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The Integrated Energy Consumption Index for Energy Biomass Grinding Technology Assessment

Weronika Kruszelnicka *, Robert Kasner, Patrycja Bałdowska-Witos, Józef Flizikowski, Andrzej Tomporowski

Faculty of Mechanical Engineering, University of Science and Technology in Bydgoszcz, Al. Prof. S. Kaliskiego 7, 85-796 Bydgoszcz; robert.kasner@utp.edu.pl (R.K.); patrycja.baldowska-witos@utp.edu.pl (P.B.-W.); fliz@utp.edu.pl (J.F.); a.tomporowski@utp.edu.pl (A.T.)

* Correspondence: weronika.kruszelnicka@utp.edu.pl

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Table S1. The test results of rice grinding's integrated energy consumption and particular components of the model.

RP	Config.	Rice							
		P_R	Q_r	E_j	D_{80}	d_{80}	i_{80}	E_{zint}	$S\Delta\omega$
		kW	kg·h^{-1}	kWh·kg^{-1}	mm	mm	-	-	rad·s^{-1}
I 1	1	1.09	26.1	0.042	2.142	2.035	1.05	605	50
I 2	2	1.43	27.1	0.053	2.153	1.945	1.11	399	100
I 3	3	1.73	29.2	0.059	2.139	1.862	1.15	326	150
I 4	4	2.06	30.6	0.067	2.148	1.748	1.23	272	200
II 1	1	1.62	29.8	0.054	2.150	1.904	1.13	381	200
II 2	2	1.42	28.7	0.049	2.153	1.976	1.09	445	150
II 3	3	1.16	27.2	0.043	2.148	2.008	1.07	590	100
II 4	4	0.88	26.1	0.034	2.163	2.049	1.06	919	50
III 1	1	0.84	25.2	0.033	2.116	2.029	1.04	944	40
III 2	2	1.23	27	0.046	2.123	1.997	1.06	512	85
III 3	3	1.99	28.8	0.069	2.128	1.834	1.16	244	225
III 4	4	2.48	30.5	0.081	2.138	1.635	1.31	197	360
IV 1	1	0.84	30.6	0.027	2.155	2.029	1.06	1417	40
IV 2	2	1.02	29.6	0.035	2.133	1.956	1.09	916	80
IV 3	3	1.21	28.8	0.042	2.146	1.841	1.17	665	120
IV 4	4	1.37	27	0.051	2.134	1.758	1.21	473	160
V 1	1	1.97	26.2	0.075	2.129	1.772	1.2	212	240
V 2	2	2.08	27	0.077	2.147	1.763	1.22	205	280
V 3	3	2.21	27.9	0.079	2.142	1.700	1.26	201	320
V 4	4	2.48	29.9	0.083	2.144	1.635	1.31	190	360

RP—research program; ω_1, ω_2, ω_3, ω_4, and ω_5,—angular speeds of discs, rad·s^{-1}; $S\Delta\omega$—total increase in angular speeds, rad·s^{-1}; P_r—power consumption for grinding, kW; Q_r—grinding yield, kg·h^{-1}; E_j—unit energy consumption, kWh·h^{-1}; i_{80}—80% fragmentation degree; E_{zint}—integrated energy consumption; D_{80}—dimension of the sieve hole through which 80% of the feed material passes; and d_{80}—dimension of the sieve hole through which 80% of the grinding product passes.

Table S2. Test results of the integrated energy consumption for rice grinding and particular components of the model.

RP	Config.	Corn							
		P_R	Q_r	E_j	D_{80}	d_{80}	i_{80}	E_{zint}	$S\Delta\omega$
		kW	kg·h^{-1}	kWh·kg^{-1}	mm	mm	-	-	rad·s^{-1}
I 1	1	1.09	15.2	0.072	8.215	3.59	2.29	446	50
I 2	2	1.51	18.6	0.081	7.832	1.97	4.17	631	100
I 3	3	1.89	19.8	0.096	8.173	1.73	4.76	520	150
I 4	4	2.27	22.8	0.1	8.222	1.80	4.99	503	200
II 1	1	1.86	30.6	0.061	8.104	2.22	4.31	1167	200
II 2	2	1.7	29.7	0.057	8.206	2.13	3.85	1176	150
II 3	3	1.31	28.2	0.046	7.944	2.29	3.69	1712	100
II 4	4	0.97	26.3	0.037	8.145	2.28	3.6	2639	50
III 1	1	0.91	24	0.038	8.223	2.41	3.41	2350	40
III 2	2	1.41	26.4	0.053	8.136	2.24	3.67	1292	85
III 3	3	2.52	29.6	0.085	8.075	2.11	3.9	538	225
III 4	4	3.11	32.4	0.096	8.099	1.85	4.44	483	360
IV 1	1	0.91	24	0.038	8.167	2.41	3.41	2350	40
IV 2	2	1.35	13.2	0.102	8.235	2.21	3.72	356	80
IV 3	3	1.54	7.2	0.214	8.217	1.83	4.08	89	120
IV 4	4	1.81	4.3	0.422	8.210	1.93	4.27	24	160
V 1	1	2.31	5.6	0.412	8.207	1.93	5.11	30	240
V 2	2	2.65	17.2	0.154	8.216	1.76	4.67	196	280
V 3	3	2.7	27	0.1	8.198	1.79	4.59	458	320
V 4	4	3.11	32.4	0.096	8.203	1.85	4.44	483	360

RP—research program; ω_1, ω_2, ω_3, ω_4, and ω_5,—angular speeds of discs, rad·s^{-1}; $S\Delta\omega$—total increase in angular speeds, rad·s^{-1}; P_r—power consumption for grinding, kW; Q_r—grinding yield, kg·h^{-1}; E_j—unit energy consumption, kWh·h^{-1}; i_{80}—80% fragmentation degree; E_{zint}—integrated energy consumption; D_{80}—dimension of the sieve hole through which 80% of the feed material passes; and d_{80}—dimension of the sieve hole through which 80% of the grinding product passes.