

Table 5.17**Measurement of roundness by Dial gauge deflections of 8-mm Diameter Copper (Cu) Round Bar Before Straightening**

Mean values of Dial Gauge Deflection Readings before straightening of 8 mm Copper round bar x 0.01 mm

| Length in cm | Angles in Degrees | | | | | | | | | | | | | | | | | | | | | | | | STD DEV (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° | |
| 11.5 | 174 | 174 | 174 | 174 | 173 | 171 | 171 | 172 | 174 | 174 | 172 | 169 | 164 | 161 | 157 | 156 | 156 | 155 | 157 | 159 | 163 | 165 | 168 | 173 | 0.0715195 |
| 13 | 173 | 171 | 173 | 173 | 172 | 172 | 172 | 173 | 175 | 174 | 171 | 168 | 162 | 159 | 156 | 154 | 153 | 154 | 157 | 159 | 163 | 165 | 167 | 172 | 0.0751011 |
| 15 | 173 | 174 | 174 | 174 | 173 | 172 | 171 | 172 | 172 | 171 | 167 | 163 | 158 | 155 | 152 | 151 | 152 | 155 | 158 | 162 | 164 | 165 | 167 | 170 | 0.0793996 |
| 17 | 179 | 178 | 178 | 177 | 176 | 175 | 174 | 175 | 174 | 169 | 166 | 163 | 158 | 155 | 154 | 158 | 163 | 167 | 170 | 172 | 174 | 174 | 175 | 177 | 0.076413 |
| 19 | 179 | 178 | 177 | 177 | 175 | 173 | 173 | 172 | 169 | 165 | 162 | 157 | 153 | 152 | 155 | 161 | 168 | 171 | 175 | 177 | 176 | 176 | 177 | 180 | 0.0875861 |
| 22 | 181 | 180 | 179 | 179 | 175 | 172 | 172 | 170 | 166 | 163 | 158 | 155 | 151 | 152 | 156 | 164 | 170 | 176 | 179 | 180 | 179 | 178 | 179 | 180 | 0.0994951 |
| 25 | 181 | 181 | 179 | 176 | 173 | 169 | 168 | 166 | 161 | 156 | 153 | 147 | 147 | 152 | 156 | 165 | 170 | 175 | 178 | 178 | 177 | 177 | 179 | 183 | 0.1144598 |
| 28 | 177 | 178 | 175 | 175 | 172 | 171 | 170 | 166 | 162 | 158 | 153 | 149 | 148 | 153 | 156 | 161 | 168 | 173 | 174 | 175 | 176 | 177 | 179 | 181 | 0.102854 |
| 31 | 175 | 175 | 174 | 172 | 172 | 174 | 172 | 168 | 165 | 162 | 156 | 153 | 153 | 152 | 155 | 158 | 160 | 165 | 168 | 171 | 173 | 175 | 176 | 177 | 0.0847492 |
| 34 | 173 | 173 | 174 | 174 | 174 | 176 | 175 | 171 | 169 | 163 | 160 | 157 | 156 | 155 | 154 | 156 | 157 | 161 | 165 | 167 | 172 | 175 | 175 | 175 | 0.0794817 |
| 37 | 172 | 172 | 173 | 174 | 175 | 176 | 175 | 173 | 170 | 167 | 164 | 161 | 160 | 159 | 157 | 155 | 156 | 158 | 160 | 163 | 167 | 171 | 172 | 172 | 0.0697508 |
| 40 | 166 | 166 | 166 | 167 | 170 | 173 | 173 | 171 | 171 | 167 | 165 | 164 | 163 | 164 | 162 | 159 | 157 | 156 | 154 | 156 | 159 | 161 | 163 | 165 | 0.0546066 |
| 43 | 159 | 159 | 159 | 162 | 165 | 165 | 166 | 164 | 163 | 161 | 160 | 159 | 159 | 158 | 157 | 156 | 154 | 152 | 151 | 152 | 155 | 156 | 157 | 158 | 0.0423575 |
| 46 | 155 | 155 | 155 | 158 | 162 | 162 | 162 | 162 | 161 | 159 | 158 | 158 | 160 | 159 | 157 | 155 | 154 | 152 | 151 | 152 | 154 | 155 | 154 | 156 | 0.0337161 |
| 49 | 153 | 154 | 154 | 157 | 160 | 161 | 161 | 161 | 160 | 159 | 158 | 160 | 160 | 160 | 159 | 157 | 156 | 154 | 152 | 152 | 154 | 155 | 155 | 154 | 0.031172 |
| 52 | 150 | 150 | 151 | 155 | 157 | 158 | 159 | 158 | 157 | 157 | 156 | 158 | 161 | 159 | 158 | 156 | 154 | 152 | 151 | 151 | 153 | 152 | 152 | 151 | 0.0336536 |
| 55 | 148 | 149 | 151 | 154 | 156 | 158 | 159 | 160 | 158 | 157 | 158 | 159 | 160 | 160 | 159 | 157 | 154 | 151 | 150 | 150 | 150 | 149 | 149 | 149 | 0.0443226 |
| 57.5 | 178 | 178 | 180 | 179 | 177 | 176 | 174 | 167 | 165 | 163 | 162 | 158 | 156 | 157 | 158 | 157 | 160 | 164 | 169 | 172 | 174 | 175 | 176 | 177 | 0.0845534 |
| 61.2 | 174 | 174 | 175 | 175 | 175 | 174 | 171 | 164 | 163 | 161 | 160 | 158 | 156 | 156 | 158 | 158 | 161 | 165 | 168 | 169 | 171 | 173 | 175 | 176 | 0.0716308 |
| 64.3 | 168 | 169 | 171 | 173 | 171 | 170 | 169 | 163 | 159 | 157 | 157 | 156 | 155 | 155 | 155 | 155 | 157 | 159 | 163 | 164 | 165 | 167 | 168 | 169 | 0.0625833 |
| 67.5 | 169 | 169 | 169 | 171 | 170 | 169 | 168 | 163 | 159 | 158 | 160 | 158 | 159 | 158 | 158 | 156 | 157 | 158 | 162 | 164 | 166 | 168 | 170 | 168 | 0.0521803 |
| 70.5 | 162 | 162 | 162 | 163 | 163 | 162 | 162 | 158 | 155 | 154 | 154 | 154 | 157 | 157 | 159 | 158 | 158 | 158 | 158 | 161 | 164 | 164 | 166 | 164 | 0.0350129 |
| 73.5 | 163 | 161 | 161 | 161 | 161 | 160 | 160 | 156 | 155 | 154 | 156 | 158 | 160 | 160 | 162 | 161 | 160 | 159 | 161 | 161 | 164 | 165 | 166 | 165 | 0.0313003 |
| 77 | 161 | 160 | 159 | 157 | 158 | 157 | 158 | 157 | 155 | 156 | 156 | 159 | 162 | 164 | 164 | 165 | 161 | 161 | 162 | 163 | 164 | 165 | 166 | 165 | 0.0340689 |
| 80.2 | 159 | 158 | 157 | 156 | 156 | 158 | 160 | 159 | 160 | 158 | 160 | 162 | 163 | 163 | 164 | 164 | 162 | 163 | 166 | 166 | 166 | 164 | 166 | 164 | 0.0332256 |
| 83.2 | 160 | 156 | 155 | 157 | 158 | 161 | 164 | 167 | 169 | 169 | 172 | 173 | 174 | 174 | 174 | 172 | 171 | 168 | 169 | 169 | 170 | 169 | 167 | 164 | 0.059673 |
| 86.2 | 151 | 149 | 149 | 147 | 149 | 152 | 156 | 159 | 161 | 162 | 164 | 167 | 167 | 168 | 169 | 167 | 165 | 164 | 165 | 162 | 163 | 162 | 160 | 157 | 0.0690148 |
| 90.2 | 151 | 149 | 148 | 146 | 150 | 154 | 160 | 164 | 165 | 166 | 170 | 173 | 174 | 173 | 172 | 170 | 168 | 168 | 166 | 166 | 165 | 162 | 161 | 156 | 0.0868282 |

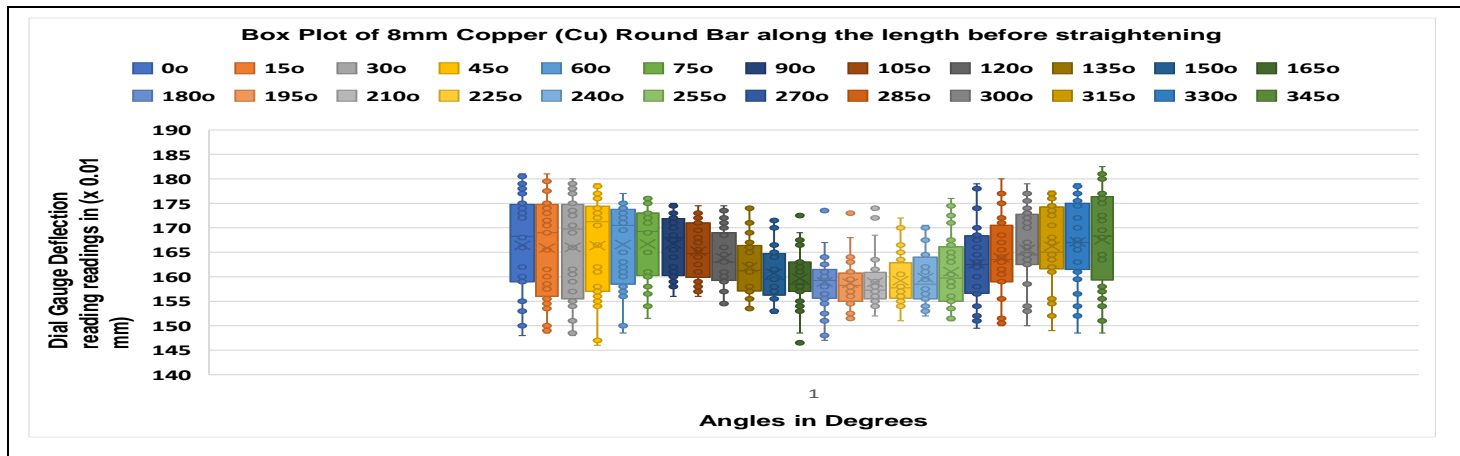


Figure 5.15(a): Box Plot of dial gauge readings dataset of mean values of 8-mm diameter Copper (Cu) round bar before straightening

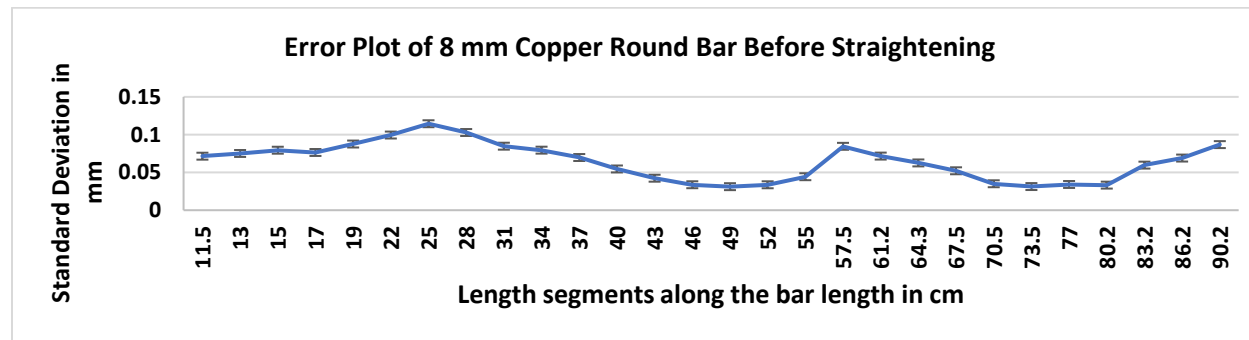


Figure 5.15: Error Plot of 8 mm Copper Round Bar Before Straightening