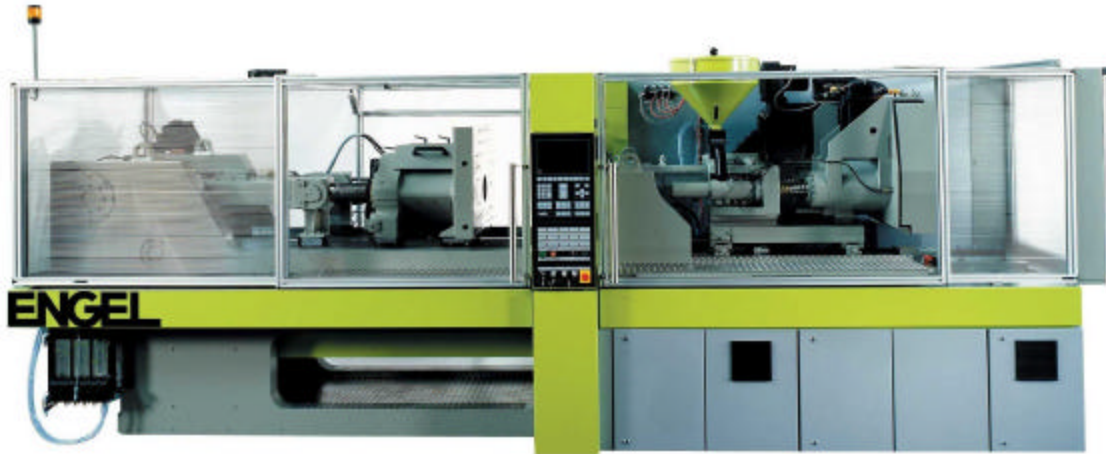


# PLASTICS PRODUCT REVIEW



***-e-motion***

## **ENGEL DOES IT AGAIN**

ENGEL has yet again been awarded a 'Best Buy' in the recently published Plastics Product Review report on injection molding machinery. As the "best machine tested", Engel has again proven itself as a market leader.

PPR writes "Simply put, the best machine we have tested. It was far ahead of its nearest competitor and achieved a first place ranking in over half the categories. It's part weight consistency, energy efficiency, and cavity pressure repeatability were all superior. This combination of factors should make it a no brainer for your machine of choice. It is the Best Buy in this ever-expanding category. This machine earned a composite ranking of 2.18 versus 4.03 for the nearest competitor."

# PLASTICS PRODUCT REVIEW

## TEST RESULTS

### 75-110 Ton Machines (4 cavity automotive part mold)

Specifications:	Battenfeld	Engel	Ferromatik	Krauss Maffei	Meiki	Milacron	Milacron	Netstal	Niigata	Sodick	Sumitomo
Model #	BA 800-315	e-motion 80/60	K85S	KM65-160	M-70C-AS-DM	110i	55i	800 H-230	MD 110S III	75EH	SE 75S
Clamp Tonnage	88	60	93.5	72	70	110	55	88	110	83	83
Maximum Shot Size	4.94 oz.	1.2 oz.	6 oz.	2.4 oz	2.68 oz.	3.42 oz.	1.95 oz.	4.1 oz.	3.47 oz.	2.93 oz.	2.4 oz.
Clamp Type	Hydraulic	Toggle	Hydraulic	Hydraulic	Hydraulic	Toggle	Toggle	Toggle	Toggle	Hybrid	Toggle
Screw Diameter	35 mm	22 mm	40 mm.	30 mm.	28 mm	32 mm	28 mm	32 mm.	35 mm.	28 mm	28 mm.
Injection Pressure	29,835 psi	29,000 psi	32,480 psi	29,363 psi	35,656 psi	28,440 psi	24,174 psi	33,236 psi	31,180 psi	36,395 psi	32,560 psi
Price	\$69,000	\$90,000	\$96,500	\$86,500	\$95,000	N/A	N/A	\$160,000	\$99,000	\$116,000	\$88,000
<b>Viscosity Change Test</b>											
Energy Consumption (kWh)	3.82 (8)	1.58 (1)	5.71 (10)	4.42 (9)	3.54 (7)	1.87 (4)	1.62 (2)	12.20 (11)	1.71 (3)	3.15 (6)	2.20 (5)
<b>Part Weight (grams)</b>											
Average	1.7522	1.7516	1.7766	1.7635	1.7498	1.764	1.7704	1.7678	1.7736	1.7744	1.751
Standard Deviation	0.0101 (5)	0.0093 (1)	0.0102 (6)	0.0121 (10)	0.0094 (2)	0.0106 (9)	0.0102 (6)	0.0105 (8)	0.0096 (3)	0.0123 (11)	0.0097 (4)
St. Dev/Average*100 (C.O.V.)	0.5760 (6)	0.5309 (1)	0.5741 (5)	0.6861 (10)	0.5372 (2)	0.6010 (9)	0.5760 (6)	0.5940 (8)	0.5413 (3)	0.6940 (11)	0.5563 (4)
<b>Fill Time (seconds)</b>											
Average	0.503	0.501	0.51	0.492	0.503	0.504	0.508	0.502	0.500	0.504	0.502
Standard Deviation	0.006 (10)	0.002 (2)	0.004 (2)	0.004 (2)	0.005 (7)	0.005 (7)	0.004 (2)	0.008 (11)	0.000 (1)	0.005 (7)	0.004 (2)
<b>Cavity Pressure (psi)</b>											
Average Coefficient of Variation	5.562 (2)	6.464 (4)	6.798 (5)	8.232 (8)	6.393 (3)	11.388 (9)	12.763 (10)	5.409 (1)	7.349 (6)	7.384 (7)	16.083 (11)
<b>Single Material Test</b>											
<b>Part Weight (grams)</b>											
Average	1.7428	1.7648	1.7852	1.7692	1.7784	1.7716	1.7756	1.7774	1.7742	1.7827	1.7594
Standard Deviation	0.0049 (6)	.0042 (1)	0.0050 (7)	0.0070 (10)	0.0048 (4)	0.0058 (9)	0.0054 (8)	0.0048 (4)	0.0070 (10)	0.0045 (3)	0.0042 (1)
St. Dev/Average*100 (C.O.V.)	0.2810 (7)	0.2380 (1)	0.2800 (6)	0.3950 (11)	0.2699 (4)	0.3270 (9)	0.3040 (8)	0.2701 (5)	0.3945 (10)	0.2520 (3)	0.2411 (2)
<b>Fill Time (seconds)</b>											
Average	0.501	0.502	1.505	0.493	0.502	0.502	0.507	0.508	0.5	0.504	0.503
Standard Deviation	0.006 (10)	.005 (4)	0.005 (4)	0.004 (2)	0.005 (4)	0.005 (4)	0.004 (2)	0.010 (11)	0.000 (1)	0.005 (4)	0.005 (4)
<b>Cavity Pressure (psi)</b>											
Average Coefficient of Variation	2.761 (8)	1.938 (1)	2.150 (4)	2.608 (6)	2.063 (3)	3.031 (9)	3.252 (11)	2.704 (7)	2.376 (5)	1.975 (2)	3.071 (10)
<b>Fill Velocity Linearity</b>											
Average % Difference From Expected Value	3.27 (9)	1.38 (4)	5.21 (11)	1.26 (3)	2.19 (7)	1.52 (5)	1.52 (5)	4.85 (10)	0.92 (2)	3.17 (8)	0.72 (1)
<b>Actual Speed</b>											
Set Point (in./sec.)	4.09	5.10	19.69	6.1	18.42	4.09	4.09	39.37	6.3	19.69	7.87
Actual Speed	3.75	4.69	11.93	5.06	17.15	3.75	3.75	20.82	6.35	14.76	7.42
Difference	0.34	0.41	7.76	1.04	1.27	0.34	0.34	18.55	0.05	4.93	0.45
% Difference	8.00 (4)	8.00 (4)	39.00 (11)	17.00 (8)	6.00 (3)	8.00 (4)	8.00 (4)	37.00 (10)	0.00 (1)	25.00 (9)	5.00 (2)
<b>Composite Average Ranking</b>	6.81 (8)	2.18 (1)	6.45 (6)	7.18 (10)	4.18 (3)	7.09 (9)	5.81 (5)	7.81 (11)	4.09 (2)	6.45 (6)	4.18 (3)