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Anexos

Anexo 1: Output do S-Plus para o modelo para a média da espessura do material

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*** Linear Mixed Effects Model ***

Linear mixed-effects model fit by REML
Data: CSNtotal
      AIC      BIC    logLik
-788.679 -746.4616 414.3395

Random effects:
Formula: ~ 1 | Bloco
      (Intercept)      Residual
StdDev: 1.260883e-006 0.0000253777

Variance function:
Structure: Different standard deviations per stratum
Formula: ~ 1 | Bloco
Parameter estimates:
1      2      3      4      5      6      7      8      9
1 1.759516 8.936476 9.928224 10.04949 7.805378 2.618476 2.682286 12.89753

      10      11      12      13      14      15      16
10.4832 41.98625 29.68266 32.90161 28.76416 23.68551 11.17529

Fixed effects: Ym ~ C + D
      Value      Std.Error DF  t-value p-value
(Intercept) 0.2476336 0.00003807525 48 6503.794 <.0001
      C 0.0000466 0.00001246532 13 3.739 0.0025
      D 0.0002348 0.00003785850 13 6.203 <.0001

Correlation:
      (Intr)      C
C -0.130
D -0.945 -0.074

Standardized Within-Group Residuals:
      Min      Q1      Med      Q3      Max
-1.964499 -0.7209435 0.110756 0.6188089 1.90274

Number of Observations: 64
Number of Groups: 16

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Analysis of Variance Table

	numDF	denDF	F-value	p-value
(Intercept)	1	48	639023838	<.0001
C	1	13	18	0.001
D	1	13	38	<.0001

Approximate 95% confidence intervals

Fixed effects:

	lower	est.	upper
(Intercept)	0.24755700263	0.24763355804	0.2477101135
C	0.00001967293	0.00004660262	0.0000735323
D	0.00015303329	0.00023482160	0.0003166099

Random Effects:

Level: Bloco

	lower	est.	upper
sd((Intercept))	1.690748e-025	1.260883e-006	9403090834562

Variance function:

	lower	est.	upper
2	0.3066856	1.759516	10.09469
3	2.0306682	8.936476	39.32726
4	2.2349652	9.928224	44.10343
5	2.1975840	10.049489	45.95603
6	1.6632907	7.805378	36.62855
7	0.4754929	2.618476	14.41960
8	0.5037469	2.682286	14.28229
9	2.6467672	12.897533	62.84888
10	2.2622602	10.483204	48.57866
11	9.5066086	41.986251	185.43366
12	6.3095543	29.682661	139.63908
13	7.4080132	32.901613	146.12772
14	6.3880455	28.764157	129.51954
15	5.2368172	23.685509	107.12677
16	2.3594145	11.175290	52.93140

Within-group standard error:

	lower	est.	upper
	6.715791e-006	0.0000253777	0.00009589753

Anexo 2: Output do S-Plus para o modelo para o ln da variância da espessura do material

*** Linear Mixed Effects Model ***

Linear mixed-effects model fit by REML

Data: CSNtotal

	AIC	BIC	logLik
	194.0022	243.0354	-73.00108

Random effects:

Formula: ~ 1 | Bloco

(Intercept) Residual

StdDev: 0.001425265 0.2943147

Variance function:

Structure: Different standard deviations per stratum

Formula: ~ 1 | Bloco

Parameter estimates:

1	2	3	4	5	6	7	8	9
1	4.106059	0.9612693	3.656268	3.588497	2.687294	2.031961	0.8429605	1.533808

10	11	12	13	14	15	16
3.565266	2.376541	0.4133706	2.964382	4.200671	5.124742	4.137271

Fixed effects: lnYv ~ D + E + AD + BD + A + B

	Value	Std.Error	DF	t-value	p-value
(Intercept)	-14.60499	0.06979241	48	-209.2633	<.0001
D	-0.10782	0.06834414	9	-1.5777	0.1491
E	-0.32931	0.08824760	9	-3.7316	0.0047
AD	-0.40990	0.07731232	9	-5.3019	0.0005
BD	-0.27993	0.08775556	9	-3.1899	0.0110
A	-0.08761	0.08034974	9	-1.0903	0.3039
B	0.09275	0.08565853	9	1.0827	0.3071

Correlation:

	(Intr)	D	E	AD	BD	A
D	-0.286					
E	0.411	-0.366				
AD	-0.163	-0.013	0.147			
BD	-0.241	0.480	-0.396	-0.627		
A	-0.088	-0.107	-0.307	-0.484	0.503	
B	0.196	0.042	-0.339	0.357	-0.261	-0.456

Standardized Within-Group Residuals:

Min	Q1	Med	Q3	Max
-1.871476	-0.755367	0.04460978	0.7489051	1.837547

Number of Observations: 64

Number of Groups: 16

Anexo 3: Teste da homogeneidade de variâncias para os resíduos do modelo para a média da espessura

Test of Homogeneity of Variances

Resíduos_Ym

Levene Statistic	df1	df2	Sig.
,100	15	48	1,000

Anexo 4: Teste da homogeneidade de variâncias para os resíduos do modelo para a variância da espessura

Test of Homogeneity of Variances

Resíduos_Yv

Levene Statistic	df1	df2	Sig.
,153	15	48	1,000

Anexo 5: Representação esquemática da 1ª cadeira do laminador de tiras a frio

