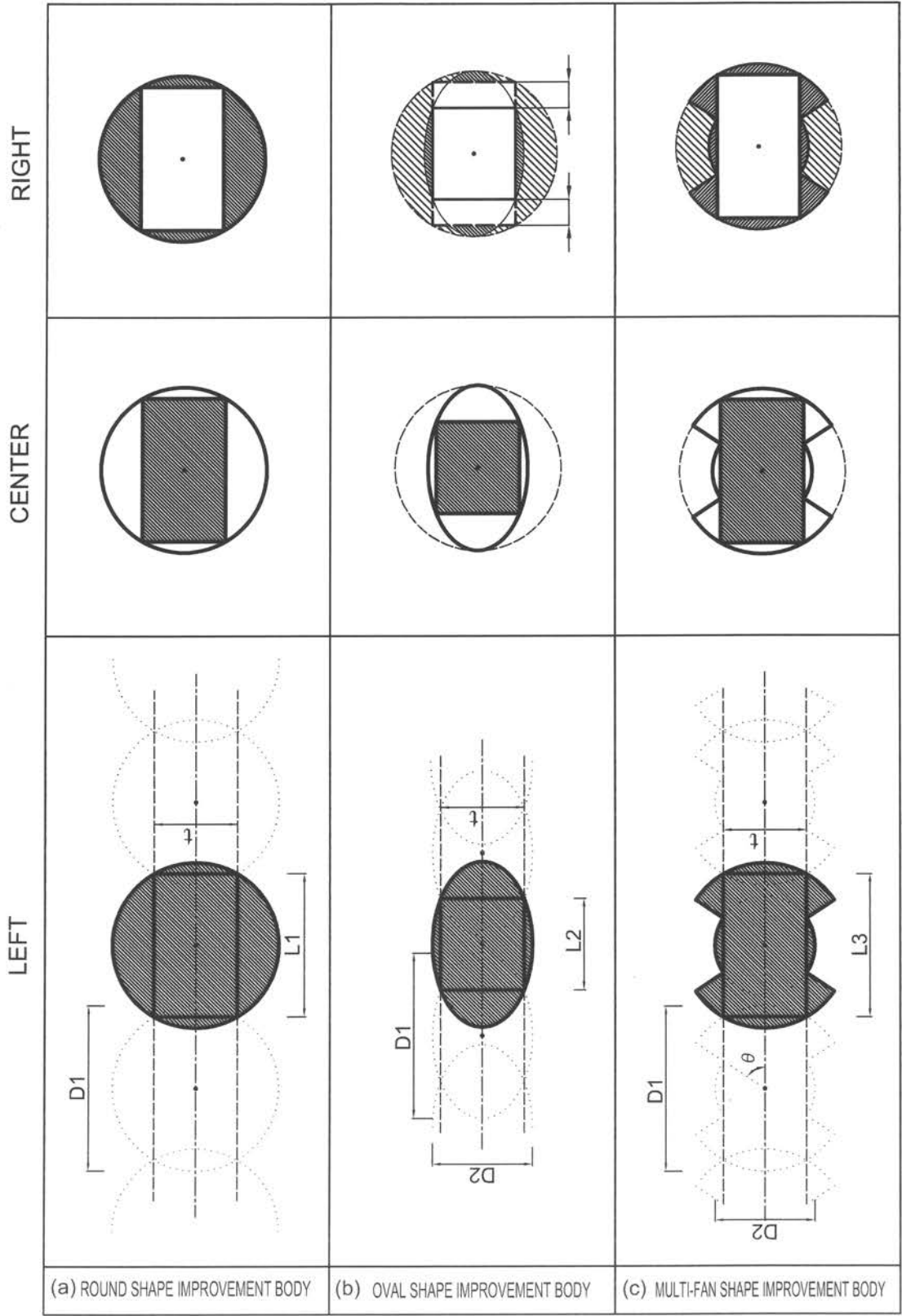
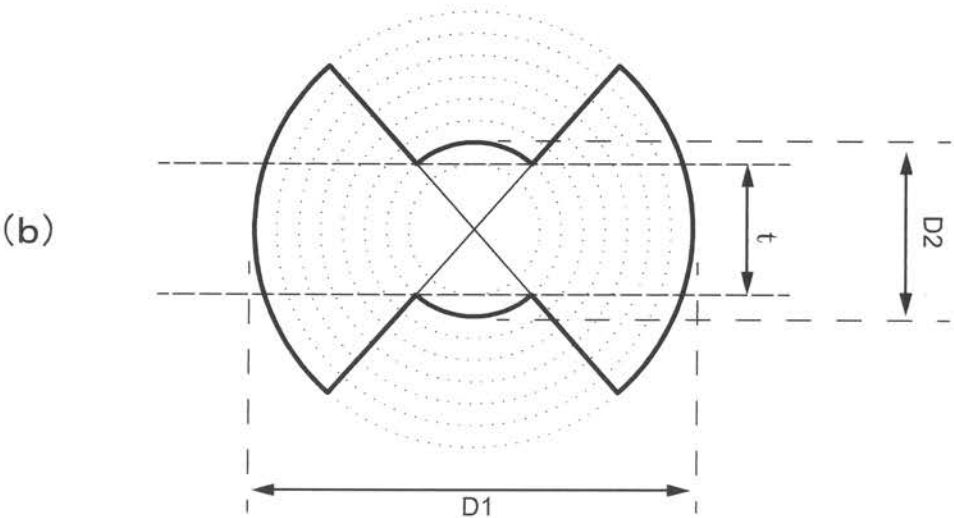
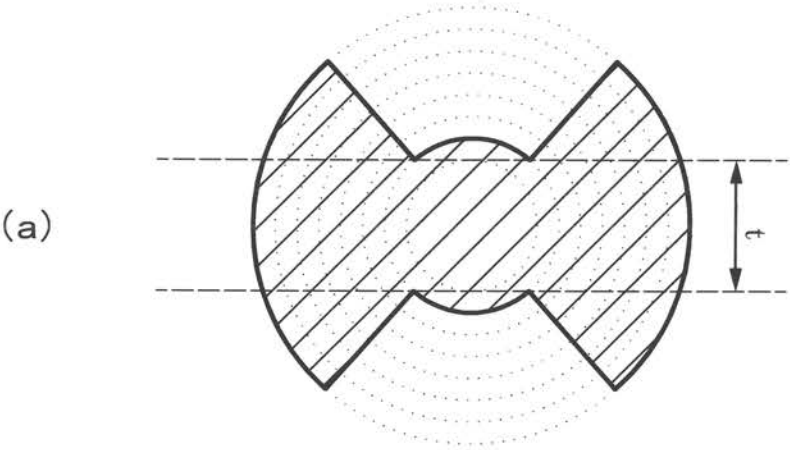


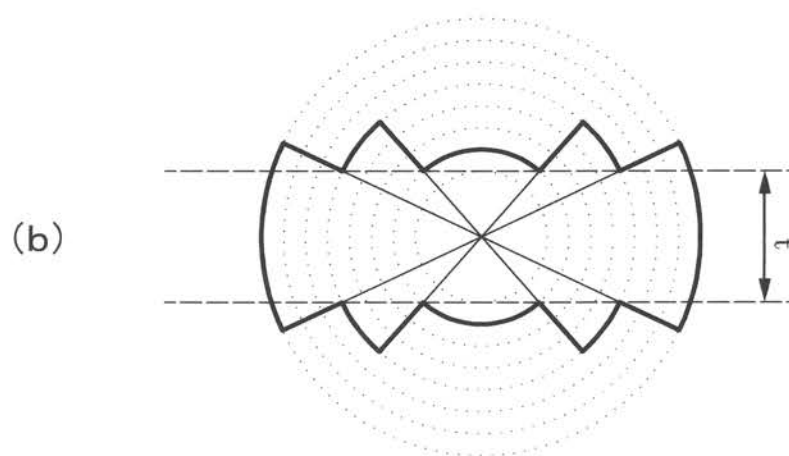
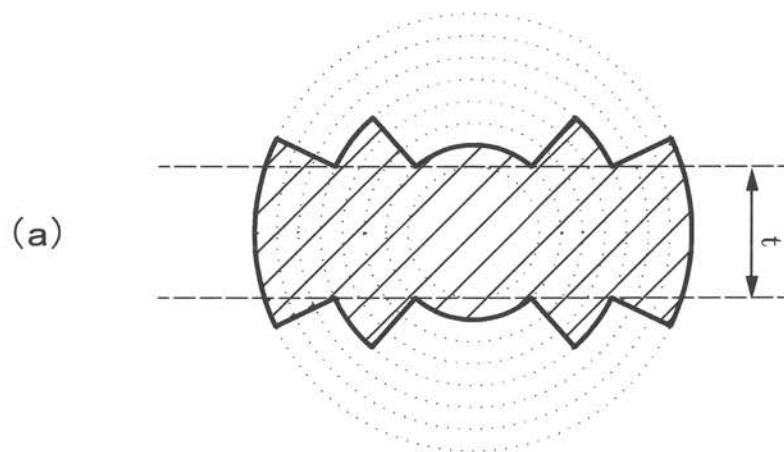
[FIG. 1]



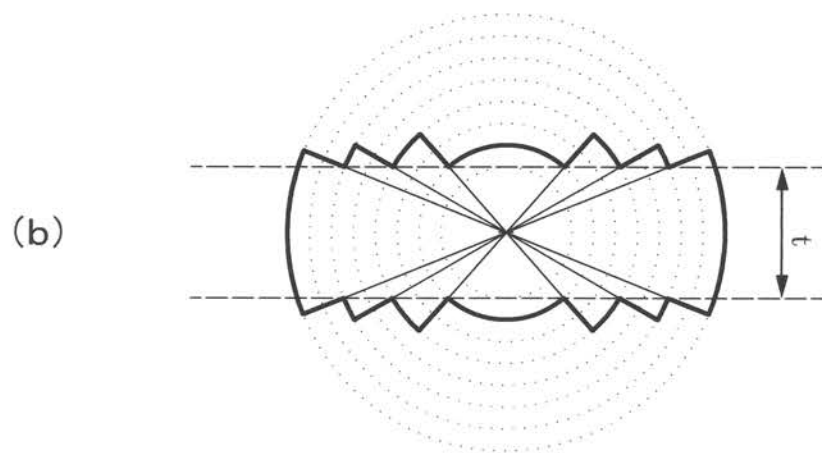
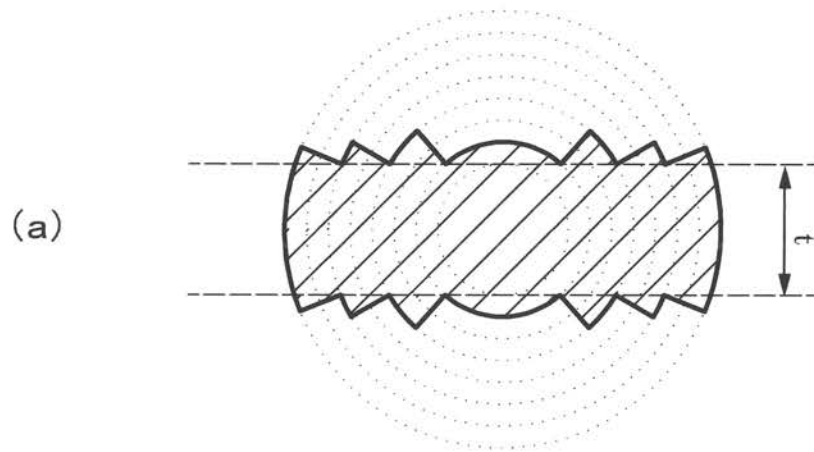
[FIG. 2]



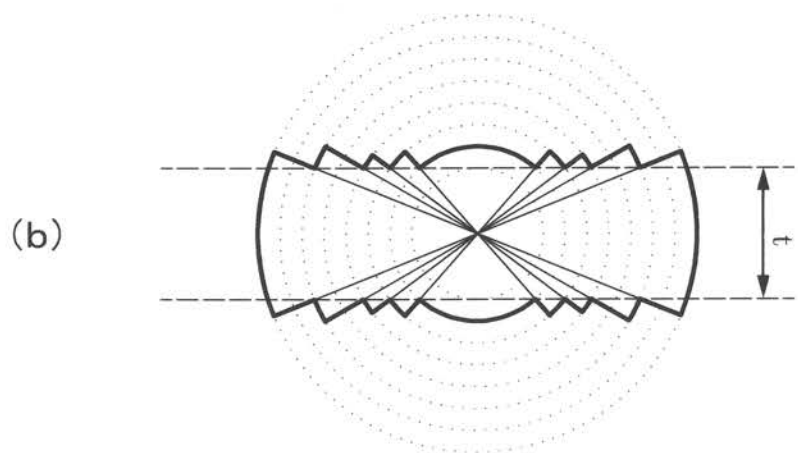
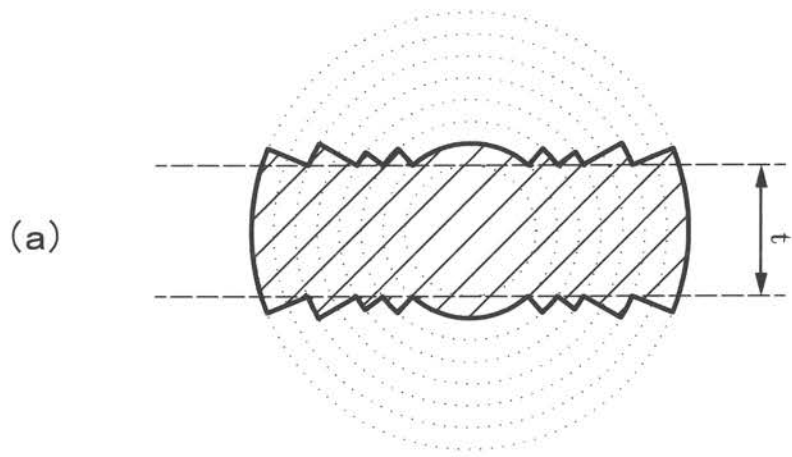
[FIG. 3]



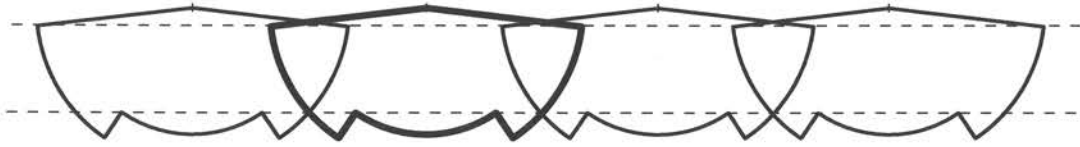
[FIG. 4]



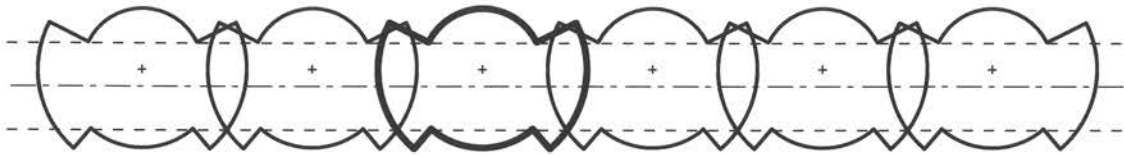
[FIG. 5]



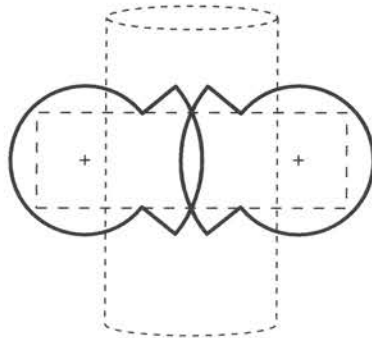
[FIG. 6]



- (a) Improvement bodies in a case where the jet grouting cannot be carried out from the top of a wall portion with an effective wall thickness.

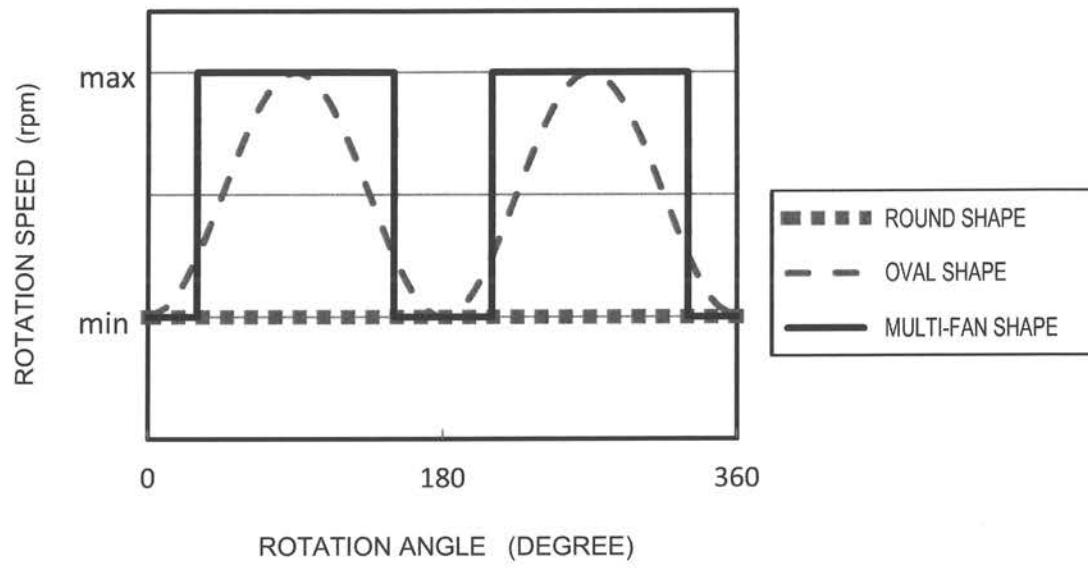


- (b) Improvement bodies in a case where the jet grouting cannot be carried out along with the center line of a wall portion with an effective wall thickness.

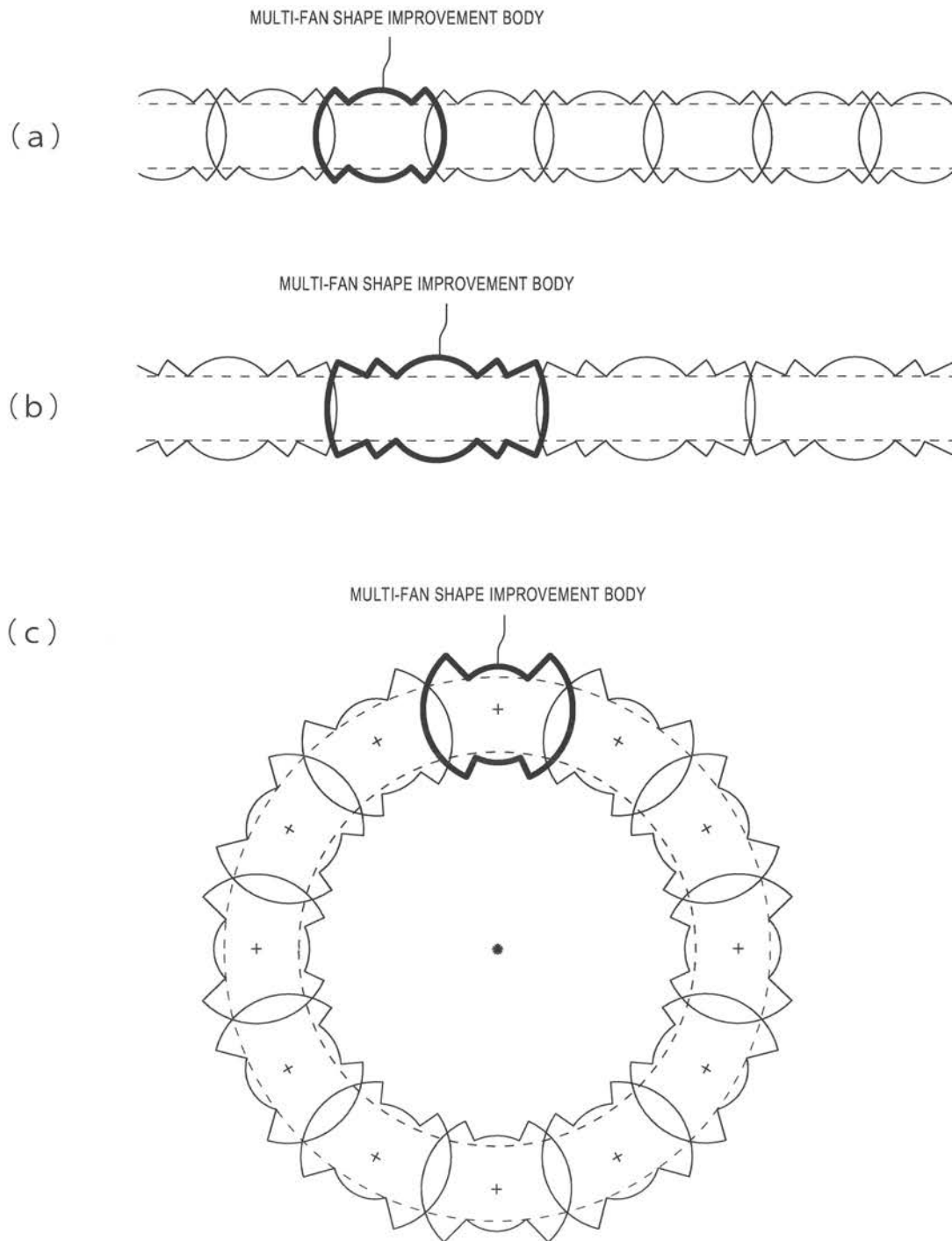


- (c) Improvement bodies in a case where an underground pipe or the like is present.

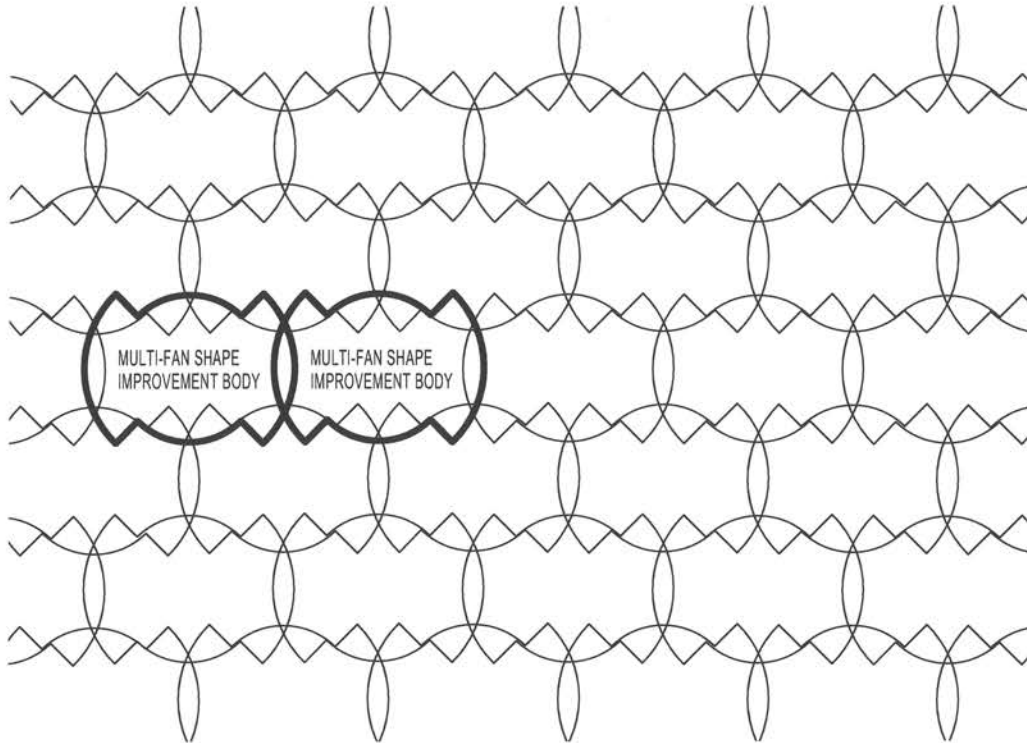
[FIG. 7]



[FIG. 8]



[FIG. 9]



[FIG. 11]

COMPARATIVE EXAMPLE 1 / ROUND SHAPE IMPROVEMENT BODY

*C.I.C.: COLUMN-IN-COLUMN

The c.i.c. risk becomes higher as value becomes closer to 0,
and the c.i.c. occurs with negative value.

SECTIONAL SHAPE	LARGE DIAMETER D1	SMALL DIAMETER COEFFICIENT b	SMALL DIAMETER D2=b·D1	WALL THICKNESS COEFFICIENT a	PITCH L	PITCH RATIO L/D1	SECTIONAL AREA OF IMPROVEMENT BODIES	Ajg	Aw	Ajg/Aw	EFFECTIVE SECTIONAL AREA OF BODY	REDUNDANT AMOUNT	REDUNDANT RATIO (Ajg-Aw)/Aw	C.I.C. * D1/2-L
ROUND 1.000	—	—	—	0.100	0.995	0.995	1.000	0.785	0.099	7.894	0.686	6.894	0.495	
ROUND 1.000	—	—	—	0.150	0.989	0.989	1.000	0.785	0.148	5.296	0.637	4.296	0.489	
ROUND 1.000	—	—	—	0.200	0.980	0.980	1.000	0.785	0.196	4.008	0.589	3.008	0.480	
ROUND 1.000	—	—	—	0.300	0.954	0.954	1.000	0.785	0.286	2.744	0.499	1.744	0.454	
ROUND 1.000	—	—	—	0.400	0.917	0.917	1.000	0.785	0.367	2.142	0.419	1.142	0.417	
ROUND 1.000	—	—	—	0.500	0.866	0.866	1.000	0.785	0.433	1.814	0.352	0.814	0.366	
ROUND 1.000	—	—	—	0.600	0.800	0.800	1.000	0.785	0.480	1.636	0.305	0.636	0.300	
ROUND 1.000	—	—	—	0.700	0.714	0.714	1.000	0.785	0.500	1.571	0.285	0.571	0.214	
ROUND 1.000	—	—	—	0.800	0.600	0.600	1.000	0.785	0.480	1.636	0.305	0.636	0.100	

[FIG. 12]

COMPARATIVE EXAMPLE 2 / OVAL SHAPE IMPROVEMENT BODY

*C.I.C.: COLUMN-IN-COLUMN

The c.i.c. risk becomes higher as value becomes closer to 0,
and the c.i.c. occurs with negative value.

SECTIONAL SHAPE	LARGE DIAMETER D1	SMALL DIAMETER D2=b·D1	WALL THICKNESS t=a·D1	PITCH L	PITCH RATIO L/D1	SECTIONAL AREA OF IMPROVEMENT BODIES	EFFECTIVE SECTIONAL AREA OF BODY	REDAUNDANT AMOUNT	REDAUNDANT RATIO (A _{lg} -A _w)/A _w	A _{lg} /A _w	a/b	b/a
OVAL(0.8)	1.000	0.800	0.100	0.992	1.003	0.628	0.099	6.333	0.529	5.333	0.492	0.125
OVAL(0.8)	1.000	0.800	0.150	0.982	1.007	0.628	0.147	4.264	0.481	3.264	0.482	0.188
OVAL(0.8)	1.000	0.800	0.200	0.968	1.012	0.628	0.194	3.245	0.435	2.245	0.468	0.250
OVAL(0.8)	1.000	0.800	0.300	0.927	1.029	0.628	0.278	2.259	0.350	1.259	0.427	0.375
OVAL(0.8)	1.000	0.800	0.400	0.866	1.058	0.628	0.346	1.814	0.282	0.814	0.366	0.500
OVAL(0.8)	1.000	0.800	0.500	0.781	1.109	0.628	0.390	1.610	0.238	0.610	0.281	0.625
OVAL(0.8)	1.000	0.800	0.600	0.661	1.209	0.628	0.397	1.583	0.231	0.583	0.161	0.750
OVAL(0.8)	1.000	0.800	0.700	0.484	1.475	0.628	0.339	1.854	0.289	-0.016	0.875	1.143
OVAL(0.6)	1.000	0.600	0.100	0.986	1.009	0.471	0.099	4.779	0.373	3.779	0.486	0.167
OVAL(0.6)	1.000	0.600	0.150	0.968	1.021	0.471	0.145	3.245	0.326	2.245	0.468	0.250
OVAL(0.6)	1.000	0.600	0.200	0.943	1.039	0.471	0.189	2.499	0.283	1.499	0.443	0.333
OVAL(0.6)	1.000	0.600	0.300	0.866	1.102	0.471	0.260	1.814	0.211	0.814	0.366	0.500
OVAL(0.6)	1.000	0.600	0.400	0.745	1.230	0.471	0.298	1.581	0.173	0.581	0.245	0.667
OVAL(0.6)	1.000	0.600	0.500	0.553	1.567	0.471	0.276	1.705	0.195	0.705	0.053	0.833
OVAL(0.4)	1.000	0.400	0.100	0.968	1.028	0.314	0.097	3.245	0.217	2.245	0.468	0.250
OVAL(0.4)	1.000	0.400	0.150	0.927	1.067	0.314	0.139	2.259	0.175	1.259	0.427	0.375
OVAL(0.4)	1.000	0.400	0.200	0.866	1.131	0.314	0.173	1.814	0.141	0.814	0.366	0.500
OVAL(0.4)	1.000	0.400	0.300	0.661	1.442	0.314	0.198	1.583	0.116	0.583	0.161	0.750
OVAL(0.3)	1.000	0.300	0.100	0.943	1.055	0.236	0.094	2.499	0.141	1.499	0.443	0.333
OVAL(0.3)	1.000	0.300	0.150	0.866	1.142	0.236	0.130	1.814	0.106	0.814	0.366	0.500
OVAL(0.3)	1.000	0.300	0.200	0.745	1.315	0.236	0.149	1.581	0.087	0.581	0.245	0.667
OVAL(0.2)	1.000	0.200	0.100	0.866	1.149	0.157	0.087	1.814	0.070	0.814	0.366	0.500
OVAL(0.2)	1.000	0.200	0.150	0.661	1.495	0.157	0.099	1.583	0.058	0.583	0.161	0.750

EXAMPLE / MULTI-FAN SHAPE IMPROVEMENT BODY

[FIG. 13A]

*C.I.C.: COLUMN-IN-COLUMN

The c.i.c. risk becomes higher as value becomes closer to 0,
and the c.i.c. occurs with negative value.

SECTIONAL SHAPE	LARGE DIAMETER D1	SMALL DIAMETER D2=b•D1	WALL THICKNESS t=a•D1	PITCH L	PITCH RATIO L/D1	SECTIONAL AREA OF IMPROVEMENT BODIES	REUNDANT AMOUNT	REUNDANT RATIO (A _{lg} -A _w)/A _w	A _{lg} /A _w	C.I.C. * D1/2-L	a/b	b/a		
MULTI-FAN (0.8)	1.000	0.800	0.100	0.995	0.995	1.000	0.525	0.099	5.279	0.426	4.279	0.495	0.125	8.000
MULTI-FAN (0.8)	1.000	0.800	0.150	0.989	0.989	1.000	0.537	0.148	3.618	0.388	2.618	0.489	0.188	5.333
MULTI-FAN (0.8)	1.000	0.800	0.200	0.980	0.980	1.000	0.548	0.196	2.797	0.352	1.797	0.480	0.250	4.000
MULTI-FAN (0.8)	1.000	0.800	0.300	0.954	0.954	1.000	0.572	0.286	1.998	0.286	0.998	0.454	0.375	2.667
MULTI-FAN (0.8)	1.000	0.800	0.400	0.917	0.917	1.000	0.597	0.367	1.628	0.230	0.628	0.417	0.500	2.000
MULTI-FAN (0.8)	1.000	0.800	0.500	0.866	0.866	1.000	0.624	0.433	1.441	0.191	0.441	0.366	0.625	1.600
MULTI-FAN (0.8)	1.000	0.800	0.600	0.800	0.800	1.000	0.655	0.480	1.365	0.175	0.365	0.300	0.750	1.333
MULTI-FAN (0.8)	1.000	0.800	0.700	0.714	0.714	1.000	0.694	0.500	1.389	0.195	0.389	0.214	0.875	1.143
MULTI-FAN (0.6)	1.000	0.600	0.100	0.995	0.995	1.000	0.336	0.099	3.380	0.237	2.380	0.495	0.167	6.000
MULTI-FAN (0.6)	1.000	0.600	0.150	0.989	0.989	1.000	0.364	0.148	2.452	0.215	1.452	0.489	0.250	4.000
MULTI-FAN (0.6)	1.000	0.600	0.200	0.980	0.980	1.000	0.391	0.196	1.998	0.196	0.998	0.480	0.333	3.000
MULTI-FAN (0.6)	1.000	0.600	0.300	0.954	0.954	1.000	0.450	0.286	1.573	0.164	0.573	0.454	0.500	2.000
MULTI-FAN (0.6)	1.000	0.600	0.400	0.917	0.917	1.000	0.516	0.367	1.408	0.150	0.408	0.417	0.667	1.500
MULTI-FAN (0.6)	1.000	0.600	0.500	0.866	0.866	1.000	0.598	0.433	1.381	0.165	0.381	0.366	0.833	1.200
MULTI-FAN (0.4)	1.000	0.400	0.100	0.995	0.995	1.000	0.232	0.099	2.330	0.132	1.330	0.495	0.250	4.000
MULTI-FAN (0.4)	1.000	0.400	0.150	0.989	0.989	1.000	0.287	0.148	1.936	0.139	0.936	0.489	0.375	2.667
MULTI-FAN (0.4)	1.000	0.400	0.200	0.980	0.980	1.000	0.346	0.196	1.764	0.150	0.764	0.480	0.500	2.000
MULTI-FAN (0.4)	1.000	0.400	0.300	0.954	0.954	1.000	0.482	0.286	1.684	0.196	0.684	0.454	0.750	1.333
MULTI-FAN (0.3)	1.000	0.300	0.100	0.995	0.995	1.000	0.225	0.099	2.264	0.126	1.264	0.495	0.333	3.000
MULTI-FAN (0.3)	1.000	0.300	0.150	0.989	0.989	1.000	0.309	0.148	2.083	0.161	1.083	0.489	0.500	2.000
MULTI-FAN (0.3)	1.000	0.300	0.200	0.980	0.980	1.000	0.403	0.196	2.055	0.207	1.055	0.480	0.667	1.500
MULTI-FAN (0.2)	1.000	0.200	0.100	0.995	0.995	1.000	0.283	0.099	2.842	0.183	1.842	0.495	0.500	2.000
MULTI-FAN (0.2)	1.000	0.200	0.150	0.989	0.989	1.006	0.438	0.148	2.957	0.290	1.957	0.489	0.750	1.333

that occurs when the value becomes closer to 0, and the c.i.c. occurs with negative value.

[FIG. 13B]

EXAMPLE / MULTI-FAN SHAPE IMPROVEMENT BODY

**RATE OF REDUNDANT RATIO:

Redundant ratio of a multi-fan shaped improvement body with respect to redundant ratio of a round shaped improvement body.

*C.I.C.: COLUMN-IN-COLUMN

The c.i.c. risk becomes higher as value becomes closer to 0, and the c.i.c. occurs with negative value.

SECTIONAL SHAPE	LARGE DIAMETER D1	SMALL DIAMETER D2=b•D1	WALL THICKNESS COEFFICIENT a	PITCH L	PITCH RATIO L/D1	SECTIONAL AREA OF IMPROVEMENT BODIES	EFFECTIVE SECTIONAL AREA OF BODY	REDUNDANT AMOUNT	C.I.C. * D1/2-L	REDUNDANT RATIO	REDUNDANT RATIO **	a/b	b/a	b/2	
MULTI-FAN (a=0.1)	1.000	0.100	0.100	0.995	0.995	1.000	0.785	0.099	7.894	0.686	6.894	1.000	0.495	1.000	0.010
MULTI-FAN (a=0.1)	1.000	0.200	0.100	0.995	0.995	1.000	0.283	0.099	2.842	0.183	1.842	0.267	0.495	0.500	0.040
MULTI-FAN (a=0.1)	1.000	0.300	0.100	0.995	0.995	1.000	0.225	0.099	2.264	0.126	1.264	0.183	0.495	0.333	0.090
MULTI-FAN (a=0.1)	1.000	0.400	0.100	0.995	0.995	1.000	0.232	0.099	2.330	0.132	1.330	0.193	0.495	0.250	0.160
MULTI-FAN (a=0.1)	1.000	0.500	0.100	0.995	0.995	1.000	0.272	0.099	2.732	0.172	1.732	0.251	0.495	0.200	0.250
MULTI-FAN (a=0.1)	1.000	0.600	0.100	0.995	0.995	1.000	0.336	0.099	3.380	0.237	2.380	0.345	0.495	0.167	0.360
MULTI-FAN (a=0.1)	1.000	0.700	0.100	0.995	0.995	1.000	0.421	0.099	4.235	0.322	3.235	0.469	0.495	0.143	0.490
MULTI-FAN (a=0.1)	1.000	0.800	0.100	0.995	0.995	1.000	0.525	0.099	5.279	0.426	4.279	0.621	0.495	0.125	0.640
MULTI-FAN (a=0.1)	1.000	0.900	0.100	0.995	0.995	1.000	0.647	0.099	6.500	0.547	5.500	0.798	0.495	0.111	0.810
MULTI-FAN (a=0.2)	1.000	0.200	0.200	0.980	0.980	1.000	0.785	0.196	4.008	0.589	3.008	1.000	0.480	1.000	0.040
MULTI-FAN (a=0.2)	1.000	0.300	0.200	0.980	0.980	1.000	0.403	0.196	2.055	0.207	1.055	0.351	0.480	0.667	0.090
MULTI-FAN (a=0.2)	1.000	0.400	0.200	0.980	0.980	1.000	0.346	0.196	1.764	0.150	0.764	0.254	0.480	0.500	0.160
MULTI-FAN (a=0.2)	1.000	0.500	0.200	0.980	0.980	1.000	0.351	0.196	1.789	0.155	0.789	0.262	0.480	0.400	0.250
MULTI-FAN (a=0.2)	1.000	0.600	0.200	0.980	0.980	1.000	0.391	0.196	1.998	0.196	0.998	0.332	0.480	0.333	0.360
MULTI-FAN (a=0.2)	1.000	0.700	0.200	0.980	0.980	1.000	0.459	0.196	2.341	0.263	1.341	0.446	0.480	0.286	0.490
MULTI-FAN (a=0.2)	1.000	0.800	0.200	0.980	0.980	1.000	0.548	0.196	2.797	0.352	1.797	0.597	0.480	0.250	0.640
MULTI-FAN (a=0.2)	1.000	0.900	0.200	0.980	0.980	1.000	0.657	0.196	3.355	0.462	2.355	0.783	0.480	0.222	0.810
MULTI-FAN (a=0.3)	1.000	0.300	0.300	0.954	0.954	1.000	0.785	0.286	2.744	0.499	1.744	1.000	0.454	1.000	0.090
MULTI-FAN (a=0.3)	1.000	0.400	0.300	0.954	0.954	1.000	0.482	0.286	1.684	0.196	0.684	0.392	0.454	0.750	0.160
MULTI-FAN (a=0.3)	1.000	0.500	0.300	0.954	0.954	1.000	0.438	0.286	1.529	0.151	0.529	0.303	0.454	0.600	0.250
MULTI-FAN (a=0.3)	1.000	0.600	0.300	0.954	0.954	1.000	0.450	0.286	1.573	0.164	0.573	0.329	0.454	0.500	0.360
MULTI-FAN (a=0.3)	1.000	0.700	0.300	0.954	0.954	1.000	0.498	0.286	1.739	0.212	0.739	0.424	0.454	0.429	0.330
MULTI-FAN (a=0.3)	1.000	0.800	0.300	0.954	0.954	1.000	0.572	0.286	1.998	0.286	0.998	0.572	0.454	0.375	0.640
MULTI-FAN (a=0.3)	1.000	0.900	0.300	0.954	0.954	1.000	0.668	0.286	2.336	0.382	1.336	0.766	0.454	0.333	0.810

EXAMPLE / MULTI-FAN SHAPE IMPROVEMENT BODY

[FIG. 13C]

**RATE OF REDUNDANT RATIO:

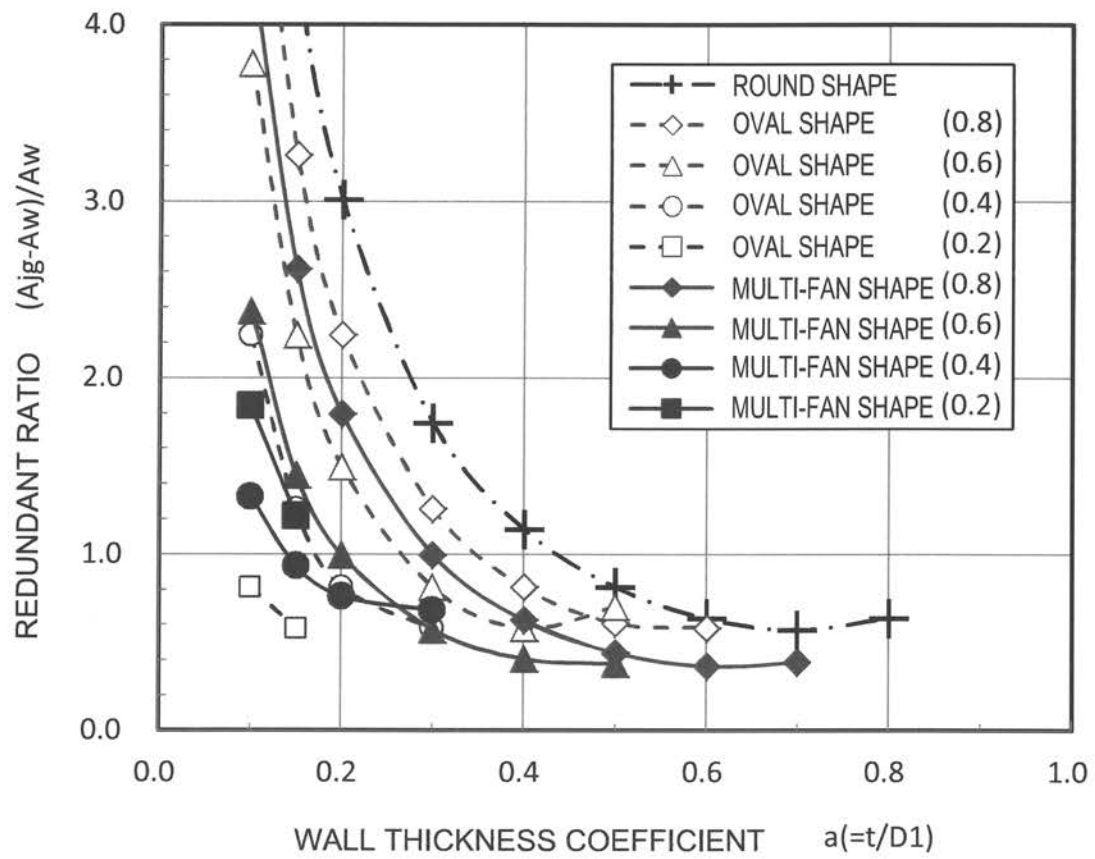
Redundant ratio of a multi-fan shaped improvement body with respect to redundant ratio of a round shaped improvement body.

*C.I.C.: COLUMN-IN-COLUMN

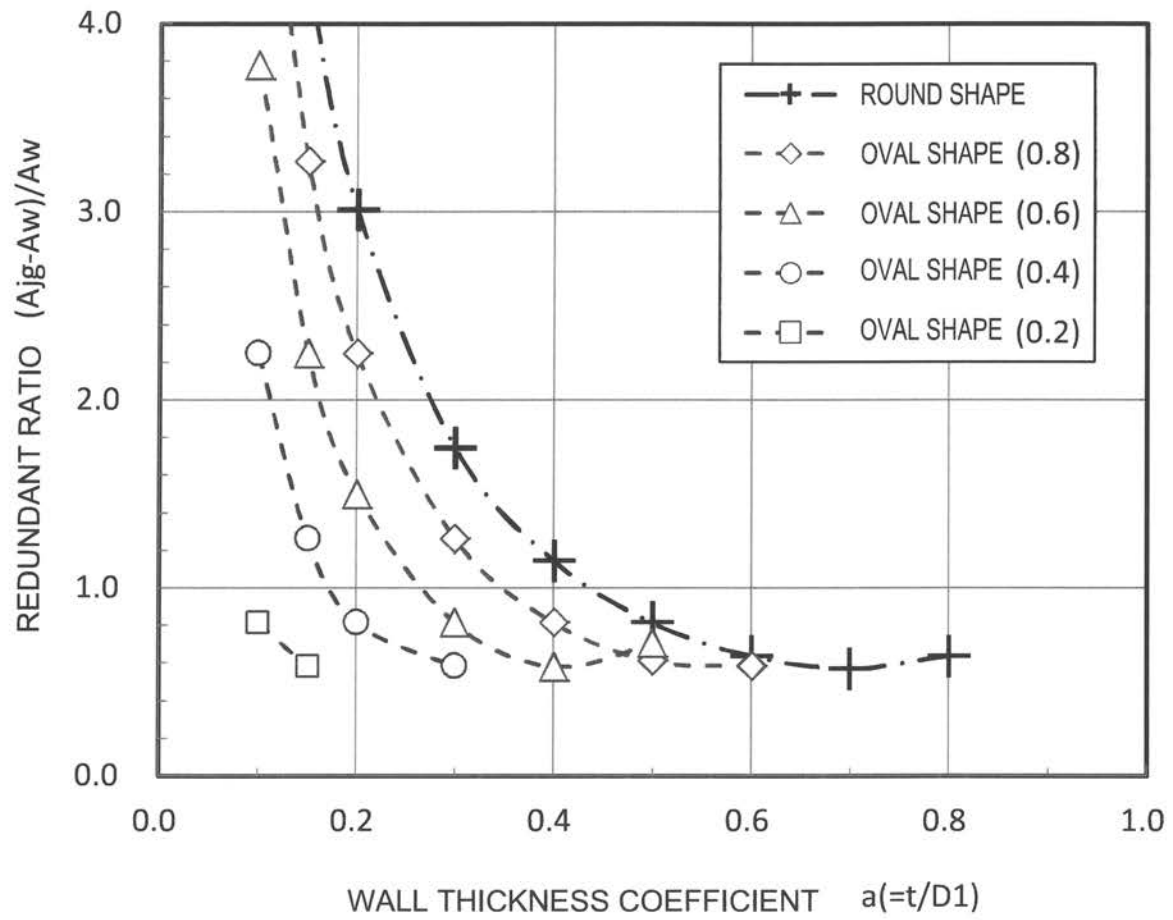
The c.i.c. risk becomes higher as value becomes closer to 0, and the c.i.c. occurs with negative value.

SECTIONAL SHAPE	LARGE DIAMETER D1	SMALL DIAMETER COEFFICIENT b	WALL THICKNESS COEFFICIENT a	PITCH L	PITCH RATIO L/D1	SECTIONAL AREA OF IMPROVEMENT BODIES	RATIO OF EFFECTIVE SECTIONAL AREA OF BODY	REDUNDANT AMOUNT	REDUNDANT RATIO	C.I.C. * D1/2-L	a/b	b/a	b-2
MULTI-FAN (a=0.4)	1.000	0.400	0.400	0.917	1.000	0.785	0.367	2.142	0.419	1.142	1.000	0.417	1.000
MULTI-FAN (a=0.4)	1.000	0.500	0.400	0.917	1.000	0.544	0.367	1.484	0.177	0.484	0.424	0.417	0.800
MULTI-FAN (a=0.4)	1.000	0.600	0.400	0.917	1.000	0.516	0.367	1.408	0.150	0.408	0.357	0.417	0.667
MULTI-FAN (a=0.4)	1.000	0.700	0.400	0.917	1.000	0.540	0.367	1.473	0.173	0.473	0.414	0.417	0.571
MULTI-FAN (a=0.4)	1.000	0.800	0.400	0.917	1.000	0.597	0.367	1.628	0.230	0.628	0.550	0.417	0.500
MULTI-FAN (a=0.4)	1.000	0.900	0.400	0.917	1.000	0.680	0.367	1.855	0.313	0.855	0.748	0.417	0.444
MULTI-FAN (a=0.5)	1.000	0.500	0.500	0.866	1.000	0.785	0.433	1.814	0.352	0.814	1.000	0.366	1.000
MULTI-FAN (a=0.5)	1.000	0.600	0.500	0.866	1.000	0.598	0.433	1.381	0.165	0.381	0.468	0.366	0.833
MULTI-FAN (a=0.5)	1.000	0.700	0.500	0.866	1.000	0.588	0.433	1.357	0.155	0.357	0.439	0.366	0.714
MULTI-FAN (a=0.5)	1.000	0.800	0.500	0.866	1.000	0.624	0.433	1.441	0.191	0.441	0.542	0.366	0.625
MULTI-FAN (a=0.5)	1.000	0.900	0.500	0.866	1.000	0.692	0.433	1.598	0.259	0.598	0.735	0.366	0.556
MULTI-FAN (a=0.6)	1.000	0.600	0.600	0.800	1.000	0.785	0.480	1.636	0.305	0.636	1.000	0.300	1.000
MULTI-FAN (a=0.6)	1.000	0.700	0.600	0.800	1.000	0.647	0.480	1.349	0.167	0.349	0.548	0.300	0.857
MULTI-FAN (a=0.6)	1.000	0.800	0.600	0.800	1.000	0.655	0.480	1.365	0.175	0.365	0.574	0.300	0.750
MULTI-FAN (a=0.6)	1.000	0.900	0.600	0.800	1.000	0.705	0.480	1.470	0.225	0.470	0.738	0.300	0.667
MULTI-FAN (a=0.7)	1.000	0.700	0.700	0.714	1.000	0.785	0.500	1.571	0.285	0.571	1.000	0.214	1.000
MULTI-FAN (a=0.7)	1.000	0.800	0.700	0.714	1.000	0.694	0.500	1.389	0.195	0.389	0.681	0.214	0.875
MULTI-FAN (a=0.7)	1.000	0.900	0.700	0.714	1.000	0.721	0.500	1.442	0.221	0.442	0.774	0.214	0.778
MULTI-FAN (a=0.8)	1.000	0.800	0.800	0.600	1.000	0.785	0.480	1.636	0.305	0.636	1.000	0.100	1.000
MULTI-FAN (a=0.8)	1.000	0.850	0.800	0.600	1.000	0.738	0.480	1.537	0.258	0.537	0.843	0.100	0.941
MULTI-FAN (a=0.8)	1.000	0.900	0.800	0.600	1.000	0.740	0.480	1.542	0.260	0.542	0.852	0.100	0.889
MULTI-FAN (a=0.8)	1.000	0.900	0.800	0.600	1.000	0.740	0.480	1.542	0.260	0.542	0.852	0.100	0.889

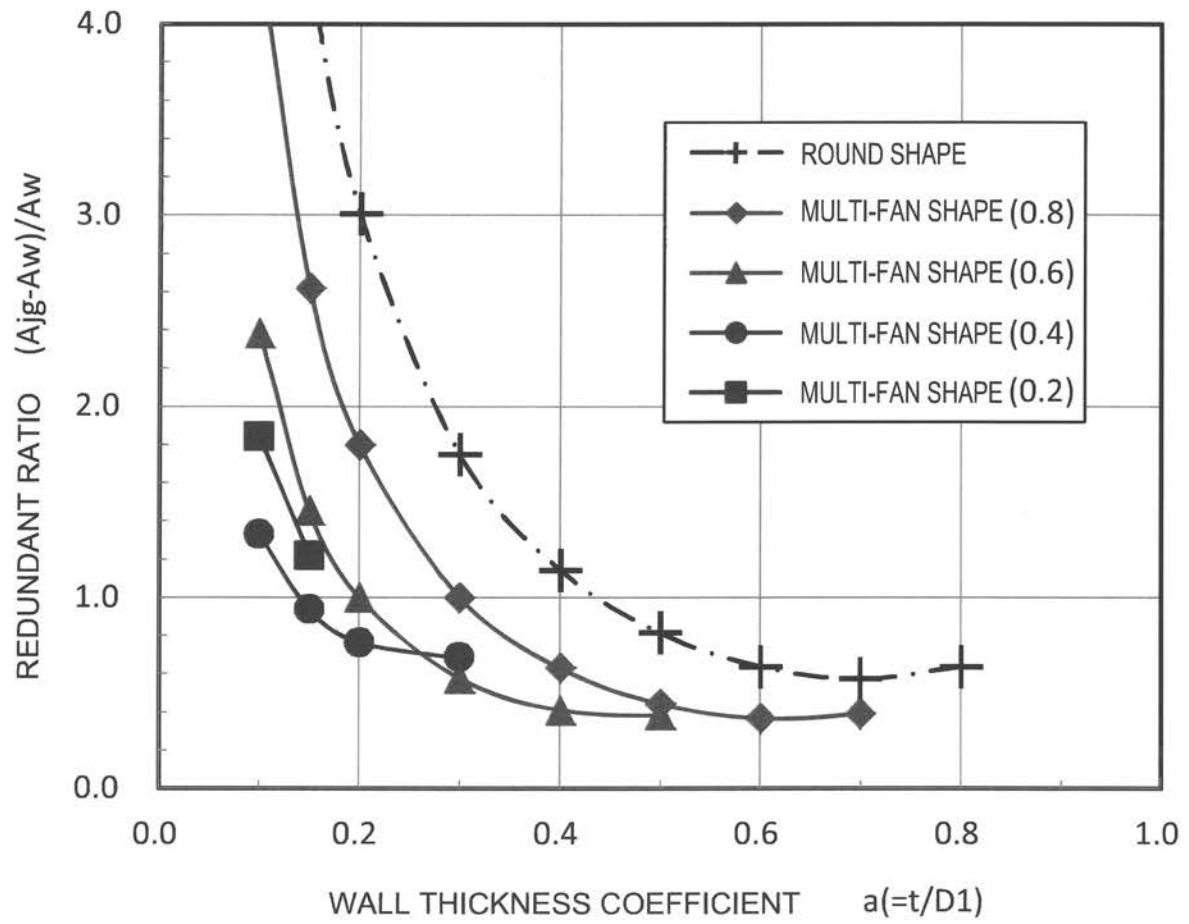
[FIG. 14A]



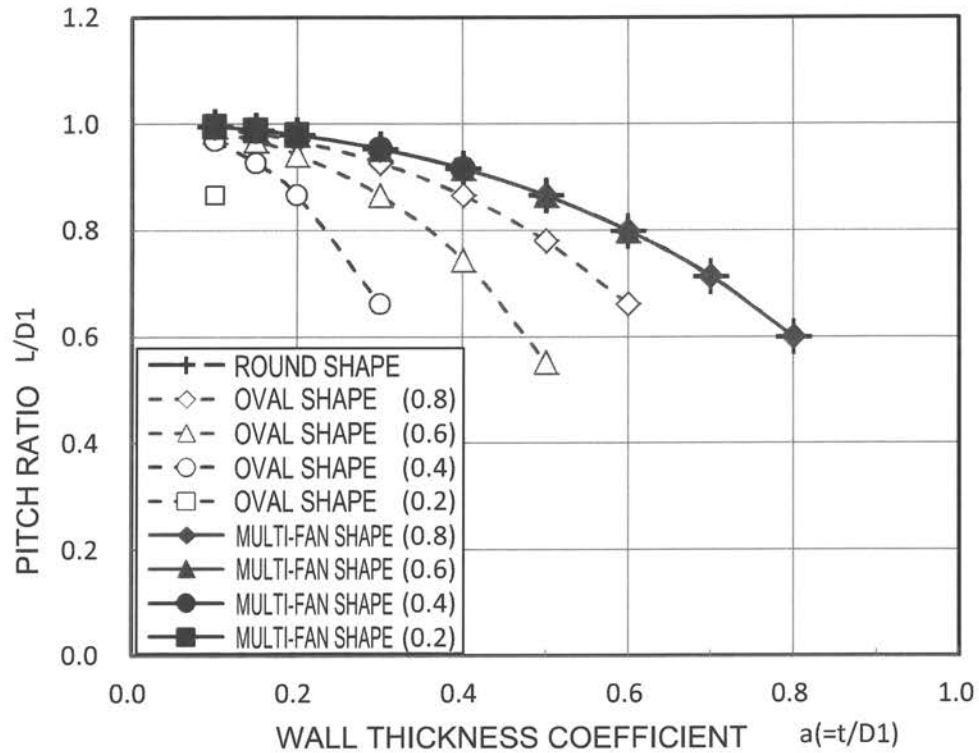
[FIG. 14B]



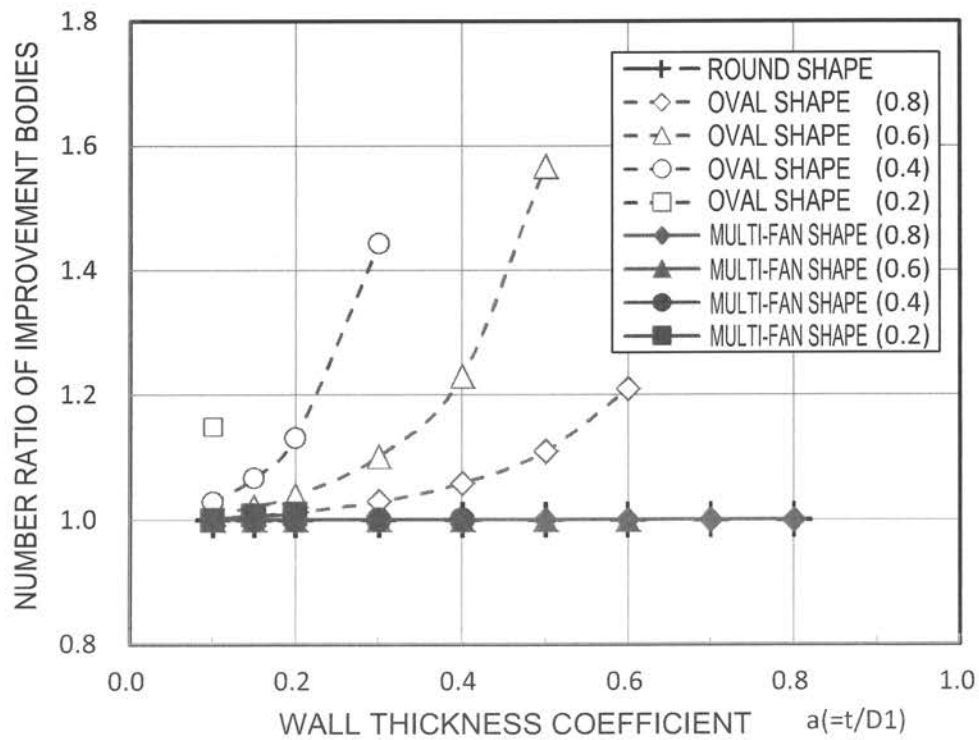
[FIG. 14C]



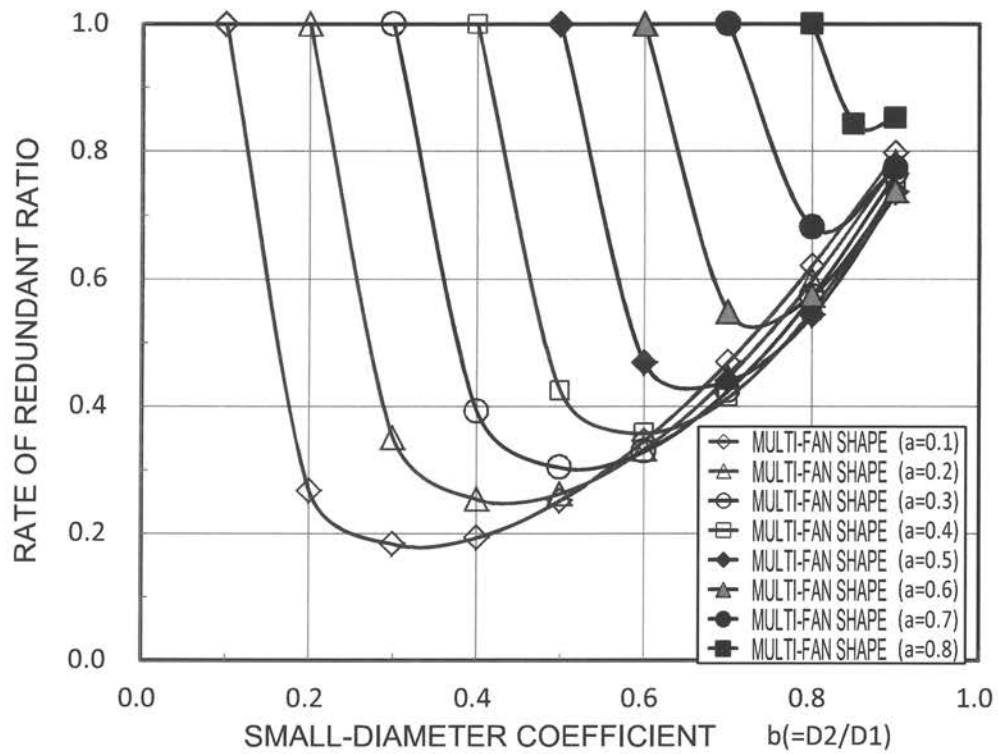
[FIG. 15]



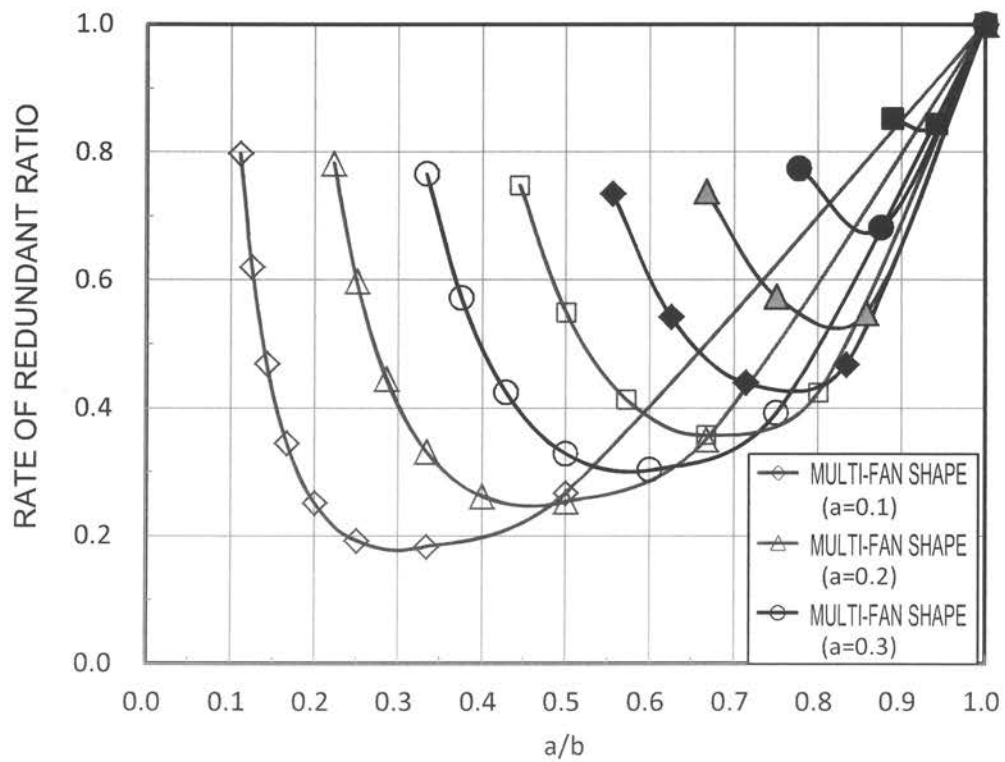
[FIG. 16]



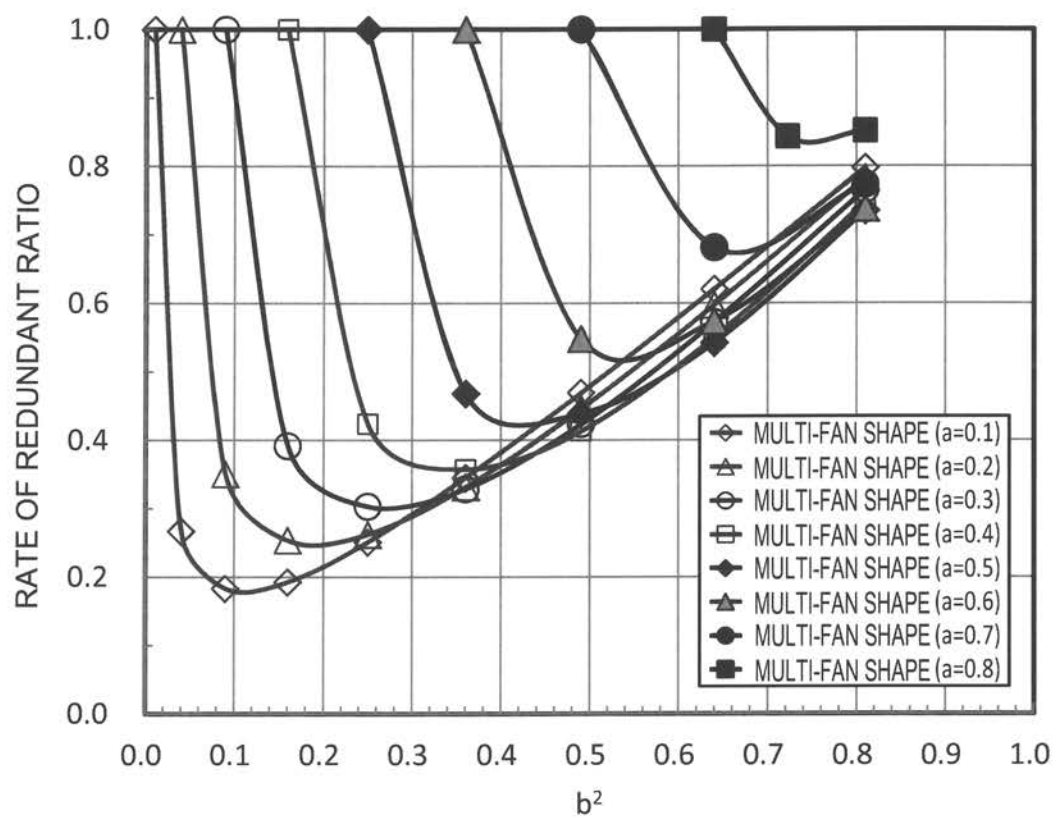
[FIG. 17]



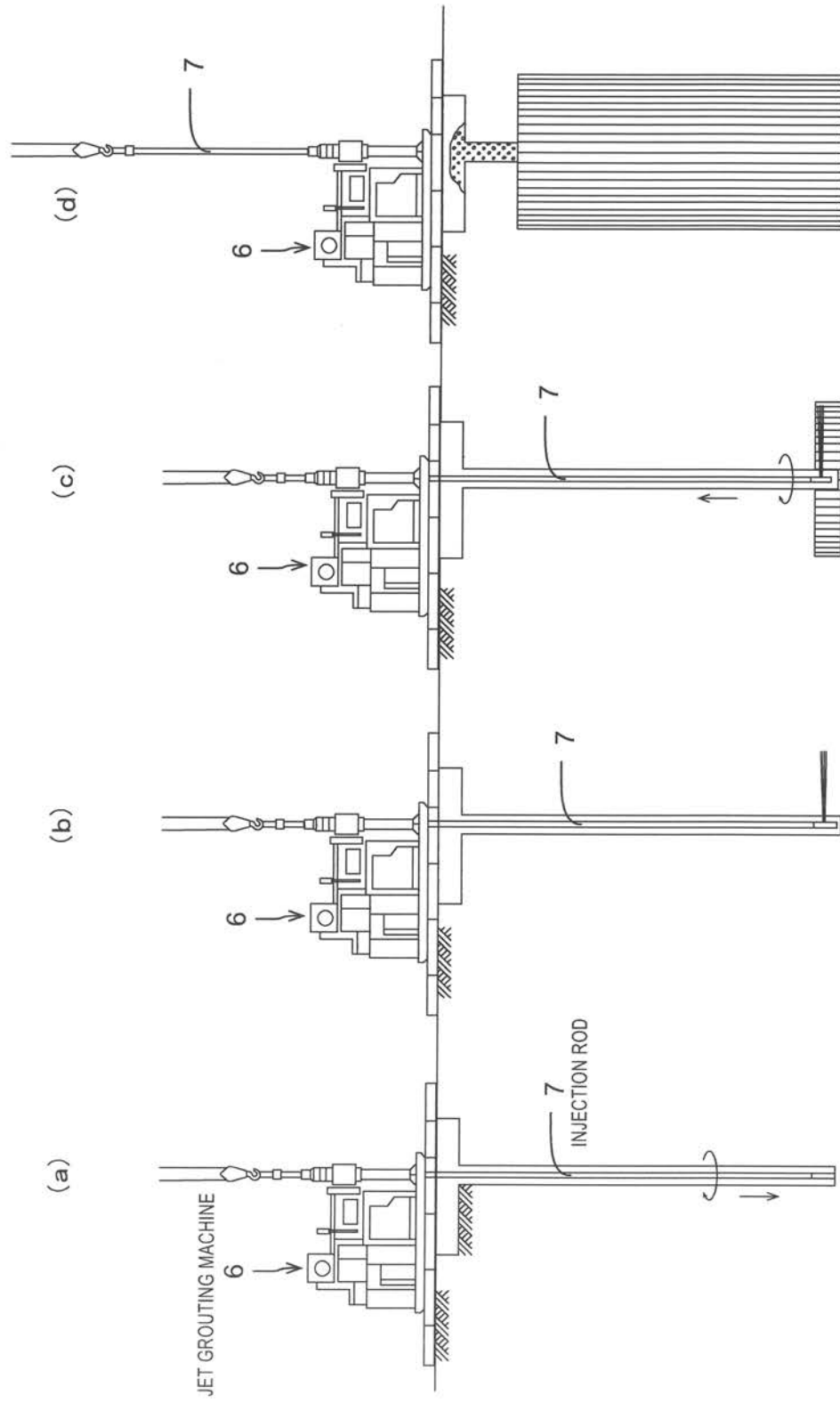
[FIG. 18]



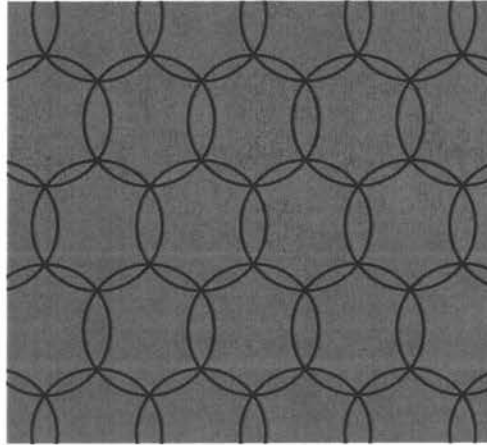
[FIG. 19]



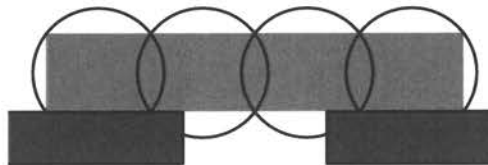
[FIG. 20]



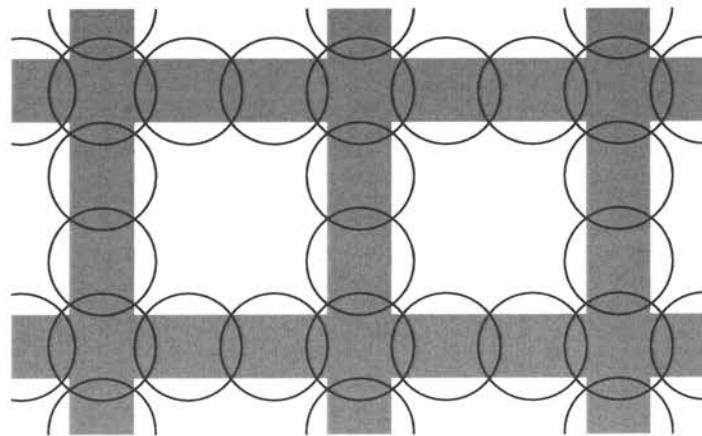
[FIG. 21]



(a) OVERLAPPING ARRANGEMENT
OF IMPROVEMENT BODIES

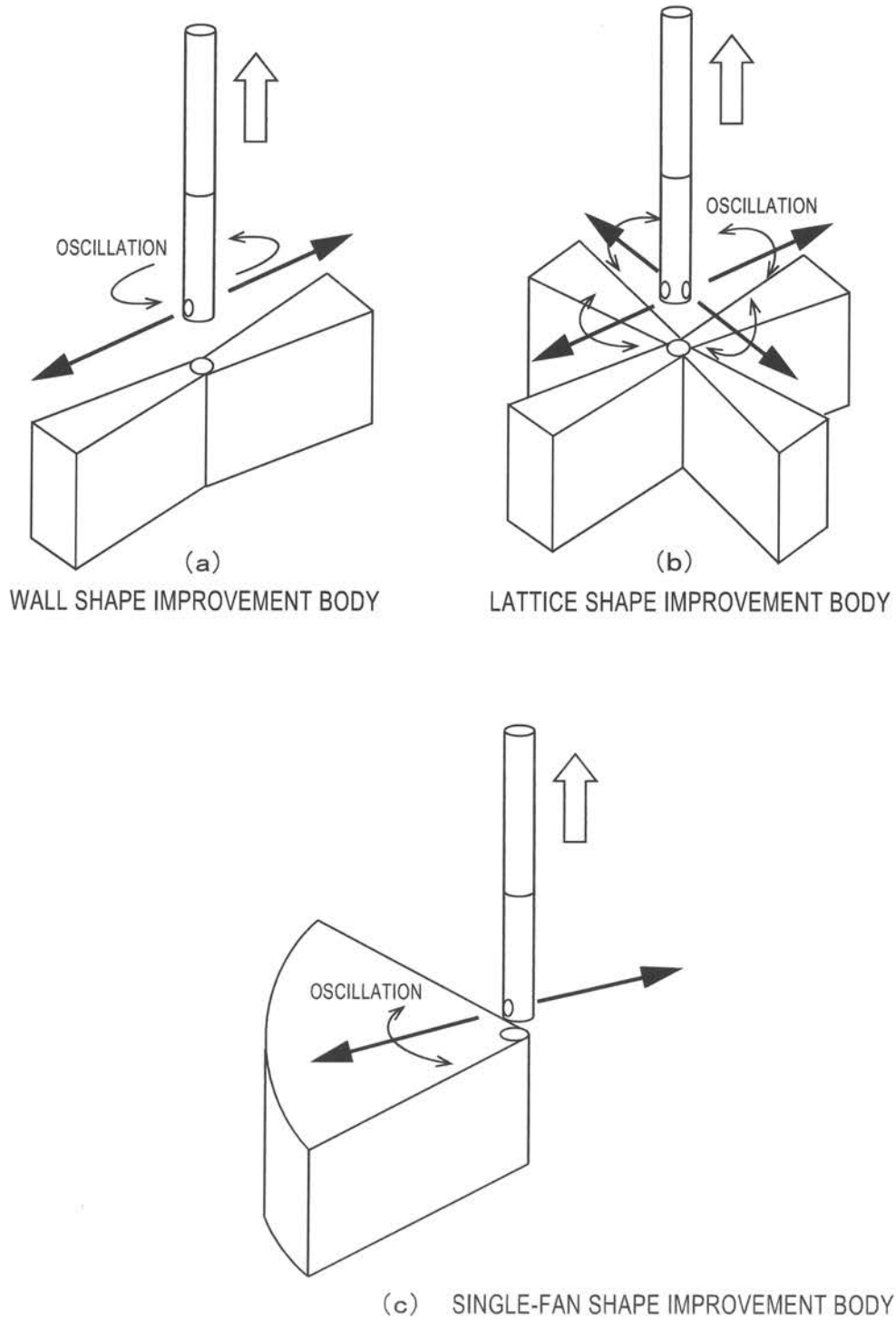


(b) WALL FORM

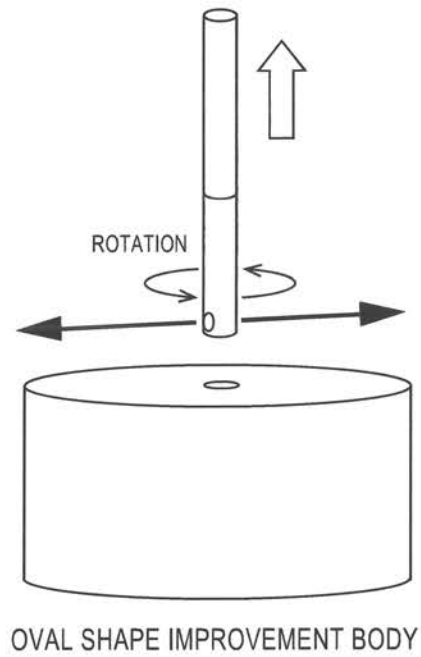


(c) LATTICE FORM

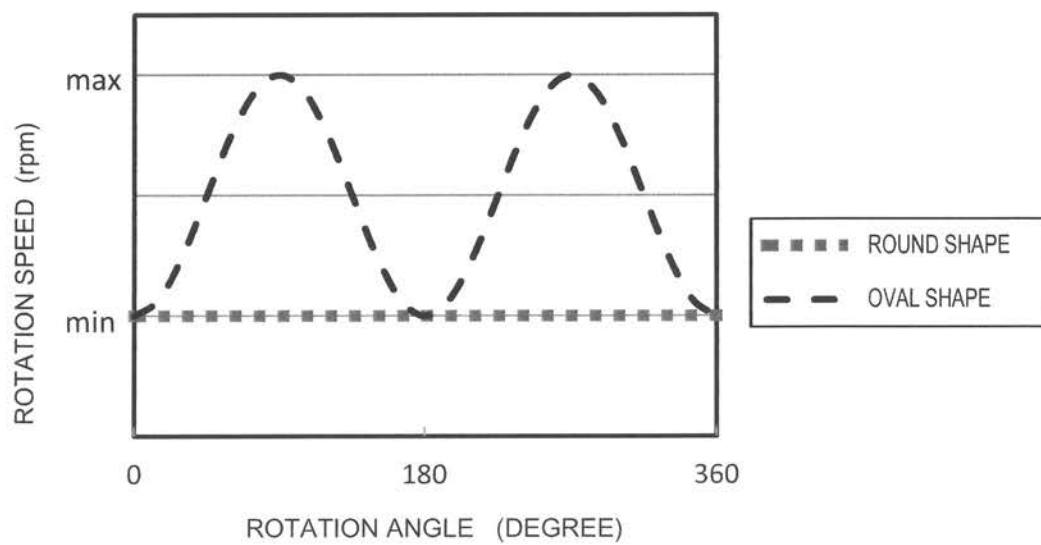
[FIG. 22]



[FIG. 23]



[FIG. 24]



[FIG. 25]

