

TABLE E-1 Kinematic Data for the Capitate, Scaphoid, and Lunate at the Representative Wrist Positions Rendered in Figure 4\*

Figure (Wrist Position)	Wrist Position† (deg)	Carpal Bone‡	$\phi$ (deg)	Nx	<th>Nz</th> <th>T (mm)</th> <th>Qx (mm)</th> <th>Qz (mm)</th>	Nz	T (mm)	Qx (mm)	Qz (mm)
4, A (Flexion)	55, -1	C <sub>F</sub>	45.8	0.35	0.93	0.14	-0.1	-8.7	0.9
		S <sub>F</sub>	33.2	0.26	0.96	0.14	0.1	-7.5	-0.8
		L <sub>F</sub>	20.7	0.17	0.90	0.40	0.8	-4.9	3.8
4, A (Extension)	-49, 1	C <sub>E</sub>	48.8	-0.12	-0.99	0.04	-1.1	-10.2	-2.5
		S <sub>E</sub>	40.5	-0.22	-0.98	0.02	-1.4	-7.9	-1.9
		L <sub>E</sub>	26.6	-0.25	-0.94	0.22	-0.7	-7.5	-2.2
4, B (Ulnar deviation)	-2, 30	C <sub>U</sub>	38.5	-0.04	-0.01	1.00	-3.5	-1.3	-372.4
		S <sub>U</sub>	31.3	-0.08	-0.93	0.35	-1.7	-9.2	-2.9
		L <sub>U</sub>	31.3	-0.25	-0.87	0.43	-1.4	-6.9	-6.4
4, B (Radial deviation)	2, -16	C <sub>R</sub>	16.6	0.48	-0.06	-0.88	-1.6	-20.8	17.7
		S <sub>R</sub>	11.3	0.42	0.86	-0.28	-0.5	-8.5	0.8
		L <sub>R</sub>	10.0	0.39	0.89	-0.23	-0.2	-5.8	-0.2
4, C (Ulnar flexion)	20, 18	C <sub>UF</sub>	26.0	-0.05	0.61	0.79	-0.3	-12.6	5.3
		S <sub>UF</sub>	3.9	-0.34	-0.46	0.82	-0.2	-8.3	-3.5
		L <sub>UF</sub>	11.9	-0.42	-0.77	0.48	0.3	-3.5	-2.3
4, C (Radial extension)	-24, -14	C <sub>RE</sub>	21.8	0.50	-0.37	-0.78	-1.5	-16.4	1.5
		S <sub>RE</sub>	8.2	0.87	0.25	-0.43	-0.7	-3.2	1.5
		L <sub>RE</sub>	8.7	0.58	0.81	-0.10	-0.2	1.5	-0.3
4, D (Radial flexion)	16, -10	C <sub>RF</sub>	32.0	0.41	0.87	-0.26	-1.9	-8.4	-1.3
		S <sub>RF</sub>	34.6	0.31	0.95	0.00	-0.3	-7.9	-0.5
		L <sub>RF</sub>	26.7	0.23	0.97	0.09	-0.4	-5.8	0.7
4, D (Ulnar extension)	-19, 7	C <sub>UE</sub>	31.7	-0.27	-0.67	0.70	-2.5	-10.7	-2.9
		S <sub>UE</sub>	34.8	-0.20	-0.96	0.20	-1.5	-9.0	-1.4
		L <sub>UE</sub>	26.0	-0.25	-0.93	0.26	-1.2	-6.8	-2.0

\* The helical axis-of-motion variables describing the kinematics are the rotation angle ( $\phi$ ) about and translation (T) along the rotation axis. The orientation of the rotation axis is described by its directional components (Nx, Ny, Nz), and its location is described by its point of intersection with the x-z plane (Qx, Qz), with respect to the coordinate system defined in Figure 1. †The first value indicates the position of flexion (positive values) or extension (negative values), and the second value indicates the position of ulnar deviation (positive values) or radial deviation (negative values). ‡C = capitate, S = scaphoid, L = lunate, F = flexion, E = extension, U = ulnar deviation, R = radial deviation, UF = ulnar flexion, RE = radial extension, RF = radial flexion, and UE = ulnar extension.