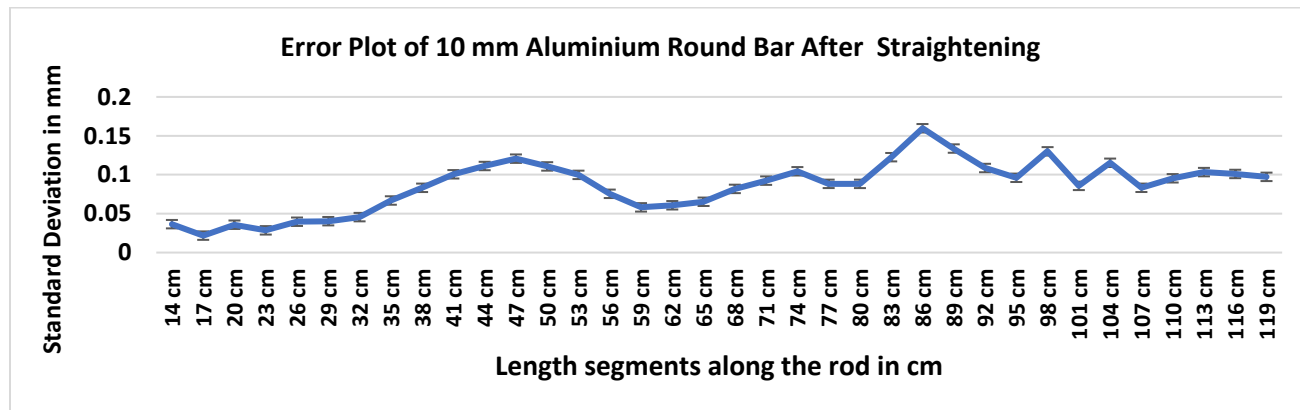
| Length<br>in cm | Angles in Degrees |     |     |     |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      | STD<br>DEV<br>(mm) |
|-----------------|-------------------|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------------------|
|                 | 0°                | 15° | 30° | 45° | 60° | 75° | 90° | 105° | 120° | 135° | 150° | 165° | 180° | 195° | 210° | 225° | 240° | 255° | 270° | 285° | 300° | 315° | 330° | 345° |                    |
| 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<br>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<br>DEV<br>(mm) |
| 92              | 116               | 114 | 113 | 112 | 112 | 114 | 117 | 122  | 127  | 131  | 135  | 137  | 140  | 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**