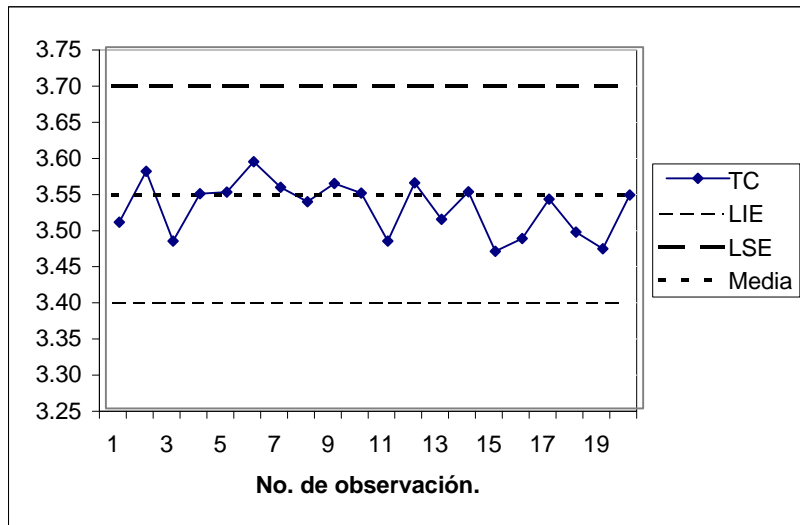


Anexo 4:
Gráficas de control de los procesos actuales.

Material: Hierro gris G1800

Variable: Carbono total (CT)

TC
3.51
3.58
3.48
3.55
3.55
3.59
3.56
3.54
3.56
3.55
3.48
3.56
3.51
3.55
3.47
3.49
3.54
3.49
3.47
3.55

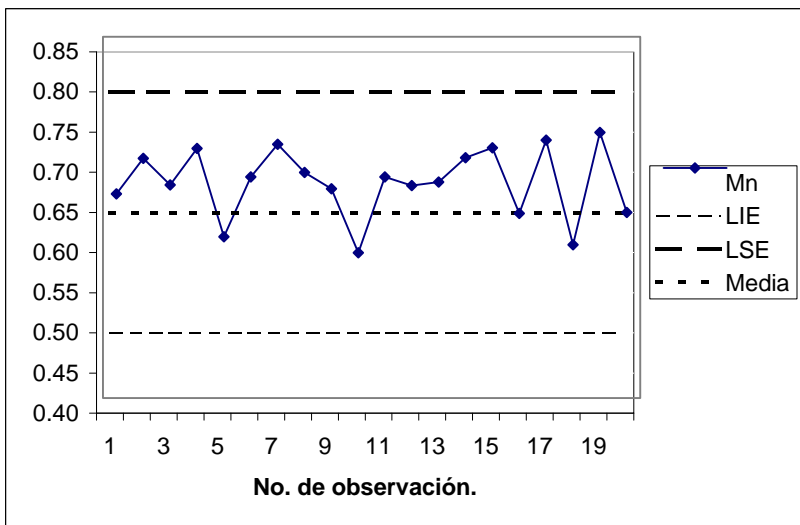


Media	3.53
Desv. std.	0.0375
Especificación Nominal	3.55
LIE	3.40
LSE	3.70
CP	1.335
Cpu	1.529
Cpl	1.141
Cpk	1.141

Material: Hierro gris G1800

Variable: Manganeso (Mn)

Mn
0.65
0.70
0.67
0.71
0.60
0.68
0.72
0.68
0.66
0.58
0.68
0.66
0.67
0.70
0.71
0.63
0.72
0.59
0.73
0.63

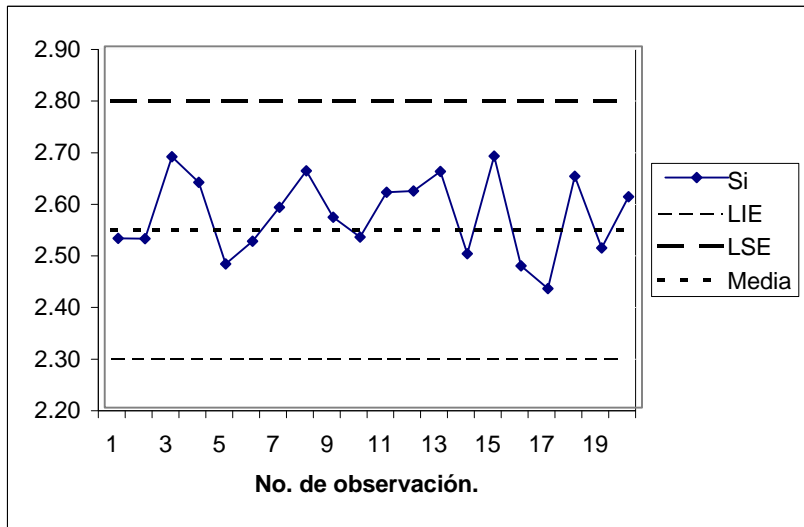


Media	0.67
Desv. std.	0.0436
Especificación Nominal	0.65
LIE	0.50
LSE	0.80
CP	1.147
Cpu	1.006
Cpl	1.288
Cpk	1.006

Material: Hierro gris G1800

Variable: Silicio (Si)

Si
2.53
2.53
2.69
2.64
2.48
2.52
2.59
2.66
2.57
2.53
2.62
2.66
2.50
2.69
2.47
2.43
2.65
2.51
2.61

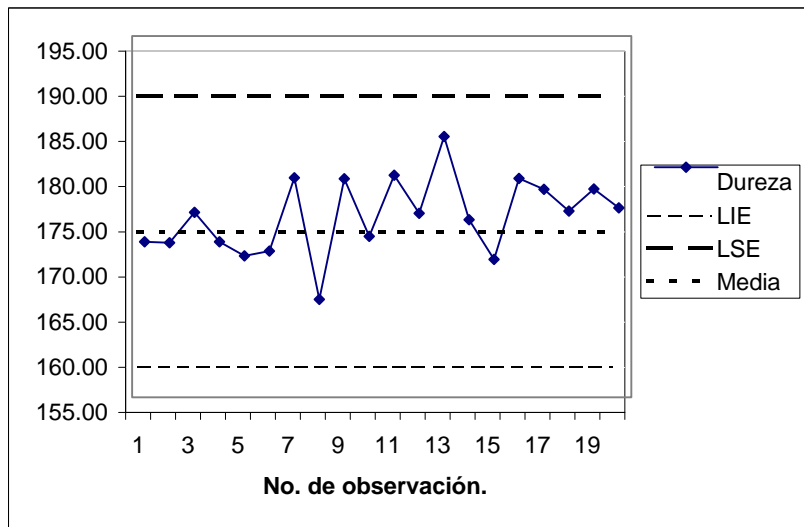


Media	2.57
Desv. std.	0.0771
Especificación Nominal	2.55
LIE	2.30
LSE	2.80
CP	1.081
Cpu	0.978
Cpl	1.185
Cpk	0.978

Material: Hierro gris G1800

Variable: Dureza

Dureza
172.22
172.11
175.48
172.23
170.67
171.19
179.30
165.85
179.20
172.82
179.59
175.37
183.87
174.67
170.27
179.23
178.04
175.64
178.06
175.97

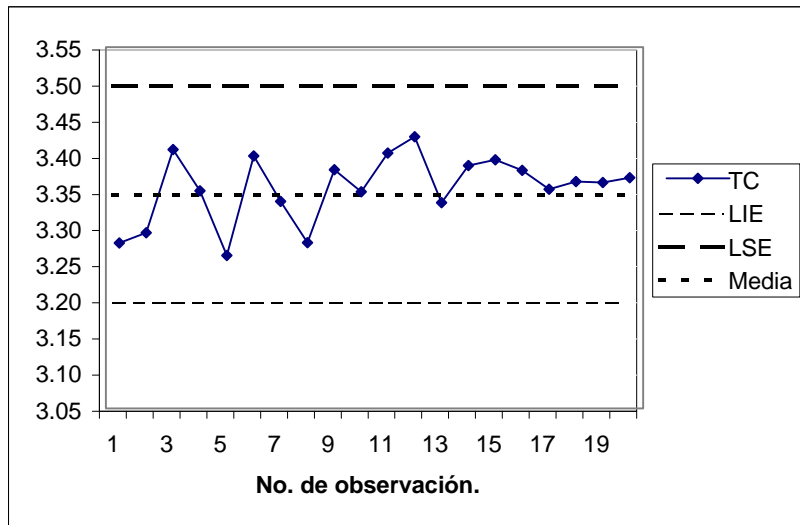


Media	175.09
Desv. std.	4.2416
Especificación Nominal	175.00
LIE	160.00
LSE	190.00
CP	1.179
Cpu	1.172
Cpl	1.186
Cpk	1.172

Material: Hierro gris G2500

Variable: Carbono total (CT)

TC
3.28
3.29
3.41
3.35
3.26
3.40
3.34
3.28
3.38
3.35
3.40
3.43
3.33
3.39
3.39
3.38
3.35
3.36
3.36
3.37

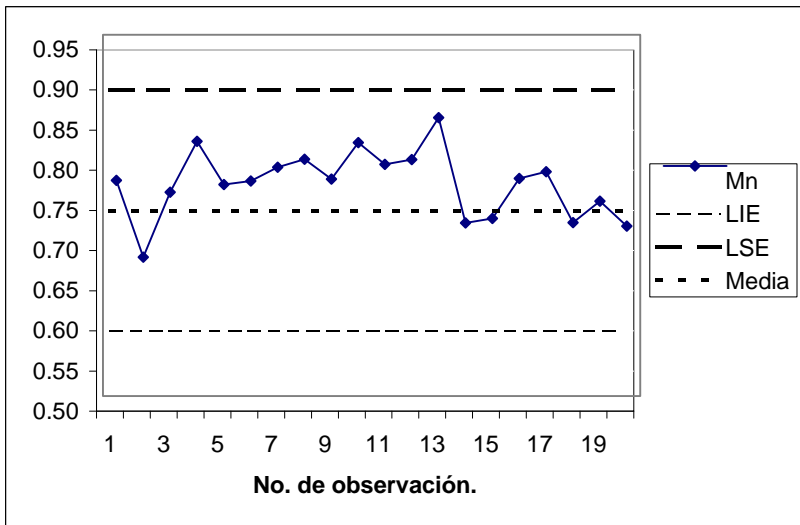


Media	3.36
Desv. std.	0.0465
Especificación Nominal	3.35
LIE	3.20
LSE	3.50
CP	1.076
Cpu	1.035
Cpl	1.116
Cpk	1.035

Material: Hierro gris G2500

Variable: Manganeso (Mn)

Mn
0.77
0.67
0.75
0.82
0.76
0.77
0.78
0.79
0.77
0.82
0.79
0.79
0.85
0.72
0.72
0.77
0.78
0.72
0.74
0.71

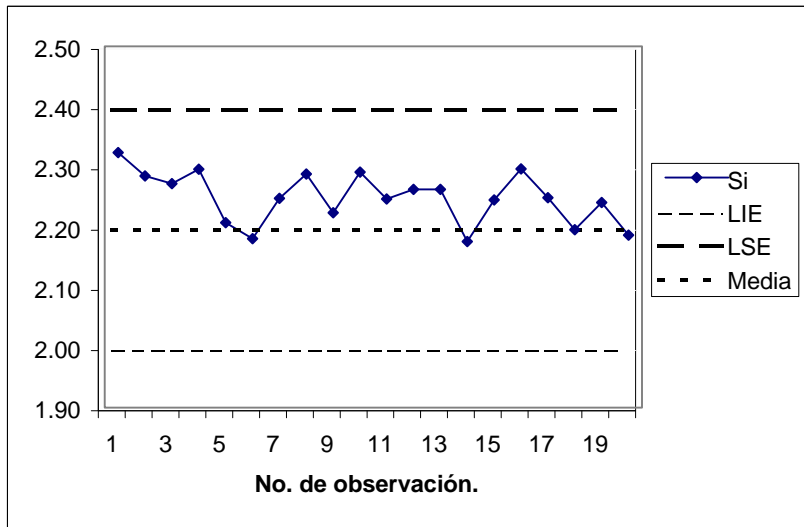


Media	0.76
Desv. std.	0.0421
Especificación Nominal	0.75
LIE	0.60
LSE	0.90
CP	1.188
Cpu	1.070
Cpl	1.306
Cpk	1.070

Material: Hierro gris G2500

Variable: Silicio (Si)

Si
2.32
2.28
2.27
2.30
2.21
2.18
2.25
2.29
2.22
2.29
2.25
2.26
2.26
2.18
2.24
2.30
2.25
2.20
2.24
2.19

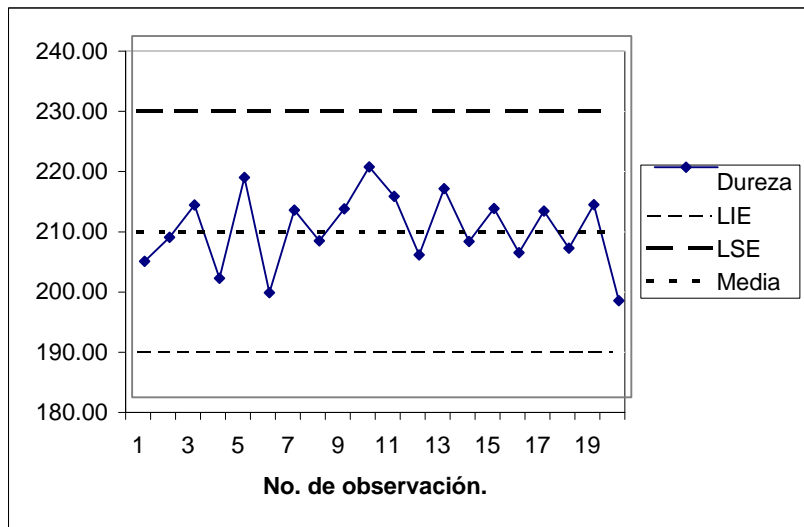


Media	2.25
Desv. std.	0.0427
Especificación Nominal	2.20
LIE	2.00
LSE	2.40
CP	1.560
Cpu	1.180
Cpl	1.939
Cpk	1.180

Material: Hierro gris G2500

Variable: Dureza

Dureza
202.57
206.57
211.93
199.79
216.50
197.35
211.12
205.97
211.29
218.29
213.39
203.64
214.64
205.89
211.37
204.04
210.93
204.77
212.02
196.05

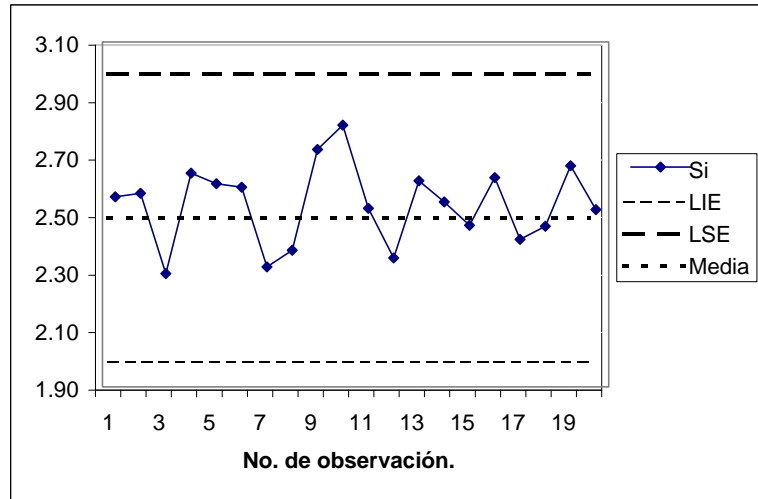


Media	207.90
Desv. std.	6.2068
Especificación Nominal	210.00
LIE	190.00
LSE	230.00
CP	1.074
Cpu	1.187
Cpl	0.962
Cpk	0.962

Material: Aluminio SAE 380

Variable: Silicio (Si)

Si
2.56
2.57
2.29
2.64
2.61
2.60
2.32
2.38
2.73
2.81
2.52
2.35
2.62
2.54
2.46
2.63
2.41
2.46
2.67
2.52

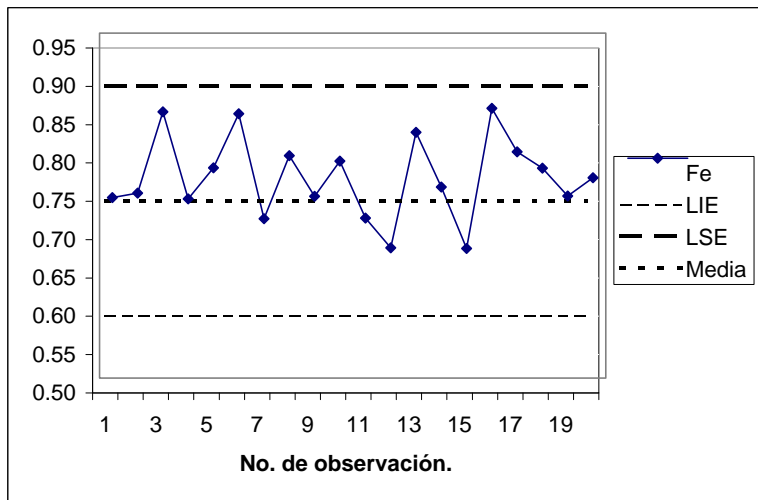


Media	2.53
Desv. std.	0.1377
Especificación Nominal	2.50
LIE	2.00
LSE	3.00
CP	1.210
Cpu	1.127
Cpl	1.293
Cpk	1.127

Material: Aluminio SAE 380

Variable: Hierro (Fe)

Fe
0.74
0.74
0.85
0.73
0.77
0.85
0.71
0.79
0.74
0.78
0.71
0.67
0.82
0.75
0.67
0.85
0.80
0.77
0.74
0.76

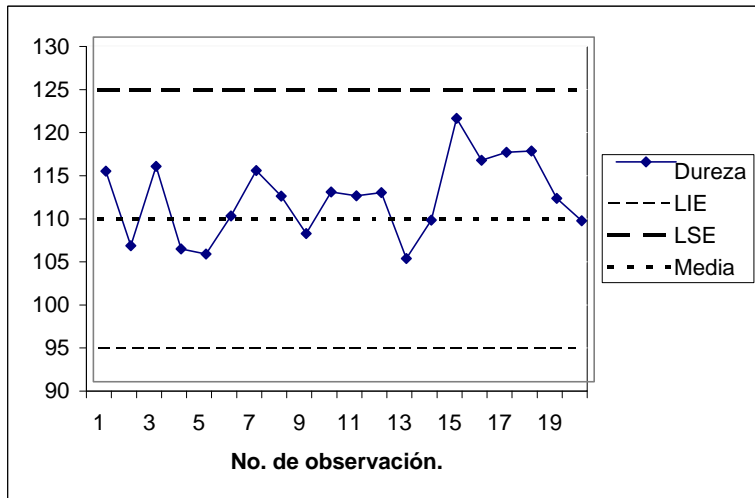


Media	0.76
Desv. std.	0.0536
Especificación Nominal	0.75
LIE	0.60
LSE	0.90
CP	0.934
Cpu	0.861
Cpl	1.006
Cpk	0.861

Material: **Bronce al Aluminio**

Variable: **Dureza**

Dureza
114
106
115
105
105
109
115
112
107
112
112
104
109
121
116
117
117
111
109

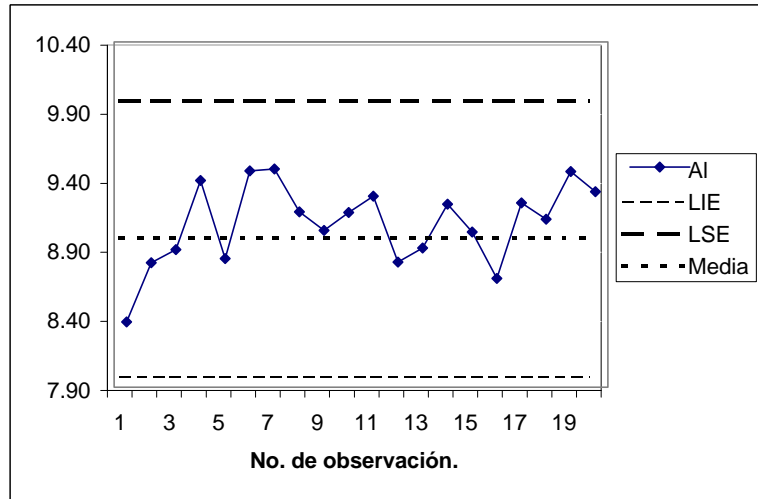


Media	111.31
Desv. std.	4.5205
Especificación Nominal	110.00
LIE	95.00
LSE	125.00
CP	1.106
Cpu	1.010
Cpl	1.202
Cpk	1.010

Material: **Bronce al Aluminio**

Variable: **Aluminio (Al)**

Al
8.37
8.80
8.90
9.40
8.83
9.47
9.48
9.17
9.04
9.17
9.28
8.81
8.91
9.23
9.02
8.69
9.23
9.12
9.46
9.32

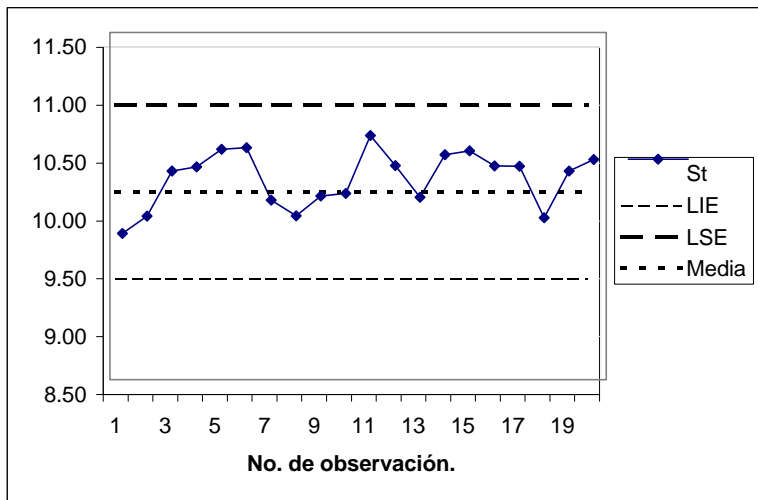


Media	9.08
Desv. std.	0.2947
Especificación Nominal	9.00
LIE	8.00
LSE	10.00
CP	1.131
Cpu	1.036
Cpl	1.226
Cpk	1.036

Material: **Bronce SAE 64**

Variable: **Estañó (St)**

St
9.76
9.91
10.30
10.34
10.49
10.50
10.05
9.91
10.09
10.11
10.61
10.35
10.08
10.44
10.48
10.35
10.34
9.90
10.30
10.40

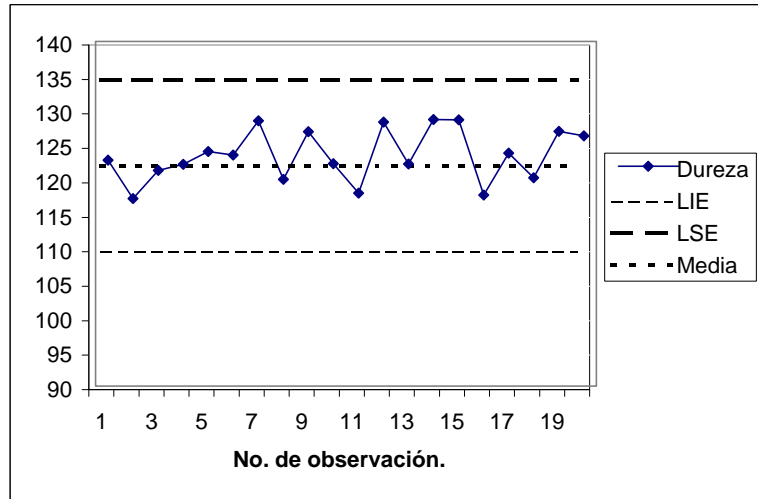


Media	10.24
Desv. std.	0.2410
Especificación Nominal	10.25
LIE	9.50
LSE	11.00
CP	1.037
Cpu	1.056
Cpl	1.018
Cpk	1.018

Material: **Bronce al Aluminio**

Variable: **Dureza**

Dureza
123
117
121
122
124
124
129
120
127
122
118
128
122
129
129
118
124
120
127
126

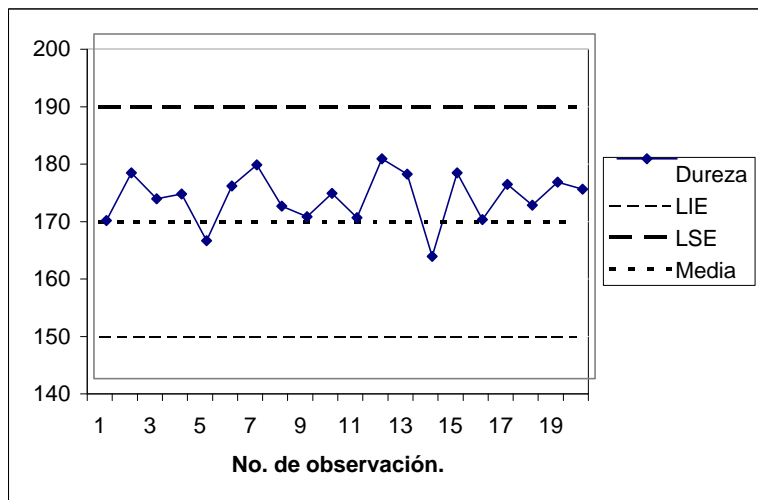


Media	123.47
Desv. std.	3.7720
Especificación Nominal	122.50
LIE	110.00
LSE	135.00
CP	1.105
Cpu	1.019
Cpl	1.191
Cpk	1.019

Material: **Bronce Sae 64**

Variable: **Dureza**

Dureza
168
176
171
172
164
174
177
170
168
172
168
178
176
161
176
168
174
170
174
173

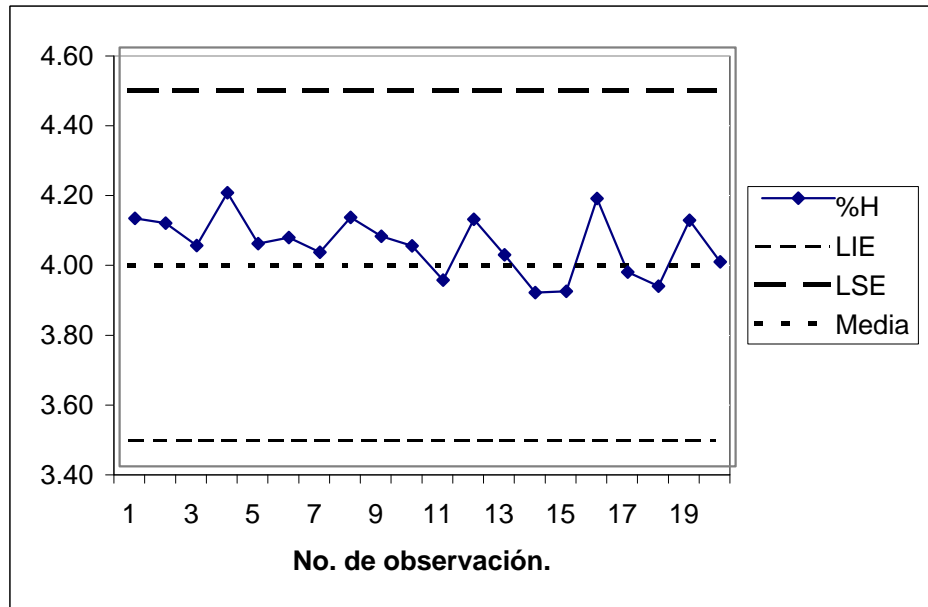


Media	171.49
Desv. std.	4.4145
Especificación Nominal	170.00
LIE	150.00
LSE	190.00
CP	1.510
Cpu	1.397
Cpl	1.623
Cpk	1.397

Material: Arena de careo

Variable: Humedad (H)

%H
4.11
4.10
4.03
4.18
4.04
4.06
4.01
4.11
4.06
4.03
3.93
4.11
4.01
3.90
3.90
4.17
3.96
3.92
4.10
3.99



Media	4.04
Desv. std.	0.0851
Especificación Nominal	4.00
LIE	3.50
LSE	4.50
CP	1.958
Cpu	1.819
Cpl	2.097
Cpk	1.819