

# The 102nd ISIJ Meeting Programme

## Paper Presentations

### — IRONMAKING —

#### November 1, 1981

1	Determination of Young's modulus and poisson ratio of lump ores. Minoru Asada, <i>et al.</i> .....	S651
2	Residual stress in hematite and magnetite containing $\text{Al}_2\text{O}_3$ , $\text{CaO}$ and $\text{MgO}$ . Minoru Asada, <i>et al.</i> .....	S652
3	Study on crushing strength of the minerals constituting sinter. Hisashi Ikezaki, <i>et al.</i> .....	S653
4	Reduction of fluctuation of $\text{SiO}_2$ in fine ore bed. Yukio Sato, <i>et al.</i> .....	S654
5	Evaluation of fine ores for sintering. Seiichi Isozaki, <i>et al.</i> .....	S655
6	Effect of hot water addition into the primary mixer. Shin-ichi Kurosawa, <i>et al.</i> .....	S656
7	Study on the wettability of fine iron ores. (Study on surface properties of iron ores—I). Katsuhiko Satoh, <i>et al.</i> .....	S657
8	Granulation of iron ore sinter feeds. P. W. Roller, <i>et al.</i> .....	S658
9	On the quasi-particle formation of sintering mix. Fukuo Aratani, <i>et al.</i> .....	S659
10	Simulation of sinter material granulation and permeability. (Relation between the granulation of sinter feed and the permeability of packed bed). Shun Sato, <i>et al.</i> .....	S660
11	Segregation of sinter material at charging. Hitoshi Kawata, <i>et al.</i> .....	S661
12	Effect of grain size of limestone on quality of self-fluxing sinter. Hideo Hurutaku, <i>et al.</i> .....	S662
13	Influence of particle size of coke breeze and blended ore on sinter properties. (Improvement of sinter quality—I). Seiki Nagano, <i>et al.</i> .....	S663
14	Influence of bed density and coke segregation on sinter properties. (Improvement of sinter quality—II). Kazuhiro Furukawa, <i>et al.</i> .....	S664
15	Promotion of carbothermic reduction of chromite ore with addition of borates. Hiroshi Katayama, <i>et al.</i> .....	S665
16	Reduction of chromite–hematite mixture by carbon. Syouhei Kouroki, <i>et al.</i> .....	S666
17	Smelting reduction of iron ore in plasma furnace. Shin-ichi Nishioka, <i>et al.</i> .....	S667
18	Melting and final reduction of powdered reduced iron by plasma arc furnace. Masaya Ozawa, <i>et al.</i> .....	S668
19	Gasification of coal by impinging on iron bath. Shusaku Komatsu, <i>et al.</i> .....	S669
20	Effect of the oxide additives on the reduction of wustite. Kinji Toda, <i>et al.</i> .....	S670
21	Effect of the addition of $\text{CaO}$ or $\text{MgO}$ on the reduction of dense wustite with $\text{H}_2$ . Nobukazu Shigematsu, <i>et al.</i> .....	S671
22	Reduction of wustites containing $\text{MgO}$ and $\text{CaO}$ and structure of the $\text{Fe}-\text{FeO}$ interface. Nobuhiro Sata, <i>et al.</i> .....	S672
23	Temperature dependence of the reduction rate of iron oxides containing $\text{CaO}$ . Mitsushige Fukunaga, <i>et al.</i> .....	S673
24	Measurement of interdiffusion coefficient of the $\text{Fe}_{1-x}\text{O}-\text{MgO}$ system. Yoshikazu Aoki, <i>et al.</i> .....	S674
25	Effect of phosphorus on the reduction of wustite pellet. Kensuke Sassa, <i>et al.</i> .....	S675
26	Observation of wüstite particles showing retardation phenomenon during reduction of hematite. Sung Soo Kim, <i>et al.</i> .....	S676
27	On the reduction and expansion during reduction of $\text{CaO}-\text{Fe}_2\text{O}_3$ compounds. Noboru Taguchi, <i>et al.</i> .....	S677
28	On the reduction and expansion during reduction of $\text{MgO}-\text{Fe}_2\text{O}_3$ compounds. Noboru Taguchi, <i>et al.</i> .....	S678

#### November 2, 1981

29	Quantitative measurement of sinter structure. Katsuhiro Takemoto, <i>et al.</i> .....	S679
30	Improvement of sinter qualities by investigation of sinter texture. Genji Saito, <i>et al.</i> .....	S680
31	Relationship between the grain size of secondary hematite in sinter and degradation during low temperature reduction. (Study on melting reaction of sintering—II). Yasumasa Sawamura, <i>et al.</i> .....	S681

32	Relationship between sinter structure and the degree of reduction at 900°C. (Study on melting reaction of sintering—III). Satoru Suzuki, <i>et al.</i> .....	S682
33	The degradation phenomena of sintered ore. (Influence of SiO <sub>2</sub> and Al <sub>2</sub> O <sub>3</sub> in sinter—II). Junsuke Haruna, <i>et al.</i> .....	S683
34	The mechanism of secondary hematite formation in sinter and the property of degradation. (Influence of SiO <sub>2</sub> and Al <sub>2</sub> O <sub>3</sub> in sinter—III). Junsuke Haruna, <i>et al.</i> .....	S684
35	Test operation results of sinter production with low slag content and high reducibility. Yoshio Kamiko, <i>et al.</i> .....	S685
36	Influence of chloride on low temperature reduction behaviour of sinter. Hiroshi Kanayama, <i>et al.</i> .....	S686
37	Production of sinter added CaCl <sub>2</sub> and its using test in blast furnace. (The study on the improvement of reduction degradation of sinter—III). Masaharu Kohno, <i>et al.</i> .....	S687
38	Some factors affecting sinter material melting. Takazo Kawaguchi, <i>et al.</i> .....	S688
39	Effect of SiO <sub>2</sub> and CaO on the strength of sinter. Ryoichi Machishima, <i>et al.</i> .....	S689
40	Relationship between position in bed and properties of sinter at thick bed sintering. Masato Kawano, <i>et al.</i> .....	S690
41	Optimization of time for changing flow direction of sintering air from bottom to top. Shigeo Itano, <i>et al.</i> .....	S691
42	Application of measuring technique in sinter process. Kouichi Yazama, <i>et al.</i> .....	S692
43	Automation of raw material handling line in Tobata sinter plant, Nippon Steel Corp. Tuneo Ikeda, <i>et al.</i> .....	S693
44	Decrease of energy consumption ratio per ton of sintered ore at Kashima No. 3 sinter plant, Sumitomo Metal Industries, Ltd. Genshun Kochihira, <i>et al.</i> .....	S694
45	Improvement of sintered ore quality in Kashima Steel Works, Sumitomo Metal Industries, Ltd. Kozo Takata, <i>et al.</i> .....	S695
46	Development of wind volume measuring apparatus in sintering bed. (Studies of heat pattern in sintering bed—IV). Shoji Nitta, <i>et al.</i> .....	S696
47	Relationship between sinter quality and red-hot zone distribution in sintering bed. (Studies of heat pattern in sintering bed—V). Kazuma Nakashima, <i>et al.</i> .....	S697
48	Counterplan for the increase of sintering yield. (Development to equalize the heat pattern in sintering bed—I). Nobuhiko Takamatsu, <i>et al.</i> .....	S698
49	Study of sintering operation with hot gas blowing by test pan. Kazuhiro Yamamoto, <i>et al.</i> .....	S699
50	Influence of cooling condition on sinter quality. Kazumasa Katoh, <i>et al.</i> .....	S700
51	Production of low FeO and low SiO <sub>2</sub> sinter at Tobata No. 3 sinter plant, Nippon Steel Corp. (Improvement of sinter reducibility—I). Yasunori Hegi, <i>et al.</i> .....	S701
52	Properties of low FeO and low SiO <sub>2</sub> sinter produced at Tobata No. 3 sinter plant, Nippon Steel Corp. (Improvement of sinter reducibility—II). Yasunori Hegi, <i>et al.</i> .....	S702
53	Effect of CaO/SiO <sub>2</sub> , MgO on high temperature properties of sinter. Haruo Kokubu, <i>et al.</i> .....	S703
54	Effect of FeO on the high temperature properties of sinter. (Study on the high temperature properties of blast furnace burdens—VI). Hirohisa Hotta, <i>et al.</i> .....	S704
55	Influence of load on the high temperature properties of blast furnace burdens. Shirou Tarumoto, <i>et al.</i> .....	S705
56	Microscopical investigation of high temperature reduction procedure of dolomite-fluxed pellet. Katsuhiko Inoue, <i>et al.</i> .....	S706
57	Effect of size-segregated sinter charging on gas distribution in blast furnace of bell-less top. (Studies on the control of burden distribution—II). Masashi Isoyama, <i>et al.</i> .....	S707
58	Simulation model of burden distribution in blast furnace with bell-less charging equipment. Mikio Kondoh, <i>et al.</i> .....	S708
59	Burden distribution formed by size-segregated sinter charging in blast furnace. (Studies on the control of burden distribution—I). Yoshio Okuno, <i>et al.</i> .....	S709
60	Quantification of burden redistribution at the stock level. Akira Kani, <i>et al.</i> .....	S710
61	Monitoring of burden distribution with profile-meter for all-coke operation of a blast furnace. Shouichi Haratou, <i>et al.</i> .....	S711
62	Study of particle size distribution of charging material. Yasuhiko Sakaguchi, <i>et al.</i> .....	S712
63	Estimation of the gas flow pattern in the lumpy zone, based on the gas velocity and the burden profile at the top of a blast furnace. Yasushi Takamoto, <i>et al.</i> .....	S713
64	Estimation of the state of lumpy zone in a blast furnace. (The development of a device for detecting the movement of burdens in the blast furnace—III). Kenji Tamura, <i>et al.</i> .....	S714
65	Influence of the state of lumpy zone on blast furnace operation. (The development of a device for detecting the movement of burdens in the blast furnace—IV). Kenji Tamura, <i>et al.</i> .....	S715
66	Effects of sinter properties at temperatures over 1 100°C on blast furnace operation. Kazuyoshi Yamaguchi, <i>et al.</i> .....	S716
67	Study on the property of burden materials in blast furnace—I. Mitsushi Shirakawa, <i>et al.</i> .....	S717

68	States of burden and burden qualities in blast furnace. (Report on the dissection of Kakogawa No. 1 B.F., Kobe Steel, Ltd.). Toshitake Okada, <i>et al.</i> .....	S718
69	Behaviour of cold pellet in softening-melting zone of blast furnace. (Report on the dissection of blast furnace of Nagoya No. 1 [second], Nippon Steel Corp.—III). Kenzi Nosima, <i>et al.</i> .....	S719
70	Estimation and verification of melting zone profile in blast furnace. Isao Kobayashi, <i>et al.</i> .....	S720
71	Detection of melting level profile in blast furnace with Fe-P alloy. Isao Kobayashi, <i>et al.</i> .....	S721
72	Analysis of coke behavior in raceway using endoscope and ultrahigh speed camera. (Investigation of raceway—II). Michiru Nakagome, <i>et al.</i> .....	S722
73	Investigation of raceway behavior on oilless blast furnace operation. Yoshihiro Inoue, <i>et al.</i> .....	S723
74	On the mechanism of formation of stagnant layer in the hearth of blast furnace. (Studies on the control of molten pig iron and slag flow in the hearth of blast furnace—V). Jiro Ohno, <i>et al.</i> .....	S724
75	Properties of coke and behaviour of pig and slag between tuyere and bottom. (Report on the dissection of No. 4 B.F. in first campaign at Mizushima Works, Kawasaki Steel Corp.—II). Osamu Nishimura, <i>et al.</i> .....	S725
76	High TiO <sub>2</sub> input operation of blast furnace. Shunji Iyama, <i>et al.</i> .....	S726
77	Low [Si] operation at Mizushima No. 2 B.F., Kawasaki Steel Corp. Yoshikazu Senoo, <i>et al.</i> .....	S727
78	Mathematical simulation of [Si] transfer in the blast furnace. Seiji Taguchi, <i>et al.</i> .....	S728
79	Production of silica enriched coke and operation test in the blast furnace. Nobuo Ishioka, <i>et al.</i> .....	S729
80	Estimation of blast furnace operation with various fuel injection. Kazumasa Wakimoto, <i>et al.</i> .....	S730
81	Injection of boiler waste gas into a blast furnace. Mitsuru Kiguchi, <i>et al.</i> .....	S731
82	COM injection through three tuyeres of Kashima No. 1 blast furnace, Sumitomo Metal Industries, Ltd. Masateru Kojima, <i>et al.</i> .....	S732
83	A development of high concentrate coal-water slurry and a study of its application to a blast furnace. Tsutomu Fukushima, <i>et al.</i> .....	S733
84	Sintering of the iron layer formed by hydrogen reduction at around 910°C. Akira Ohba, <i>et al.</i> .....	S734
85	Kinetics analyses of hydrogen reduction of fluxed pellets in packed beds by three interface model in considering of solid-state diffusion. Tateo Usui, <i>et al.</i> .....	S735
86	MnO reduction by droplets of pig iron with Si. Katsuichi Kimura, <i>et al.</i> .....	S736
87	Reduction rate of chromium oxide in slag by carbon. Nobuya Shinozaki, <i>et al.</i> .....	S737
88	Trial make of such a testing apparatus for high temperature properties that self-follows the change of gas composition according to reactivity of blast furnace burdens. Hideyoshi Yamaguchi, <i>et al.</i> .....	S738
89	Experimental studies on the carburization of reduced iron in blast furnace. Shuji Sato, <i>et al.</i> .....	S739
90	Carburization and melting mechanism of reduced iron ore. Fumitaka Tsukihashi, <i>et al.</i> .....	S740
91	Fluidized bed reduction of sintered ore with mixtures of carbon monoxide and carbon dioxide. Kouji Takatani, <i>et al.</i> .....	S741
92	Effect of the reactor geometry on the reaction of the countercurrent reduction. Kazuhiko Kobayashi, <i>et al.</i> .....	S742
93	Side reaction for reduction of iron oxide pellets with gas mixtures by using laboratory scale moving bed reactor at high pressures. Masahiro Ishigaki, <i>et al.</i> .....	S743
94	Improvement of pellet's qualities for gaseous direct reduction process. Yoshio Kimura, <i>et al.</i> .....	S744
95	Study on production of carbon contents pellet. (High temperature properties of pellets—II). Noboru Sakamoto, <i>et al.</i> .....	S745
96	Crushing characteristics of blast furnace and steel making slags. Takahisa Koshida, <i>et al.</i> .....	S746
97	Solution of nitrogen into liquid blast furnace slag. Hidenobu Kondou, <i>et al.</i> .....	S747
98	The granulation of blast furnace slag. Hiroaki Sato, <i>et al.</i> .....	S748
99	An experiment for production of vitreous blast furnace slag. Shigeru Araki, <i>et al.</i> .....	S749
100	Fundamental study on production of alkali treated granulated slag. (Study on alkali treated granulated slag—I). Shigeru Araki, <i>et al.</i> .....	S750

### November 3, 1981

101	Dynamic modeling of blowing-in operation of a blast furnace. Hideyuki Yamaoka, <i>et al.</i> .....	S751
102	Theoretical prediction of cohesive zone of blast furnace on the basis of a mathematical model. Mamoru Kuwabara, <i>et al.</i> .....	S752
103	Descending behavior of burden in the blast furnace model. Koichi Isobe, <i>et al.</i> .....	S753
104	Theory on fluid flow behavior up to flooding in packed beds irrigated by a liquid counter-current to an uprising gas stream. Tateo Usui, <i>et al.</i> .....	S754
105	Flow of bulk solids to raceway in blast furnace. Masakata Shimizu, <i>et al.</i> .....	S755
106	Fluid mechanical model of the raceway in a blast furnace. Tsutomu Tanaka, <i>et al.</i> .....	S756
107	Statistical evaluation of fracture strength of bricks by Weibull theory. Makoto Iiyama, <i>et al.</i> .....	S757
108	Quality change of silicon carbide brick in alkali and zinc vapour. Mituo Saito, <i>et al.</i> .....	S758
109	Stress-strain properties of a brickwork with joints. Manabu Miyamoto, <i>et al.</i> .....	S759
110	Failure of carbon block in the blast furnace bottom. Mituo Saito, <i>et al.</i> .....	S760

111	A gunning repair apparatus for blast furnace. (Development of a new gunning repair system for blast furnace—I). Yuji Uchiyama, <i>et al.</i> .....	S761
112	Studies of suitable gunning repair conditions for blast furnace linings. (Development of a new gunning repair system for blast furnace—II). Yorihito Mikami, <i>et al.</i> .....	S762
113	Heat transfer and sintering mechanism of tap hole mix for blast furnaces. Hiroaki Yamanaka, <i>et al.</i> ...	S763
114	Hearth construction of Wakayama No. 3 blast furnace, Sumitomo Metal Industries, Ltd. Hiroyuki Yoshioka, <i>et al.</i> .....	S764
115	Brittle layer of carbon refractory at blast furnace bottom. Takao Suzuki, <i>et al.</i> .....	S765
116	Thermal stress analysis of the blast furnace bottom by the photothermoelasticity. Tadao Kaneko, <i>et al.</i> .....	S766
117	Carbon and oxygen contents of molten pig iron. Yoshitomo Satoh, <i>et al.</i> .....	S767
118	Development of BF-gas dry cleaning facility. Akinobu Ogawa, <i>et al.</i> .....	S768
119	Recovery of relief gas at Ohgishima Nos. 1 and 2 blast furnaces, Nippon Kokan K.K. Tomoo Kamoshida, <i>et al.</i> .....	S769
120	Top pressure recovery turbine of Muroran No. 4 blast furnace, Nippon Steel Corp. Toshiaki Sawai, <i>et al.</i> .....	S770
121	Lower productivity operation of Chiba No. 2 blast furnace at Kawasaki Steel Corp. Takanari Kawai, <i>et al.</i> .....	S771
122	Blast furnace operation under low blast temperature and high fuel rate at the Keihin Works, Nippon Kokan K.K. Seiichi Ikeda, <i>et al.</i> .....	S772
123	Blast furnace operation by use of upper and lower shaft probes. Kazuyoshi Yamaguchi, <i>et al.</i> .....	S773
124	On the oilless operation of Chiba No. 6 blast furnace, Kawasaki Steel Corp. Toshiro Sawada, <i>et al.</i> .....	S774
125	Vertical probe investigation of condition in a blast furnace without oil injection. Toshiyuki Irita, <i>et al.</i> .....	S775
126	Oil-free operation at a large blast furnace. (Oil-free operation—II). Toshiyuki Komatsu, <i>et al.</i> .....	S776
127	Stress corrosion cracking of hot blast stove shells. Ryuji Okabe, <i>et al.</i> .....	S777
128	Temperature fluctuations in the lower stack of a blast furnace. Masato Kumagai, <i>et al.</i> .....	S778
129	Computer diagnosis of Wakayama No. 3 B.F., Sumitomo Metal Industries, Ltd. Masando Wakabayashi, <i>et al.</i> .....	S779
130	Prediction of fatigue life of blast furnace's mantle. Hiroshi Takamichi, <i>et al.</i> .....	S780
131	Development of blast furnace rapid repairing techniques. (Investigations after dismantlement of Mizushima No. 4 blast furnace, Kawasaki Steel Corp.—I). Kazuhiko Yoshida, <i>et al.</i> .....	S781
132	The dry blowing-out operation of Chiba No. 3 blast furnace, Kawasaki Steel Corp. Kazuo Ichifushi, <i>et al.</i> .....	S782
133	Control of blast volume during the blowing-out operation with lowering stock level in blast furnace. Kazuo Ichifushi, <i>et al.</i> .....	S783
134	Blowing out of Kokura No. 2 blast furnace of Sumitomo Metal Industries, Ltd. with lowering stock level. Kazuaki Sato, <i>et al.</i> .....	S784
135	Short period relining of Kokura No. 2 blast furnace, Sumitomo Metal Industries, Ltd. Ken Mochizuki, <i>et al.</i> .....	S785
136	Investigation on the brick of C.D.Q. chamber. Yukio Murakami, <i>et al.</i> .....	S786
137	Automatic measurement of coke oven temperature. Kyozo Ikai, <i>et al.</i> .....	S787
138	On the heat recovery from coke oven gas at its uptake. Kiyokazu Kubo, <i>et al.</i> .....	S788
139	Recovery system of surplus circular gas in coke dry quenching equipment. Atsushi Nagashima, <i>et al.</i> .....	S789
140	Outline of a new coal-briquetting system. Kōji Tsukada, <i>et al.</i> .....	S790
141	A study on coking mechanism. Kunihiko Nishioka, <i>et al.</i> .....	S791
142	A modeling of carbonization in coke oven. Shūhei Yoshida, <i>et al.</i> .....	S792
143	Relation between coke anisotropy and coke characteristics. Tatsuo Fukuyama, <i>et al.</i> .....	S793
144	A study on the characteristics of char as material of coke pellet. Katutoshi Igawa, <i>et al.</i> .....	S794
145	Improvement of the strength after CO <sub>2</sub> gasification of formed coke (2). (New development of formed coke process by two-stage heating—VII). Katsuaki Kobayashi, <i>et al.</i> .....	S795
146	Influence of reaction temperature on the strength after CO <sub>2</sub> gasification of lump coke. Tetsu Nishi, <i>et al.</i> .....	S796
147	Investigation of strength difference between dry quenched and wet quenched coke. Tsugio Miyagawa, <i>et al.</i> .....	S797
148	Changes of some factors concerned in blast furnace operation by using CDQ coke. Yoichi Karikome, <i>et al.</i> .....	S798
149	Method for estimating the inner temperature of blast furnace based on the coke sample taken out from blast furnace. Hiroshi Haraguchi, <i>et al.</i> .....	S799
150	Physical and chemical investigation of coke sampled at tuyere level of Tobata No. 1 BF, Nippon	

Steel Corp.	Kazuyoshi Inokuchi, <i>et al.</i>	S800	
151	Coke properties of different sizes sampled at tuyere level of blast furnace.	Shin-ya Okamoto, <i>et al.</i>	S801
152	The effect of coke CSR on the pulverization characteristic of coke in the raceway.	Takashi Sugiyama, <i>et al.</i>	S802

**— STEELMAKING —**

**November 1, 1981**

153	Infiltration of corrosive liquid into capillary tubes and porous bodies.	Seiji Yokoyama, <i>et al.</i>	S803
154	Refractories for hot metal pretreatment.	Nobuyoshi Hiroki, <i>et al.</i>	S804
155	Refractories developed for hot metal treatment.	Haruya Nagai, <i>et al.</i>	S805
156	Reduction of refractory consumption in LD converter.	Takashi Matsunaga, <i>et al.</i>	S806
157	Wear mechanism of magnesia–carbon bricks in converter linings.	Kazuki Ogasahara, <i>et al.</i>	S807
158	Monitoring method for the lining erosion of the top and bottom blowing converter.	Nobuyuki Nagai, <i>et al.</i>	S808
159	Flame gunning equipment.	Teruo Hiramatsu, <i>et al.</i>	S809
160	Heat analysis of flame gunning.	Masuto Shimizu, <i>et al.</i>	S810
161	Operational results of flame gunning.	Shigeru Ogura, <i>et al.</i>	S811
162	Some improvements on schnorkel repair of RH degasser.	Tamotsu Osaki, <i>et al.</i>	S812
163	Development of casting materials. (Development of casting process for ladle lining—I).	Masaaki Nishi, <i>et al.</i>	S813
164	Progress of installation, curing time and drying time reduction. (Development of casting process for ladle lining—II).	Noriaki Morishita, <i>et al.</i>	S814
165	Industrialization. (Development of casting process for ladle lining—III).	Hiroshi Mihashi, <i>et al.</i>	S815
166	Wear mechanism of monolithic refractories for ladles.	Jun-ichi Ikeda, <i>et al.</i>	S816
167	Measurement of electrical resistivity of molten Fe–Co alloys and Fe–Ni alloys at higher Ni concentration by an improved four-probe method.	Yoshifumi Kita, <i>et al.</i>	S817
168	Interdiffusion of carbon in molten Fe–C and Fe–C–Si alloys.	Yoichi Ono, <i>et al.</i>	S818
169	Permeabilities of oxygen through the molten CaO–SiO <sub>2</sub> –iron oxide–chromic oxide system.	Atsushi Asamura, <i>et al.</i>	S819
170	Temperature dependence of thermal conductivity of solid and liquid slags.	Masahiro Susa, <i>et al.</i>	S820
171	Measurement of heat content of CaO–SiO <sub>2</sub> –Al <sub>2</sub> O <sub>3</sub> slag.	Atsushi Nishiwaki, <i>et al.</i>	S821
172	Heat of mixing of liquid Fe <sub>x</sub> O–SiO <sub>2</sub> slag.	Hiroshi Honda, <i>et al.</i>	S822
173	Effect of oxygen on the solubility of nitrogen in liquid iron.	Takashi Isshiki, <i>et al.</i>	S823
174	Effects of C, Si, Al and B on the activity of phosphorus in liquid iron.	Shinji Fujino, <i>et al.</i>	S824
175	Knudsen cell-mass spectrometric study on the thermodynamic properties of Fe–W alloys.	Yoshiyuki Ueshima, <i>et al.</i>	S825
176	The equilibrium between liquid slag and liquid iron in Fe–Mn–O–S system.	Shoji Hayashi, <i>et al.</i>	S826
177	Vanadium distribution between liquid iron and MgO saturated CaO–FeO <sub>x</sub> –SiO <sub>2</sub> slags.	Hideaki Suito, <i>et al.</i>	S827
178	Effect of calcium fluoride on phosphorus partitions between liquid iron and MgO saturated CaO–FeO <sub>x</sub> –SiO <sub>2</sub> slags.	Ryo Inoue, <i>et al.</i>	S828
179	Thermodynamics of phosphide and phosphate in CaO–Al <sub>2</sub> O <sub>3</sub> melt under strongly reducing conditions.	Hideyuki Momokawa, <i>et al.</i>	S829
180	The effect of CaF <sub>2</sub> addition on the sulfide capacities of CaO-based fluxes.	Masahiro Hashimoto, <i>et al.</i>	S830

**November 2, 1981**

181	The effect of flow on the formation of CO blowhole in solidifying shell. (Study on solidification of liquid steel in flow—I).	Yutaka Nagano, <i>et al.</i>	S831
182	Production of pseudo-rimmed steel for wire rod by continuously cast.	Hideo Matsui, <i>et al.</i>	S832
183	Surface quality of electromagnetic stirred slab.	Eiichi Takeuchi, <i>et al.</i>	S833
184	Development of the rotating magnet stirrer. (Development of an in-the-mold EMS method—I).	Sumio Kobayashi, <i>et al.</i>	S834
185	Improvement of surface quality by rotating magnet stirrer in the mold on C.C. bloom. (Development of an in-the-mold EMS method—II).	Akira Kawami, <i>et al.</i>	S835
186	Improvement of internal quality by rotating magnet stirrer in the mold on C.C. bloom. (Development of an in-the-mold EMS method—III).	Toshiaki Hagiwara, <i>et al.</i>	S836
187	Characteristic phenomena of the electromagnetic stirring in the mould. (On the application of electromagnetic stirrer to continuous casting—I).	Hideaki Mizukami, <i>et al.</i>	S837

188	Application of conduction current stirrer for large section bloom caster. Susumu Tsujita, <i>et al.</i>	S838
189	Improvement of high carbon steel by electro-magnetic stirring. (The technique of electro-magnetic stirring of C.C. bloom—XI). Yasuhiko Ohta, <i>et al.</i>	S839
190	Improvement of inner quality for continuous casting slabs with electromagnetic stirring. Morio Kawasaki, <i>et al.</i>	S840
191	Liquid flow in strand and carbon segregation of slabs cast with electromagnetic stirring. Hakaru Nakato, <i>et al.</i>	S841
192	Development of the non-magnetic roller for electromagnetic stirrer. Tokio Yamamoto, <i>et al.</i>	S842
193	Non-destructive measurement of the equiaxed zone thickness in stainless steel slabs by electromagnetic ultrasonic testing. Shoji Murota, <i>et al.</i>	S843
194	Micro-segregation in continuously cast slab. Hideyuki Misumi, <i>et al.</i>	S844
195	Fundamental study of rare earth metals treatment for clean steels. Sumiaki Koga, <i>et al.</i>	S845
196	Deoxidation of steel by calcium-aluminum complex deoxidizer. Yōsuke Katsura, <i>et al.</i>	S846
197	Development of ladle slag detector in CC machine. Toshiyuki Itoh, <i>et al.</i>	S847
198	Effect of the tundish weir shape on the amount of inclusion in continuously cast slabs. Yoshihiro Matsuda, <i>et al.</i>	S848
199	Model experiment on removal of non-metallic inclusions from molten steel in a CC-mold. Masaki Okajima, <i>et al.</i>	S849
200	Effect of vertical section of continuous casting machine on nonmetallic inclusions in continuously cast slabs. (Study on minimizing technique and the behavior of nonmetallic inclusions in continuously cast slabs and measures taken to reduce them—V). Ryoji Tsujino, <i>et al.</i>	S850
201	The behavior of large inclusions in slabs cast with the vertical bending type machine. Katsuhiko Murakami, <i>et al.</i>	S851
202	Mechanism of formation of the segregation along oscillation marks on C.C. slab surface. Shigenori Tanaka, <i>et al.</i>	S852
203	The behavior of molten powder in mould. Jun-ichi Fukumi, <i>et al.</i>	S853
204	Development of solid lubricant for the mold of horizontal continuous caster. (Development of horizontal continuous caster—VII). Hideo Sekiguchi, <i>et al.</i>	S854
205	Behaviour of narrow face copper plate at continuous casting mould. Takashi Mori, <i>et al.</i>	S855
206	Automatic control of mould width and taper during continuous casting. Shoichi Hiwasa, <i>et al.</i>	S856
207	Development of mold taper meter for continuous casting. Seikichi Ogata, <i>et al.</i>	S857
208	Reduction rate of iron oxide in molten slag by carbon in iron melt. Akira Sato, <i>et al.</i>	S858
209	Decarburization of liquid iron with high concentration of carbon by $\text{CO}_2\text{-CO}$ or $\text{H}_2\text{O-H}_2$ gas mixtures. Hiroyuki Mitsufuji, <i>et al.</i>	S859
210	Absorption rate of nitrogen injected into molten iron.—Effect of oxygen content in the bath. Korehito Kadoguchi, <i>et al.</i>	S860
211	Nitrogen absorptions of liquid iron and Fe-Cr alloys during teeming. Takao Choh, <i>et al.</i>	S861
212	Rate of oxidation of liquid Fe-Cr and Fe-Ni alloys by pure oxygen. Michinori Hoteiya, <i>et al.</i>	S862
213	Fundamental study on mass transfer during gas and powder injection into molten iron. Masahiro Kawakami, <i>et al.</i>	S863
214	On the evaluation of the mixing energy in top and bottom blown converter. (Development of new LD with oxygen bottom blowing (LD-OB)—VI). Mitsuo Higuchi, <i>et al.</i>	S864
215	Water model experiment on the effect of gas injection in the melting of metal. Satoshi Yamauchi, <i>et al.</i>	S865
216	Mixing characteristics of a few refining processes. Yoshio Watanabe, <i>et al.</i>	S866
217	Effect of agitation on the refining of steel. Yasuyuki Nakao, <i>et al.</i>	S867
218	Analysis of heat and material balance of LD converter process. (Study on heat and material balance of LD converter process—I). Keiko Kato, <i>et al.</i>	S868
219	Calculation of gas composition in LD converter and oxygen distribution ratios by 8-composition waste gas analysis. (Study on heat and material balance of LD converter process—II). Tetuo Sato, <i>et al.</i>	S869
220	On the distribution equations of P, S, and Mn obtained by statistical analysis of LD converter process data. Nozomu Katagiri, <i>et al.</i>	S870
221	Relation between decarburization characteristics and bath agitation intensity at LD and LD-CL converters. Yoshihiko Kawai, <i>et al.</i>	S871
222	The refining of low carbon Al-killed steel for continuous caster in Q-BOP. Hitoshi Morishita, <i>et al.</i>	S872
223	Investigation of the mushroom around the tip of tuyere in bottom blown converter. Hideo Nakamura, <i>et al.</i>	S873
224	Operational results of LD-OB process. Hiroyuki Aoki, <i>et al.</i>	S874
225	Behavior of manganese in blowing of LD-OB process. Mayumi Okimori, <i>et al.</i>	S875
226	Behavior of hydrogen content of molten steel in top and bottom blowing. (Development of top	

and bottom blowing converter—VII). Takemi Yamamoto, <i>et al.</i> .....	S876
227 On the optimum blowing technique of STB process. (Investigation of STB process—IV). Shoji Anezaki, <i>et al.</i> .....	S877
228 Bottom blowing techniques for top and bottom blowing converter. Hideaki Fujimoto, <i>et al.</i> .....	S878
229 Vibration of furnace body of LD-OB converter. Kenji Yamaura, <i>et al.</i> .....	S879
230 Slagless refining operation in top and bottom blowing converter. Masayasu Kimura, <i>et al.</i> .....	S880
231 Blowing practice of pretreated hot metal in K-BOP. (Development of limeless-blowing—III). Toshiro Fujiyama, <i>et al.</i> .....	S881
232 Stabilization mechanism of steel slag by aging treatment. Minoru Sasaki, <i>et al.</i> .....	S882
233 Reliability of 80°C CBR test for aging LD slag. (Testing method of aging LD slag—II). Yoshikazu Nagao, <i>et al.</i> .....	S883
234 Molding and drying method. (Testing method of aging LD slags—IV). Aribumi Niida, <i>et al.</i> .....	S884
235 Development of microwave level meter in the ladle. Katumi Matumura, <i>et al.</i> .....	S885
236 Several arrangement of RH degassing plant. Haruo Ozaki, <i>et al.</i> .....	S886
237 The operation of R-H at the Keihin Works, Nippon Kokan K.K. Tatsuo Hoshida, <i>et al.</i> .....	S887
238 Manufacturing of ultra-low carbon steel by LD-RH process. Arata Ueda, <i>et al.</i> .....	S888
239 Development of producing ultra low phosphorus steel with ladle refining. Hideaki Tenma, <i>et al.</i> .....	S889
240 Effect of Electromagnetic Stirring of ESR process. Takayuki Fukaya, <i>et al.</i> .....	S890
241 Basic properties of the consumable-hollow-electrode-arc-remelting-process of steel. Norinao Mochizuki, <i>et al.</i> .....	S891

**November 3, 1981**

242 Tensile deformation properties in carbon steels in elevated temperature range. Jun Imamura, <i>et al.</i> .....	S892
243 Hot ductility of carbon steels at elevated temperatures. Jun Imamura, <i>et al.</i> .....	S893
244 Development of ingot case design by thermal stress analysis. Yuji Eda, <i>et al.</i> .....	S894
245 Analysis of thermal stress in solid shell of ingot cast in corrugated mold. Hideki Kume, <i>et al.</i> .....	S895
246 Effects of axial compression on internal cracks of cast billets during bending deformation. Hideyo Kodama, <i>et al.</i> .....	S896
247 The mechanism and prevention methods of the subsurface crackings near the wide surface corners in the continuous casting slabs. Masayuki Nakada, <i>et al.</i> .....	S897
248 Decrease of transverse corner cracks on carbon Al killed C.C. slabs for sheet. Haruo Miyano, <i>et al.</i> .....	S898
249 Correlation between the precipitation of boron compounds and hot ductility during cooling from the melt. Kōichi Yamamoto, <i>et al.</i> .....	S899
250 Production method of boron bearing high strength steels by continuous casting and its mechanical properties. Naotaka Noda, <i>et al.</i> .....	S900
251 The avoidance mechanism of cracks in the casting of 9%Ni steel by the minor addition of molybdenum. Jun-ichiro Murayama, <i>et al.</i> .....	S901
252 Development of mist cooling systems in bloom caster. Sawato Noguchi, <i>et al.</i> .....	S902
253 On-line measurement of C.C. slab bulging. Yukio Nakamori, <i>et al.</i> .....	S903
254 On the interaction between mould oscillation and lubrication in view of strand surface quality. Manfred M. Wolf. .....	S904
255 Performance of rolling the continuously cast slab free from surface conditioning in stainless steel. (Influence of operational condition and synthetic slag on the depth of oscillation mark—I). Yutaka Muranaka, <i>et al.</i> .....	S905
256 The effects of mould oscillation conditions on oscillation mark of stainless steel slabs. Shogo Matsumura, <i>et al.</i> .....	S906
257 Effects of mould oscillation on surface quality of strand slabs for heavy plate use. Ken-ichi Sorimachi, <i>et al.</i> .....	S907
258 Formation mechanism of oscillation marks of continuously cast slabs. Hakaru Nakato, <i>et al.</i> .....	S908
259 The simulation of continuous casting machine mould level control. Shigeru Izawa, <i>et al.</i> .....	S909
260 Establishment of fortelling of break out. Humio Murase, <i>et al.</i> .....	S910
261 Refining of duplex stainless steel containing high chromium, extra low carbon and sulphur by AOD process. (Analysis of decarburization reaction in AOD by mathematical model—II). Takeya Tohge, <i>et al.</i> .....	S911
262 Development of the detection method by electrode for molten steel level of VOD refining. Takashi Shiokawa, <i>et al.</i> .....	S912
263 End point carbon control by using mass spectrometer in VOD process. Yuzo Saita, <i>et al.</i> .....	S913
264 Improvement of oxygen blowing method in RH-OB refining treatment of stainless steel. Noriyuki Masumitsu, <i>et al.</i> .....	S914
265 Top and bottom blowing process for making ferritic stainless steels. Kouji Ieda, <i>et al.</i> .....	S915
266 Dephosphorization of molten 18%Cr-4%C-Fe alloy by alkali metal carbonate-halide mixtures.	

267	Kyojiro Kaneko, <i>et al.</i>	S916
267	Dephosphorization and desulfurization of medium carbon high chromium steel melt with $\text{CaC}_2\text{-CaF}_2$ flux. Masatoshi Kuwabara, <i>et al.</i>	S917
268	Model experiment for the control of splash at ingot making by top pouring. Takaho Otomo, <i>et al.</i>	S918
269	Simulation experiment using organic solution on the effect of compositions on sedimentary crystal formation in ingots. Mitsunori Kanamori, <i>et al.</i>	S919
270	Effect of core casting on the internal quality of large section blooms. Shōgo Kimiya, <i>et al.</i>	S920
271	Construction and operation of new No. 1 continuous casting machine. Yoshinobu Mataga, <i>et al.</i>	S921
272	450 <sup>t</sup> round billet continuous casting for ring rolling stock. Hiroki Sakamoto, <i>et al.</i>	S922
273	Construction of bloom continuous casting machine and its operation. Kunio Ishimitsu, <i>et al.</i>	S923
274	The construction and operation of No. 3 slab caster at Chiba Works, Kawasaki Steel Corp. Saburo Moriwaki, <i>et al.</i>	S924
275	Automitization of No. 3 slab caster at Chiba Works, Kawasaki Steel Corp. Susumu Itoh, <i>et al.</i>	S925
276	The construction and operation of new slab caster at Sakai Works, Nippon Steel Corp. Katsumi Funatsu, <i>et al.</i>	S926
277	Spot scarfing start technique for hot slabs. (Development of automatic spot scarfing machine for hot slabs—I). Shin-ichi Gima, <i>et al.</i>	S927
278	Fin-free technique of spot scarfing for hot slabs. (Development of automatic spot scarfing machine for hot slabs—II). Yoshihisa Kawahara, <i>et al.</i>	S928
279	On the foaming of slag in desiliconization treatment of hot metal. (Development of slag minimum refining process—VII). Yuji Kawauchi, <i>et al.</i>	S929
280	Changes in hot metal composition during the desiliconization treatment. (Development of limeless-blown—I). Michiharu Ozawa, <i>et al.</i>	S930
281	The behavior of oxygen in hot metal. (Fundamental study of hot metal pretreatment—I). Katsuhiro Iwasaki, <i>et al.</i>	S931
282	Development of hot metal level meter in torpedo car. Keiichi Akimoto, <i>et al.</i>	S932
283	Dephosphorization of pig iron with lime-oxygen injection in 100 kg induction furnace. Toshiyuki Kaneko, <i>et al.</i>	S933
284	Dephosphorization of hot metal with $\text{CaO-O}_2$ injection. Tamenori Masui, <i>et al.</i>	S934
285	On the depshosphorization of carbon-saturated iron with $\text{CaO}$ flux. Hiroki Goto, <i>et al.</i>	S935
286	The depshosphorization and desulfurization of molten iron by $\text{CaO}$ flux injection. Morihiro Sumida, <i>et al.</i>	S936
287	Dephosphorization and desulfurization of hot metal by flux injection method. (Dephosphorization of hot metal and molten steel—V). Akihide Hikosaka, <i>et al.</i>	S937
288	Mechanism of hot metal depshosphorization by injecting lime base fluxes into bottom blown converter. Tsutomu Nozaki, <i>et al.</i>	S938
289	Changes in hot metal composition during the depshosphorization treatment. (Development of limeless-blowing—II). Michiharu Ozawa, <i>et al.</i>	S939
290	Dephosphorization and Desulfurization of liquid iron by $\text{CaF}_2\text{-CaO-Al}_2\text{O}_3$ flux. Ryūji Nakao, <i>et al.</i>	S940
291	Dephosphorization of molten iron by calcium-silicide. Manabu Ohori, <i>et al.</i>	S941
292	Sulfur partitions between carbon saturated iron melt and $\text{Na}_2\text{O-SiO}_2$ slags. Hideaki Suito, <i>et al.</i>	S942
293	Dephosphorization equilibrium of soda-slag. (Fundamental study of hot metal pretreatment—II). Tsutomu Usui, <i>et al.</i>	S943
294	Effect of stirring energy on the performance of depshosphorization treatment with soda ash. (Fundamental study of hot metal pretreatment—III). Kenzo Yamada, <i>et al.</i>	S944
295	Effects of carbon contents and temperature of liquid iron on depshosphorization by $\text{Na}_2\text{O-SiO}_2$ slag. (Dephosphorization of liquid iron by $\text{Na}_2\text{O-SiO}_2\text{-Fe}_2\text{O}_3$ slag—III). Kyoji Kunisada, <i>et al.</i>	S945
296	Removal of nitrogen in hot metal by sodium carbonate treatment. Yoshiyasu Shirota, <i>et al.</i>	S946

#### — PLASTIC WORKING AND OTHER FABRICATION PROCESSES —

**November 1, 1981**

297	New process for direct connection of steelmaking plant to rolling mills. Koji Shima, <i>et al.</i>	S947
298	A practical application to internal flaw detection of hot slabs by electromagnetic ultrasonic testing. Katsuhiro Kawashima, <i>et al.</i>	S948
299	Eddy current inspection method using rotating probes for hot steel rods and wires. (Studies on the surface defect of hot slab—VII). Takahide Sakamoto, <i>et al.</i>	S949
300	Ultrasonic testing for surface defect. (Development of automatic ultrasonic testing equipment for surface defect of billets—I). Shigeaki Matsumoto, <i>et al.</i>	S950
301	Ultrasonic inspection system for surface defects of billets. (Development of automatic ultrasonic testing equipment for surface defect of billets—II). Ken-ichi Miyata, <i>et al.</i>	S951

302	The effects of pre-shaping press method with parallel part in hot rolling. (Improvement of yield-ratio in hot strip rolling—III). Hideki Tokita, <i>et al.</i>	S952
303	Improvement of flatness of sheet at low temperature coiling in hot strip mill. Nobuo Yamada, <i>et al.</i>	S953
304	Shape control of hot strip mill with variable crown back up roll. Toshihiko Nagai, <i>et al.</i>	S954
305	The effect of roll eccentricity control in tandem cold mill. Kimiaki Doi, <i>et al.</i>	S955
306	Crown control by large-crowned back-up roll in hot strip mill. Mikie Tokunaga, <i>et al.</i>	S956
307	Crown control in tandem rolling. (On-line crown control in hot strip mill by D.C.B.—I). Minoru Baba, <i>et al.</i>	S957
308	Strip profile control by chamfer-BR on tandem mill. (Profile control for hot strip rolling—II). Sadakazu Masuda, <i>et al.</i>	S958
309	Strip profile control by chamfer-BR on actual mill. (Profile control for hot strip rolling—III). Akira Gonda, <i>et al.</i>	S959
310	Prevention of defects caused by table rollers in rougher rolling. (Prevention of surface defects of ferritic stainless in hot rolling—I). Itaru Hishinuma, <i>et al.</i>	S960
311	On the formation mechanism of seam-like cracking during plate rolling. Takashi Shimohata, <i>et al.</i>	S961
312	Prevention of scale on deformed bars by forced water cooling. Susumu Yambe, <i>et al.</i>	S962
313	Application of VVVF system for descaling pumps in the hot strip mill. Tomoo Nishi, <i>et al.</i>	S963
314	Operation aspects of waste heat boiler in hot strip mill at Keihin Works, Nippon Kokan K.K. Tuneo Kazama, <i>et al.</i>	S964
315	High current density electrolytic cleaning line for cold rolled strip. Masashi Kurata, <i>et al.</i>	S965
316	Reconstruction MG to thyristor of tandem cold mill motor for saving energy. Kazunari Nishimura, <i>et al.</i>	S966
317	Acid regeneration and recovery plant in continuous pickling line in hot strip mill of Keihin Works, Nippon Kokan K.K. Kunpei Kondo, <i>et al.</i>	S967
318	Recycling technology of wastewater in iron and steel industry. Masahiko Mizuma, <i>et al.</i>	S968
319	Levelling properties of swimming roll in tension leveller. Kito Oda, <i>et al.</i>	S969
320	Deformation aspect and mechanical properties of steel sheet in fine blanking. Iwao Sawai, <i>et al.</i>	S970
321	A newly developed method for production of steel fiber for the reinforcement of motor. Akira Yanagisawa, <i>et al.</i>	S971
322	Development of the helical roller turning device for changing the strip threading direction. Yasutaka Nawata, <i>et al.</i>	S972
323	SRL (skinpass and recoiling line)—A new process line of thin gauge black plate coil for galvanized steel sheets. Keizō Fujiwara, <i>et al.</i>	S973

#### November 2, 1981

324	Corrosion behavior of several precoated steels for automotive body. Shigeru Wakano, <i>et al.</i>	S974
325	Production of Ni-Zn alloy plated steel sheet. Hideyuki Nakahara, <i>et al.</i>	S975
326	Formability of Ni-Zn coated steel sheets for auto-body panels. Tadashi Sakane, <i>et al.</i>	S976
327	Spot weldability of Ni-Zn alloy plated steel sheet. Takao Taka, <i>et al.</i>	S977
328	On-line analyzer for the production of electroplated Ni-Zn alloy steel sheet. Yoshiro Matsumoto, <i>et al.</i>	S978
329	Development of Zn/Zn-Ni and Zn-Cr/Zn-Ni alloy electroplated steel sheet. (Development of double-layer alloy electroplated steel sheet—I). Masatoshi Iwai, <i>et al.</i>	S979
330	Development of Zn-Fe/Zn-Ni alloy electroplated steel sheet. (Development of double-layer alloy electroplated steel sheet—II). Hirohiko Sakai, <i>et al.</i>	S980
331	The prevention of pimples on electrogalvanized steel in press forming. Koji Yamato, <i>et al.</i>	S981
332	Study on electroplating with the reduced distance between the strip and the anode. (Development of new electroplating process—I). Hirohumi Nakano, <i>et al.</i>	S982
333	Inclusions in steels for DI cans. Takaaki Nakamura, <i>et al.</i>	S983
334	Development of an automatic SBI testing machine. Toshiaki Shimada, <i>et al.</i>	S984
335	Effects of surface conditions on welding of can materials. (Resistance seam welding of can materials—I). Makoto Kabasawa, <i>et al.</i>	S985
336	Effect of tinplate surface structure on eyeholing. Yasuhei Sakamoto, <i>et al.</i>	S986
337	Influence of reflow conditions on Fe-Sn alloy structure. Yoshinori Yomura, <i>et al.</i>	S987
338	Study on coating weight control by gas wiping under reduced O <sub>2</sub> concentration environment. (Study of coating weight control in galvanized steel strip—I). Katusi Saitō, <i>et al.</i>	S988
339	Study on coating weight control by gas wiping with the reduced distance between the strip and nozzle. (Study of coating weight control in galvanized steel strip—III). Katusi Saitō, <i>et al.</i>	S989
340	Study on Mg-Zn galvanized steel strip. (Study of coating weight control in galvanized steel strip—IV). Motohiro Nakayama, <i>et al.</i>	S990
341	Conversion coating process by gas wiping.—Optimum nozzle system by water model simulation—.	

Yasuhisa Tajiri, <i>et al.</i>	S991
342 Influence of alloying elements on corrosion resistance of alloys to molten zinc. Saburo Wakita, <i>et al.</i>	S992
343 Influence of Al state in substrata on wetting characteristics of Al-killed steel with molten zinc. Jiro Sumiya, <i>et al.</i>	S993
344 Influence of surface morphology on wetting characteristics of steel sheet with molten zinc. Yusuke Hirose, <i>et al.</i>	S994
345 Surface discoloration of aluminized steel sheet after heating at 400°~600°C. Yukio Uchida, <i>et al.</i>	S995
346 Influence of chemical compositions on the manufacture of dual-phase steels by continuous galvanizing heat cycles. Akihiko Nishimoto, <i>et al.</i>	S996
347 Influence of Si, P, and Ti in high strength steel on the alloying reaction between iron and zinc. Jyun-ichi Inagaki, <i>et al.</i>	S997
348 The development of high strength galvannealed steel sheet of extra deepdrawing quality. Akira Hase, <i>et al.</i>	S998
349 Production and quality characteristic of deep drawing quality, high strength galvanized steel sheet. Koichi Hirase, <i>et al.</i>	S999
350 Effect of iron plating on galvanizing of Si-containing high strength steel sheet. Makoto Himeno, <i>et al.</i>	S1000
351 Operation of uniflow-annealing system. Masaji Watanabe, <i>et al.</i>	S1001
352 Recent progress of UAD. Kunio Kawamoto, <i>et al.</i>	S1002
353 Development of the simulation model for the coldest point temperature in batch annealing—II. Takahito Watanabe, <i>et al.</i>	S1003
354 Tension control in a multipurpose continuous annealing line. Koichi Tahara, <i>et al.</i>	S1004
355 Decrease on fuel consumption of plate reheating furnace at Oita Works, Nippon Steel Corp.—I. Tetsuro Hatakeyama, <i>et al.</i>	S1005
356 Energy saving of HCR reheating furnace for continuous cast blooms. Yoshifumi Nakano, <i>et al.</i>	S1006
357 Optimal reheating furnace control by inverse time domain calculation. Sunao Tanimoto, <i>et al.</i>	S1007
358 The effect of mixing ratio of C.O.G. and B.F.G. on the heat transfer efficiency in a furnace. Kunihiro Yabuki, <i>et al.</i>	S1008
359 Development of a new type of pulverized coal burner. Motofumi Kaminaka, <i>et al.</i>	S1009
360 Temperature distribution measurement with silicon photodiode array. Naoki Harada, <i>et al.</i>	S1010
361 Selective film structure of stainless steel for solar absorber. Jiro Ohno, <i>et al.</i>	S1011
362 Thermal properties of stainless steel solar absorber. Jiro Ohno, <i>et al.</i>	S1012
363 Effect of the outermost layer elements on chemical coloring phenomenon of SUS304 stainless steels. Kazuko Uchida, <i>et al.</i>	S1013
364 Carbide coating on steel by immersing in molten bath consisting of neutral salts, V <sub>2</sub> O <sub>5</sub> and others. Norimasa Uchida	S1014
365 Carbide coating on steel by immersing in molten bath consisting of neutral salts, Fe-V powders and others. Norimasa Uchida.	S1015
366 Drying system of cold-rolled strip by induction-heating in coating line. Koji Ono, <i>et al.</i>	S1016
367 Crack of coated film at bending of precoated galvanized steel. Kenzi Hara, <i>et al.</i>	S1017
368 Predicting method on the service life of coated steel sheet. Eiki Takeshima, <i>et al.</i>	S1018
369 Predicting on deterioration (peeling) of PVC coated film by fluorescent X-ray. Toshinori Kawano, <i>et al.</i>	S1019
370 Properties of precoated steel sheets with lubricating film from UV curing. (Application of UV curing process to precoating of steel sheets—I). Masaya Tsutsumi, <i>et al.</i>	S1020
371 Production of high adhesive strength polyethylene coated pipe by cross head die. Yūzi Ikeda, <i>et al.</i>	S1021
372 Field protection technique in splash and tidal zone of offshore structures.—High corrosion resistant epoxy-mastic lining using special modified FRP mold—. Sakae Fujita, <i>et al.</i>	S1022
373 Development of stainless clad steel sheet. Tatsumasa Izumi, <i>et al.</i>	S1023
374 Press-formability of Al-clad steel sheet. (Research and development of Al-clad steel sheet—III). Hisao Kawase, <i>et al.</i>	S1024
375 Improvement of plane shape by plate edger. Yoshihei Kobayashi, <i>et al.</i>	S1025
376 Improvement of the yield by edging method in plate rolling. Masahiko Fukuda, <i>et al.</i>	S1026
377 Study on the plan view pattern control by partial lubrication. Yoshio Oike, <i>et al.</i>	S1027
378 Development of width control in plate rolling. Toshiaki Huchinami, <i>et al.</i>	S1028
379 Crop shape detecting system of hot strip. Toshihiro Konishi, <i>et al.</i>	S1029
380 Metal deformation in edging of slabs with circular grooved rolls. Syohei Kanari, <i>et al.</i>	S1030
381 Improvement in crop shapes by press preforming of slabs. Masami Oki, <i>et al.</i>	S1031
382 Relation among the width reduction of slabs and the shape of rolled slabs, rolling force and rolling torque under two rolling processes. Hirohiko Takuda, <i>et al.</i>	S1032

- 383 Manufacturing process of inverted angle from continuous casting slab. Mituharu Masuda, *et al.* ..... S1033  
 384 The experimental study on preventing slit-bone at roll slitting of hot slabs. Yoneaki Fujita, *et al.* ..... S1034

**November 3, 1981**

- 385 Computer control system of billet induction heater. Tadashi Makino, *et al.* ..... S1035  
 386 Finite element analysis of induction heating. Tsuguo Kondou. ..... S1036  
 387 Steady-state technique for measurement on heat transfer coefficient in cooling of hot metal surface with impinging droplet. Kazuo Araki, *et al.* ..... S1037  
 388 Development of curtain wall cooling system in hot strip mill. Yutaka Takemoto, *et al.* ..... S1038  
 389 Facilities for production of as hot rolled dual phase steel. Teruo Yokokura, *et al.* ..... S1039  
 390 Thermal stress of high carbon slab at various cooling conditions. Yasunori Tsugami, *et al.* ..... S1040  
 391 The cooling of moving hot steel plate with water. Akinori Otomo, *et al.* ..... S1041  
 392 Analysis of deflection during cooling of sheet pile. Hiroshi Yoshida, *et al.* ..... S1042  
 393 Reduction of residual stresses in hot-rolled wide-flange H-beams. (Prevention of the residual deformation during cooling in hot-rolled sections-II). Ichiro Nakauchi, *et al.* ..... S1043  
 394 Calculation of temperatures of wire rod and bar in the rolling mill train. Mitsuru Moritaka, *et al.* ..... S1044  
 395 Controlled rolling at heavy plate mill in Oita Works, Nippon Steel Corp.—I. Hiroyuki Asano, *et al.* ..... S1045  
 396 Application of inline gas cutter (IGC) to heavy plate rolling process. Kozo Kono, *et al.* ..... S1046  
 397 Development of automatic labeling machine. Kazuyosi Miyazawa, *et al.* ..... S1047  
 398 The high accurate on-line automatic ultrasonic testing device for heavy plates. Shuuichi Hara, *et al.* ..... S1048  
 399 Labor saved hot skinpass mill and bundling line. (Facility and operation technology in finishing line of hot strip mill of Keihin Works, Nippon Kokan K.K.—I). Kunio Dōyama, *et al.* ..... S1049  
 400 Energy control system in Nagoya Works, Nippon Steel Corp. Atsumi Ishii, *et al.* ..... S1050  
 401 SNAP-A new data analysis processor. Hidekazu Yasuda, *et al.* ..... S1051  
 402 Development of the computerized binding machine for hot-rolled coils. Tomoo Nishi, *et al.* ..... S1052  
 403 Principal component analysis of the interlock shape of steel sheet pilings. Hiroshi Higashinaka, *et al.* ..... S1053  
 404 One-heat rolling technique for large H-shapes out of C.C. slabs. (Development of new beam blank rolling method—IV). Mikio Sasada, *et al.* ..... S1054  
 405 Deformation characteristics of beam blanks in partial web rolling method. Takashi Kusaba, *et al.* ..... S1055  
 406 Application of caliberless rolling to roughing mills. (Development of caliberless rolling—I). Takashi Morita, *et al.* ..... S1056  
 407 Application of caliberless roll to finishing mills. (Development of caliberless rolling—II). Ryo Takeda, *et al.* ..... S1057  
 408 A new method for hot rolling of the asymmetrical beam blank. Hiroshi Kubo, *et al.* ..... S1058  
 409 The method of making Cr bearing low-alloy E.R.W. steel pipes. Shuzo Watanabe, *et al.* ..... S1059  
 410 Saving welding consumables in SAW method for large diameter welded pipe. Yasuhiko Tanaka, *et al.* ..... S1060  
 411 Effect of metal flow angle on longitudinal seam weld toughness of electric resistance welded pipe. Michio Saito, *et al.* ..... S1061  
 412 Measurement of bead shape by light section method and its application. (Measurement of bead shape of electric resistance welding pipe—I). Katsujiro Watanabe, *et al.* ..... S1062  
 413 Application to the control of heat. (Measurement of bead shape on electric resistance welding tube—II). Kōji Suzuki, *et al.* ..... S1063  
 414 Effect of downhill height on edge waves of thin wall thickness and large diameter ERW pipe. Takaaki Toyooka, *et al.* ..... S1064  
 415 Effect of process conditions on the performance in a centrifugal-thermit process. Osamu Odawara, *et al.* ..... S1065  
 416 Effect of additives to the thermit on the performance in a centrifugal-thermit on the process. Osamu Odawara, *et al.* ..... S1066  
 417 Composite materials produced by a centrifugal-thermit process. Osamu Odawara, *et al.* ..... S1067  
 418 Deformation during upsetting in extrusion of pipe by direct piercing method. (Hot extrusion process of pipe by direct piercing method—II). Yutaka Mihara, *et al.* ..... S1068  
 419 Deformation during piercing in extrusion of pipe by direct piercing method. (Hot extrusion process of pipe by direct piercing method—III). Tomoshige Sudō, *et al.* ..... S1069  
 420 Deformation of defects on tube surface by Mannesmann piercing. Masumi Kaida, *et al.* ..... S1070  
 421 Generation mechanism of score at plug mill. Susumu Mizunuma, *et al.* ..... S1071  
 422 Development of continuously feed equipment of lubricant on plug mill. Takeshi Shimoda, *et al.* ..... S1072  
 423 Wear in liquid nitrogen and liquid oxygen. Byon Sun Chun, *et al.* ..... S1073  
 424 Wear resistance of materials for work roll and intermediate roll of 6-high cold strip mill.

Takahiro Takashima, <i>et al.</i>	S1074
425 Deterioration of pinch roll of continuous casting machine. Osamu Kato, <i>et al.</i>	S1075
426 Measurement of residual stresses in small compound cast iron rolls. Kuniaki Edamatsu, <i>et al.</i>	S1076
427 The influence of austenitizing condition on the roughness after shot blasting of work rolls in cold strip mills. Masatake Ishii, <i>et al.</i>	S1077
428 Influence of roll history, material and strip roll wear and condition to make black film in hot strip test mill. Kazumoto Nakamura, <i>et al.</i>	S1078
429 Unusual deterioration and its mechanism on caliber roll surface with high reduction rolling. Akira Ohnuki, <i>et al.</i>	S1079
430 Counter measures for partial wear of finisher work roll in hot strip mill. Jun Kawai, <i>et al.</i>	S1080
431 Work roll temperature and cooling in hot strip rougher mill. Shinjiro Murakami, <i>et al.</i>	S1081
432 Effect of spreading characteristics on lubricity of rolling oil. Hideo Yamamoto, <i>et al.</i>	S1082
433 Thermal characteristics of strip and work roll in the cold tandem mill. (Analysis of recirculation coolant system in cold tandem mill—VII). Hiroshi Kamio, <i>et al.</i>	S1083
434 Development of new dynamic tester for the plate out quality of rolling emulsion. (Analysis of recirculation coolant system in cold tandem mill—VIII). Yutaka Ohkubo, <i>et al.</i>	S1084
435 An analysis of chatter mark in temper mill. Masaaki Okaue, <i>et al.</i>	S1085
436 "Chattering" in Senzimir cold rolling mill for stainless steel cold strip. Yasuo Izumi, <i>et al.</i>	S1086

— ANALYSES —

**November 1, 1981**

437 Determination of trace elements in steel by emission spectrometry with arc-like excitation source. Mamoru Yamaji, <i>et al.</i>	S1087
438 G. P. laser spectrochemical analysis of $\text{Fe}_2\text{O}_3\text{-CaO-SiO}_2$ solid oxide system. (Study on continuous melting and smelting reduction—X). Tsuyoshi Ozaki, <i>et al.</i>	S1088
439 Analysis of calcium in steel by quantovac. Yuji Okuyama, <i>et al.</i>	S1089
440 Background measurement on the determination of trace elements in steel by ICP AES. Noritaka Sakao, <i>et al.</i>	S1090
441 Analysis of stainless steel by inductively coupled plasma emission spectrometry. Tadashige Shiga, <i>et al.</i>	S1091
442 Analysis of steel by optical emission spectrometer with inductively coupled plasma. Tomoyuki Ichioka, <i>et al.</i>	S1092
443 Analytical method of many elements in a small amount of sample by atomic absorption spectrometry. Yoshihisa Kōno, <i>et al.</i>	S1093
444 Simultaneous determination of several elements in cast iron and low alloyed steel by atomic absorption spectrophotometry. Naoya Inoyama, <i>et al.</i>	S1094
445 Determination of phosphorus in niobium-bearing steels by molybdenum blue photometric method. Fumikichi Mogi, <i>et al.</i>	S1095
446 Effect of combustion conditions on the determination of trace amounts of sulfur in iron and steel. Sen-ichi Harimaya, <i>et al.</i>	S1096
447 Problems on gas analysis relevant to fundamental researches on iron and steelmaking. Mitsuru Ueda, <i>et al.</i>	S1097
448 Determination of nitrogen as nitride in steel by alkali fusion method. Atusi Tino, <i>et al.</i>	S1098
449 Phase analysis of carbon in steel by hydrogen hot extraction. (Phase analysis of non-metallic elements in steel by hydrogen hot extraction—III). Takeshi Furukawa, <i>et al.</i>	S1099
450 Determination of free nitrogen in steel by hot hydrogen extraction method at constant temperature. Yoshiro Takizawa, <i>et al.</i>	S1100

**November 2, 1981**

451 Measuring method of environmental odor. Tomiyuki Mizuno, <i>et al.</i>	S1101
452 Analysis apparatuses and data processing system at No. 3 steelmaking plant in Yawata Works of Nippon Steel Corp. Takehisa Tsuchiya, <i>et al.</i>	S1102
453 Rapid determination of free lime in steelmaking slag. Kenji Furukawa, <i>et al.</i>	S1103
454 Rapid determination of free CaO in LD slag. Hiroyasu Yoshikawa, <i>et al.</i>	S1104
455 Analysis of fatty acid in cold rolling lubricant. Keiichi Tanikawa, <i>et al.</i>	S1105
456 Behavior of lubrication oil on cold rolled sheet in annealing process. Keiichi Tanikawa, <i>et al.</i>	S1106
457 Determination of individual organic compounds in cold rolling oils. Takashi Ochiai, <i>et al.</i>	S1107
458 Development of the electron probe large area mapping analyzer. Koichi Kitamura, <i>et al.</i>	S1108
459 Quantitative analysis of segregation and inclusion by electron probe large area mapping analyzer. Koichi Kitamura, <i>et al.</i>	S1109
460 Depth profile analysis of steel surfaces by glow discharge spectroscopy. Yoshiharu Ohashi, <i>et al.</i>	S1110

## — PROPERTIES OF IRON AND STEEL —

November 1, 1981

- 461 Soundness and homogeneity of the large mono-block forged ring. (Properties of the large mono-block forged shell course ring (ASME SA508 Cl3) for reactor pressure vessel—I). Takeshi Ikemoto, *et al.* ..... S1111
- 462 Fracture toughness of the large mono-block forged ring. (Properties of the large mono-block forged shell course ring (ASME SA508 Cl3) for reactor pressure vessel—II). Ishige Shigematsu, *et al.* ..... S1112
- 463 Fatigue property of the large mono-block forged ring. (Properties of the large mono-block forged shell course ring (ASME SA508 Cl3) for reactor pressure vessel—III). Ishige Shigematsu, *et al.* ..... S1113
- 464 Weldability of the large mono-block forged ring. (Properties of the large mono-block forged shell course ring (ASME SA508 Cl3) for reactor pressure vessel—IV). Ishige Shigematsu, *et al.* ..... S1114
- 465 Effect of cold forming on mechanical properties of steel plates for pressure vessel—II. Takeshi Kohriyama, *et al.* ..... S1115
- 466 Retardation in fatigue crack propagation rate by monotonic over loading in a pressure vessel steel. Mitsugu Hanzawa, *et al.* ..... S1116
- 467 Mechanical properties of heavy section SUS F316L shell forging. Kazuo Aso, *et al.* ..... S1117
- 468 Effect of heat treatment conditions on toughness in  $^{1.5}\text{Cr}-\frac{1}{2}\text{Mo}$  steels for pressure vessels. Isamu Takagi, *et al.* ..... S1118
- 469 Estimation for creep retaining life of Cr-Mo steel tube for power boiler. Kohichi Asakawa, *et al.* ..... S1119
- 470 Temper embrittlement of  $2\frac{1}{4}\text{Cr}-1\text{Mo}$  steel.—On the isotropical effect—. Masahide Suzuki, *et al.* ..... S1120
- 471 Hydrogen embrittlement of a temper embrittled  $2\frac{1}{4}\text{Cr}-1\text{Mo}$  steel under slow dynamic loading. Keishi Nakano, *et al.* ..... S1121
- 472 Susceptibility of hydrogen embrittlement in temper-embrittled Cr-Mo steels. Makoto Yamada, *et al.* ..... S1122
- 473 Exposure test results of welded joint of A387-22 steel plate melted by BOP. Yukio Tsuda, *et al.* ..... S1123
- 474 Hydrogen embrittlement of SUS304 welding zone. Shuichi Funaki, *et al.* ..... S1124
- 475 Qualities of low Al and N steel produced by RH degassing. (Development of continuously cast steel for common use as flat rolled products—I). Masatoshi Takahashi, *et al.* ..... S1125
- 476 Relation between mechanical properties and manufacturing conditions of low Al and N steel, (Development of continuously cast steel for common use as flat rolled products—II). Masatoshi Takahashi, *et al.* ..... S1126
- 477 Influence of the soaking temperature of slab on mechanical properties of low Al and N steel. (Development of continuously cast steel for common use as flat rolled products—III). Hiroshi Shibayama, *et al.* ..... S1127
- 478 Surface defect in low Al-low N hot-rolled steel sheets. Haruo Mitsuji, *et al.* ..... S1128
- 479 Study on hot workability of Mn-Ni-Mo low alloy steel with various Al content. Akihiko Ikegaya, *et al.* ..... S1129
- 480 Surface composition of annealed steel sheets. Motoyuki Konishi, *et al.* ..... S1130
- 481 Formation of graphite on the surface of cold rolled low carbon steel sheet during annealing. Masanori Ohmura, *et al.* ..... S1131
- 482 Effect of inclusion shape on surface fracture in cold forming of thin plate. Masao Iritani, *et al.* ..... S1132
- 483 Diagonal tensile test of square specimen. Takaaki Hira, *et al.* ..... S1133
- 484 Strain-age-hardening at  $100^\circ\text{C}$ ,  $150^\circ\text{C}$  and  $200^\circ\text{C}$  in low-carbon sheet steel for various degrees of carbon-supersaturation. Takeshi Suzuki, *et al.* ..... S1134
- 485 Effects of phosphorus on recrystallization behaviour of rapid annealed, cold-rolled steel sheets. (Research and development of high strength steel sheet for automobiles—XXIII). Koichi Kawasaki, *et al.* ..... S1135
- 486 Effects of solute carbon on the recrystallization texture development in steel. Atsuki Okamoto, *et al.* ..... S1136
- 487 Effects of phosphorus and solute carbon on recrystallization texture in extra-low carbon cold rolled steel sheets bearing niobium. Susumu Satoh, *et al.* ..... S1137
- 488 A mathematical description of recrystallization texture development in cold-rolled steel sheet. Osamu Akisue. ..... S1138
- 489 Mechanical properties of heavy section (188 mm) SB 49 boiler steel. Tetsuo Kikutake, *et al.* ..... S1139
- 490 Creep damage of Cr-Mo-V steel. Tetsuya Kisanuki, *et al.* ..... S1140
- 491 Creep mechanisms of Cr-Mo and Cr-Mo-V cast steels for steam turbine casing. Satoshi Igari, *et al.* ..... S1141
- 492 Effect of alloying elements on mechanical properties of  $2\frac{1}{4}\text{Cr}-1\text{Mo}$  steel plates. Katsukuni Hashimoto, *et al.* ..... S1142
- 493 Effects of impurities and heat treatment on creep rupture properties of the weld joints of Mo and Cr-Mo steels. Shinji Sato, *et al.* ..... S1143
- 494 The improvement of the elevated temperature strength and toughness of ferritic heat resisting steel.

Hisashi Watanabe, <i>et al.</i>	S1144
495 The effects of alloying elements and heat treatment on the creep strength of 10Cr-2Mo heat resisting steel. Kentaro Asakura, <i>et al.</i>	S1145
496 Effect of austenitizing temperature on creep rupture ductility of B-bearing 12CrMoVNb steel. Ik-min Park, <i>et al.</i>	S1146
497 Study on creep ductility of Ni-Cr austenitic steels. Takanori Nakazawa, <i>et al.</i>	S1147
498 Application of TTP methods to creep-rupture data with points of inflection. Yoshio Monma, <i>et al.</i>	S1148
499 Safety factor and predicted 100 000-300 000 h rupture strength for SUS 304, 316, 321, and 347 stainless steels. Akimitsu Miyazaki, <i>et al.</i>	S1149
500 Effect of intergranular precipitates on creep fracture behavior of Type 304 stainless steel. Hideo Tanaka, <i>et al.</i>	S1150
501 Rupture properties and creep fracture mechanism map for Type 321 stainless steel. Norio Shinya, <i>et al.</i>	S1151
502 Creep-rupture properties of SAW 304 stainless steel welded joints. Masayoshi Yamazaki, <i>et al.</i>	S1152
503 Effect of weaving arc on microstructure in MIG welding. Takayoshi Kasugai, <i>et al.</i>	S1153
504 Structural changes of mild steel during wire-rod rolling at low temperature. Nobuhiko Matsuzu, <i>et al.</i>	S1154
505 Change in austenite grain size during rolling of hot strip. Makoto Saeki, <i>et al.</i>	S1155
506 Austenite grain refinement of low carbon steel by thermomechanical processing and the effects of minor addition of niobium. Masaharu Tokizane, <i>et al.</i>	S1156
507 The effect of solute atoms on recovery and recrystallization of austenite. Sadahiro Yamamoto, <i>et al.</i>	S1157
508 Effects of microstructural changes during rolling on deformation resistance. Yoshiyuki Saito, <i>et al.</i>	S1158
509 Duplex microstructures due to warm working in Fe-Ni-Si alloy. Ei-ichi Furubayashi, <i>et al.</i>	S1159
567 The effect of chemical composition and hot deformation on $\alpha$ - $\gamma$ transformation in Fe-Si alloy or steel. Yoshiaki Iida, <i>et al.</i>	S1217
511 Deformation behavior of a bearing steel in the vicinity of $A_1$ transformation point and resulted grain refinement. Yasuyuki Kuroda, <i>et al.</i>	S1161
512 Effect of thermomechanical treatment on the microstructure of medium carbon steel wire. (Study in TMT-III). Shin-ichi Mogami, <i>et al.</i>	S1162
513 Magnetic and X-ray measurement of volume fraction of deformation induced martensite. Kenjiro Ito, <i>et al.</i>	S1163
514 Measuring principle and its apparatus. (Development of the on-line rockwell tester-I). Tsugio Ishida, <i>et al.</i>	S1164
515 Practical application. (Development of the on-line rockwell hardness tester-II). Yoshifumi Sadakata, <i>et al.</i>	S1165
516 On-line evaluation of volume fraction of phases in steel sheets. Hajime Kitagawa, <i>et al.</i>	S1166

**November 2, 1981**

517 Measurement of fracture toughness behavior using computerized unloading compliance techniques. Shin-ichi Ono, <i>et al.</i>	S1167
518 Application of the AC potential drop technique to the determination of $R$ -curves. Naoki Okumura, <i>et al.</i>	S1168
519 Dynamic fracture toughness of structural steels by instrumented Charpy test. Kaoru Sasaki, <i>et al.</i>	S1169
520 The effect of extension rate on the fracture toughness of SUS 304 steel in 98°C pure water. Nobuya Nakajima, <i>et al.</i>	S1170
521 Evaluation of cleavage fracture strength of ferrite-pearlite steels in terms of grain size and carbide size. Naoki Okumura, <i>et al.</i>	S1171
522 Fracture toughness and fractography of 40 to 80 Kg/mm <sup>2</sup> class steel in room and intermediate temperatures. Toshinori Yokomaku, <i>et al.</i>	S1172
523 COD and fatigue crack propagation characteristics of heavy section C-Mn-V steel. (Study on the heavy section steel for cryogenic service-II). Takashi Fukuda, <i>et al.</i>	S1173
524 Effects of chemical compositions on COD value of weld heat-affected zone. (Development of steel plates for low temperature service with improved COD value in weld fusion zone-I). Takao Horiya, <i>et al.</i>	S1174
525 An estimating method of minimum value of COD in weld fusion zone. (Development of steel plates for low temperature service with improved COD value in weld fusion zone-II). Takao Horiya, <i>et al.</i>	S1175
526 Production of low yield ratio high strength steel sheet by continuous annealing. (Development of process and products for continuous annealing line-VIII). Masayuki Kinoshita, <i>et al.</i>	S1176
527 Production of high strength cold strip for drawing quality. (Development of process and products	

for continuous annealing line—IX). Shuji Kanetoh, <i>et al.</i>	S1177
528 Production of drawing quality cold strip—II. (Development of process and product for continuous annealing line—X). Osamu Nozoe, <i>et al.</i>	S1178
529 Production of the high strength cold-rolled steel sheet with super deep drawability in multipurpose continuous annealing line. Jyunsuke Takasaki, <i>et al.</i>	S1179
530 How to improve the aging properties of continuous-annealed drawing-quality steel sheets. Yoshihiro Hosoya, <i>et al.</i>	S1180
531 Strength and bendability of ultra high strength cold-rolled steel by continuous annealing. Noriaki Nagao, <i>et al.</i>	S1181
532 Production of deep drawing high strength steel sheet with high bake hardenability. (Research and development of high strength steel sheet for automobiles—XXIV). Yoshikuni Furuno, <i>et al.</i>	S1182
533 Effect of continuous annealing condition on mechanical properties in extra-low carbon cold-rolled steel sheet bearing niobium. Susumu Satoh, <i>et al.</i>	S1183
534 High strength extra-low carbon sheet steel containing Ti and P with deep drawability and bake-hardenability. Akira Yasuda, <i>et al.</i>	S1184
535 Influence of manufacturing process on elongation of ultra low carbon steel containing Nb. Akihige Yoshida, <i>et al.</i>	S1185
536 The properties of Si-Mn as-hot-rolled dual phase steel. (Research and development of high strength steel sheet for automobiles—XX). Yoshikuni Tokunaga, <i>et al.</i>	S1186
537 Manufacture of Si-Mn as-hot-rolled dual phase high strength steel. (Research and development of high strength steel sheet for automobiles—XXII). Yoshio Hashimoto, <i>et al.</i>	S1187
538 Optimum condition of rolling finishing and transformation behavior in as rolled dual phase steel. Tomoyoshi Okita, <i>et al.</i>	S1188
539 Formation of dual-phase structure during cooling of hot-rolled strip. (Production of as-hot-rolled dual-phase steel sheet). Jun-ichi Mano, <i>et al.</i>	S1189
540 Bake hardenability in as rolled dual phase steel characterized by accelerated cooling method. (HSLA having low yield ratio—VI). Kazutoshi Kunishige, <i>et al.</i>	S1190
541 Softening behavior in heat affected zone of flash butt welded hot rolled dual phase steel. (HSLA having low yield ratio—VII). Noriaki Nagao, <i>et al.</i>	S1191
542 Effect of chemical compositions on formability of flash-butt welded high strength hot-rolled steel sheet joints. Hiroshi Hashimoto, <i>et al.</i>	S1192
543 Effect of small addition of Nb on the mechanical properties of C-Mn steels. (Research and development of high strength steel sheet for automobiles—XXI). Masaki Nagao, <i>et al.</i>	S1193
544 Mechanical properties of hot-charged C-Mn steel. Yoshikazu Matsumura, <i>et al.</i>	S1194
545 Mechanical properties of hot-charged Nb bearing HSLA steel. Yoshikazu Matsumura, <i>et al.</i>	S1195
546 Hot charging process for hot-rolled and cold-rolled Al-killed steel sheets. Shiro Sayanagi, <i>et al.</i>	S1196
547 The effect of Cr, Si and Mn on the ductility of Ti bearing hot-rolled high strength steel sheets. (The development of Ti bearing hot-rolled high strength steel sheet with good cold formability—II). Yasuo Takahashi, <i>et al.</i>	S1197
548 Three dimensional analysis of the textures of austenitic stainless steel sheets by means of vector method. Shin-ichi Nishikawa, <i>et al.</i>	S1198
549 Formation of goss orientation in the hot-rolled texture of 3% silicon steel. Yoh Shimizu, <i>et al.</i>	S1199
550 On the recrystallization behaviour of grain oriented silicon steel during hot rolling. (Secondary recrystallization of grain oriented silicon steel with AlN as inhibitor—III). Jiro Harase, <i>et al.</i>	S1200
551 Incomplete secondary recrystallization in grain-oriented Si-Fe rolled directly from cast slabs. Yozo Suga, <i>et al.</i>	S1201
552 Variation of texture through the thickness of hot-rolled sheets of grain oriented silicon steel. Munetsugu Matsuo, <i>et al.</i>	S1202
553 A method for reducing core loss of grain oriented silicon steel by laser irradiation—I. Tohru Iuchi, <i>et al.</i>	S1203
554 The effect of heating rate on austenite grain size of steel—III. Hidenori Hiromatsu, <i>et al.</i>	S1204
555 Examination of continuous cooling transformation predicted by additivity rule. Kazunari Horiuchi, <i>et al.</i>	S1205
556 Isothermal and continuous cooling transformation in hypoeutectoid steels. Minoru Umemoto, <i>et al.</i>	S1206
557 Formation of precipitates in rows in Nb bearing HSLA steel and their effect on strength. Yoshikazu Matsumura, <i>et al.</i>	S1207
558 The role of MnS in the precipitation of BN in a low carbon steel. Hajime Komatsu, <i>et al.</i>	S1208
559 Effects of Al-contents on the properties of quench-tempered low alloy steels. (Effect of Al and N on the hardenability of low alloy steels—IV). Tateki Nakaya, <i>et al.</i>	S1209
560 Effects of fine-grained bainite and martensite on strength and toughness of Nb-bearing ferritic steel. Ken-iti Amano, <i>et al.</i>	S1210
561 The change of strength and toughness during rapid tempering in HSLA steel.	

Yasufumi Fujishiro, <i>et al.</i>	S1211
562 Effect of chemical compositions on mechanical properties in normalized steel plates. (Study on improvement of toughness of normalized high tensile strength steel—III). Kazuyuki Matsui, <i>et al.</i>	S1212
563 Lowering of nickel content and carbon equivalent of heavy section SM 58 class steel by addition of small amount of niobium and boron. (Studies on niobium containing heavy section steel—I). Shingo Sato, <i>et al.</i>	S1213
568 Relation between graphitic corrosion and strength of cast iron pipe. Shigeru Mizoguchi, <i>et al.</i>	S1218
565 Electron optical studies of nonmetallic inclusions in ancient and modern steels. M. R. Notis, <i>et al.</i>	S1215
722 Upsetting property of low carbon resulphurized free cutting steel by continuous casting. (Continuous casting process of low carbon resulphurized free cutting steel—III). Takashi Nishimura, <i>et al.</i>	S1372
566 The effect of internal crack on the quality of material. Norio Katsuyama, <i>et al.</i>	S1216
564 Precipitation limit of the Nb[C-N] eutectics. (Studies on niobium containing heavy section steel—II). Susumu Matsui, <i>et al.</i>	S1214
569 Mechanical properties of steel plate for low temperature service manufactured by controlled rolling process. Shigehiko Yoshimura, <i>et al.</i>	S1219
570 Effects of alloying elements on mechanical properties of controlled rolled Ni-Nb-Ti steel plate. Manabu Yamauchi, <i>et al.</i>	S1220
571 Effect of alloying elements on heat-affected-zone toughness of controlled rolled Ni-Nb-Ti steel plate. Manabu Yamauchi, <i>et al.</i>	S1221
572 Effect of controlled rolling conditions on mechanical properties of controlled rolled Ni-Nb-Ti steel plate. Noriaki Akiyama, <i>et al.</i>	S1222
573 Trial production results of controlled-rolled low temperature service steel plate substitute for quenched and tempered 3.5%Ni steel plate. Noriaki Akiyama, <i>et al.</i>	S1223
574 Decreasing of steam-induced oxidation of austenitic stainless steel by chromium-rich oxide film. Takahiro Kaneko, <i>et al.</i>	S1224
575 Effects of S and Mn on corrosion behavior of 18-8 stainless steel. Kikuo Takizawa, <i>et al.</i>	S1225
576 Effects of alloying elements on the pitting resistance of austenitic stainless steels. Yosinobu Honkura, <i>et al.</i>	S1226
577 Phase stabilities of the thermomechanical treated SUS 304 and 316 austenitic alloys. Kiyoshi Kiuchi, <i>et al.</i>	S1227
578 Influence of alloying elements on the susceptibility to chloride stress corrosion cracking of austenitic stainless steels. Makoto Masuo, <i>et al.</i>	S1228
579 The crack growth behavior of SUS 304 steel in 98°C pure water. Seishi Shima, <i>et al.</i>	S1229
580 Control of the residual stress on the surface of stainless steel pipe by brushing. Nanao Takigawa, <i>et al.</i>	S1230
581 New evaluation method of rust resistance of stainless steels. Michio Nakata, <i>et al.</i>	S1231
582 Effects of Cu, Ni, Mo and S on the corrosion resistance of ferritic stainless steel. Yoshio Tarutani, <i>et al.</i>	S1232
583 Effect of Mn and Ti on the corrosion resistance of low C, N, 17Cr-Nb stabilized stainless steels. Toshirō Adachi, <i>et al.</i>	S1233
584 Effect of Al on intergranular corrosion of 17%Cr stainless steel. Takeo Ashiura, <i>et al.</i>	S1234
585 Charpy impact characteristics of extra-low C, N ferritic stainless steels. Noboru Kinoshita, <i>et al.</i>	S1235
586 Properties of MIG weldment of SUS 444 welded by matching composition filler materials. Keiichi Yoshioka, <i>et al.</i>	S1236
587 Development of molybdenum bearing ferritic stainless steel with good corrosion resistance and formability. Shigeru Kiya, <i>et al.</i>	S1237
588 Relationship between pitting corrosion and $\alpha/\gamma$ ratio in duplex stainless steels containing nitrogen. Kuniaki Osada, <i>et al.</i>	S1238
589 Relation between corrosion and metallography of $(\alpha-\gamma)$ duplex stainless steel. (Effect of cold working on corrosion behavior—I). Kikuo Takizawa, <i>et al.</i>	S1239
590 Relation between corrosion and metallography of $(\alpha+\gamma)$ duplex stainless steel. (Effect of 475°C aging on corrosion behavior—II). Kikuo Takizawa, <i>et al.</i>	S1240
695 Effects of chemical composition on mechanical properties of temper rolled metastable austenitic stainless steel. (Development of high tensile austenitic stainless steel for railway car structures—I). Seishi Ishiyama, <i>et al.</i>	S1345
591 Evaluation of fracture life by linear damage rule for SUS 316 stainless steel subjected to combined creep-fatigue loadings. Koichi Yagi, <i>et al.</i>	S1241
592 Effect of Ni content on high temperature properties of cold-worked Fe-Cr-Ni alloys for fast reactor fuel cladding tubes. Hiroyuki Uchida, <i>et al.</i>	S1242
593 Improvement of some properties of 25Cr-12Ni cast heat resistant alloy by Nb addition.	

594	Koji Tsuchida, <i>et al.</i> .....	S1243
595	Cast heat-resisting steels dispersion-strengthened by eutectic TiC. Toshiharu Kobayashi, <i>et al.</i> .....	S1244
596	Effect of Ti on the elevated-temperature properties of iron-based superalloys. Katsumi Iijima, <i>et al.</i> .....	S1245
597	Grain refining for an Fe-base superalloy through thermomechanical treatment. Kenkichi Matsunaga, <i>et al.</i> .....	S1246
598	Relation between solid solution strengthening and substructure of carbon free 25Cr-35Ni steels with additions of Groups IVb and Vb elements. Masao Takeyama, <i>et al.</i> .....	S1247
599	Temperature dependence of the solid solution strengthening of V, Nb and Ta on high temperature creep of carbon free 25Cr-35Ni steels. Yoshihiro Kondo, <i>et al.</i> .....	S1248
600	Studies on the stress exponent of steady state creep rate and the activation energy for creep of solid solution strengthened 25Cr-35Ni steels. Yoshihiro Kondo, <i>et al.</i> .....	S1249
601	Biaxial creep properties of Inconel 617 tube—with emphasis on low creep ductility. Kazuaki Mino, <i>et al.</i> .....	S1250
602	Long term stability of Ni base superalloy Udimet 720 bar and blade for gas turbine blade. Hitomi Itō, <i>et al.</i> .....	S1251
603	DTA thermographs and solidification reactions in IN-100 alloy. (Evaluation of structures and properties of Ni-base superalloys by differential thermal analysis—I). Toshiharu Noda, <i>et al.</i> .....	S1252
604	Stability of the $\sigma$ phase in the Ni-Cr-W system. (Phase equilibrium in the Ni-Cr-W system—IV). Yoshikuni Kadoya, <i>et al.</i> .....	S1253
605	Computer calculation of the Ni-Cr-W ternary phase diagram. (Phase equilibrium in the Ni-Cr-W system—V). Masanori Kajihara, <i>et al.</i> .....	S1254
606	Effect of grain size on high temperature creep properties of a Ni-20Cr-20W alloy. Keiichi Omura, <i>et al.</i> .....	S1255
607	The effect of Nb addition on high temperature creep properties of Ni-20Cr alloy. Tōru Inazumi, <i>et al.</i> .....	S1256
608	Exposure test of commercial alloys in coal gasification environments. Takehiko Itagaki, <i>et al.</i> .....	S1257
609	Effect of oxide scale on the red heat degree of 18Cr-3Al alloys. Nobuhiko Sueda, <i>et al.</i> .....	S1258
610	Effect of heat treatment on the creep rupture properties of $\gamma'$ precipitation-hardened Fe-42Ni-15Cr alloys. Masaru Yamamoto, <i>et al.</i> .....	S1259
611	Hot corrosion behavior of $\gamma'$ precipitation-hardened Fe-42Ni-15Cr alloys. Masayuki Yoshiba, <i>et al.</i> .....	S1260
612	Creep rupture properties of $\gamma'$ precipitation-hardened Fe-42Ni-15Cr alloys subjected to hot corrosion. Masayuki Yoshiba, <i>et al.</i> .....	S1261
613	Effect of hot corrosion on the strength properties of a nickel-base superalloy subjected to fatigue-creep interaction. Tatsuya Hamanaka, <i>et al.</i> .....	S1262
614	Internal penetration layer induced by the hot corrosion of mechanical alloy MA 754 in $\text{Na}_2\text{SO}_4-\text{NaCl}$ mixture. Yōichi Araki, <i>et al.</i> .....	S1263
615	Surface reactions associated with creep deformation of Hastelloy-X in simulated HTGR environment. Manabu Tamura, <i>et al.</i> .....	S1264
616	Role of minor alloying elements on oxide adhesivity on Ni-Cr-W alloys exposed to simulated VHTR helium. Masami Shindo, <i>et al.</i> .....	S1265
617	Effect of addition of Al, Zr, Y, Ce, La and Hf on the carburization resistance of high-Si-25Cr-35Ni alloy. Tsutomu Yoshida, <i>et al.</i> .....	S1266
618	The change of mechanical properties of 25Cr-35Ni heat resisting alloy during carburization damage. (Study on carburization of heat resisting cast alloy—II). Isao Hirata, <i>et al.</i> .....	S1267
619	Effect of oxide layer on the carburization of heat resisting cast steel. (Study on carburization of heat resisting cast alloy—III). Isao Hirata, <i>et al.</i> .....	S1268
620	Rotary bending fatigue strength of large diameter stepped shaft made of carburized steel. (Fatigue strength of surface hardened large diameter stepped steel shaft—I). Hideki Kawamura, <i>et al.</i> .....	S1269
621	The effect of hardened depth on fatigue strength of induction hardened steel. Shizuyo Konuma, <i>et al.</i> .....	S1270
622	Examination of fracture mechanics for fish eye failure of carburized steel. Chitoshi Matsuda, <i>et al.</i> .....	S1271
623	Characteristics of fatigue strength of sub-critical quenched structural alloy steels. (Improvement of fatigue strength of press-fitted axle by sub-critical quenching—VI). Ryōji Takahashi, <i>et al.</i> .....	S1272
624	Microstructural change of austenitic stainless steels under low-cycle fatigue at low temperatures. Kouji Mukai, <i>et al.</i> .....	S1273
625	Effect of nitrogen on low cyclic fatigue behavior of austenitic stainless steels. Natsuki Namura, <i>et al.</i> .....	S1274
	Behavior of plastic zone around fatigue cracks in SUS 304 stainless steel. Akira Azushima, <i>et al.</i> .....	S1275

626	Fatigue crack propagation properties and $\Delta K_{th}$ for several structural steel plate. Masao Kanao, <i>et al.</i>	S1276
627	The effect of various water environments on fatigue crack growth rate in high strength steels. Masae Sumita, <i>et al.</i>	S1277
628	Development of computer-controlled fatigue crack propagation test. (Corrosion fatigue of steels in sea water—I). Takahiro Fujita, <i>et al.</i>	S1278
629	Elastic-plastic fatigue crack growth in SM50B steel at elevated temperatures. Toshinori Yokomaku, <i>et al.</i>	S1279
630	Fatigue crack propagation behaviour of 18Cr-8Ni stainless steel at 600°C. Isamu Yamauchi, <i>et al.</i>	S1280
631	Effect of grain size on high temperature low-cycle fatigue behavior of Inconel 617. Hiroshi Hattori, <i>et al.</i>	S1281
632	Low cycle high temperature fatigue structure of SUS 316 stainless steel. Shozo Ikeda, <i>et al.</i>	S1282
633	Relative thermal fatigue resistances by fluidized-bed technique of Ni-base superalloys with various pack cementations. Yōzō Kawasaki, <i>et al.</i>	S1283
634	Effect of hydrogen on the UST defects in high strength steel plate from C.C. slab. Satoru Ura, <i>et al.</i>	S1284
635	Effects of grain boundary segregation on the delayed fracture of high strength steels. Shinsaku Matsuyama.	S1285
636	Delayed fracture testing method for high tension bolt steel. Katsuyoshi Miyamoto, <i>et al.</i>	S1286
637	Effect of dissolved oxygen in seawater on delayed failure of ultra-high strength steel. Noriyoshi Taniguchi, <i>et al.</i>	S1287
638	Effect of dissolved oxygen in seawater on delayed failure of ultra-high strength steel. Fukukazu Nakasato, <i>et al.</i>	S1288
639	Development of high manganese austenitic steel rolled in hot strip mill. Yohji Kohsaka, <i>et al.</i>	S1289
640	High temperature properties of high manganese non-magnetic steels. Terufumi Sasaki, <i>et al.</i>	S1290
641	Machinability of austenitic manganese steel in drilling. Tadahisa Akazawa, <i>et al.</i>	S1291
642	Effect of Al on mechanical properties of Mn-Cr non-magnetic steel. Tateo Ohhashi, <i>et al.</i>	S1292
643	Laboratory reappearance and observation of head checks failure in rail. Jun-ichirō Takehara, <i>et al.</i>	S1293
644	Effect of microstructure on the basic properties requested for rail steels. (Development of high strength weldable rail steels—I). Kazuo Sugino, <i>et al.</i>	S1294
645	Determination of alloying elements for the improvement of rail weldability. (Development of high strength weldable rail steels—II). Hideaki Kageyama, <i>et al.</i>	S1295
646	Metallurgical properties and results of a field test of high strength weldable rail steels. (Development of high strength weldable rail steels—III). Hideaki Kageyama, <i>et al.</i>	S1296

**November 3, 1981**

647	The effect of microstructure on the toughness of the precipitation hardening hot work alloy tool steel. Toshio Okuno.	S1297
648	Effect of carbides in specimens on the nitriding layer of die steel and high speed steel. Nobuhiro Nihira, <i>et al.</i>	S1298
649	Dimensional changes of pre-strained steel on stress relieving. Tamiki Yanagisawa, <i>et al.</i>	S1299
650	Effect of Si, Cr, V on the sag resistance of spring steels. Shinzo Ashida, <i>et al.</i>	S1300
651	Development of high productive axial flow quenching technique for steel pipes. (Establishment of direct quenching technique for seamless steel pipes—I). Keiichiro Takitani, <i>et al.</i>	S1301
652	Characteristics of direct quench equipments for seamless steel pipes. (Establishment of direct quenching technique for seamless steel pipes—II). Toyoji Kanno, <i>et al.</i>	S1302
653	Establishment of operating technique for direct quenching of seamless casing. (Establishment of direct quenching technique for seamless steel pipes—III). Toshikazu Masuda, <i>et al.</i>	S1303
654	Study on direct quench-and-tempering conditions of seamless pipes. (Establishment of direct quenching technique for seamless steel pipes—IV). Katsuo Ueno, <i>et al.</i>	S1304
655	Quality and its feature in direct quenched seamless casing. (Establishment of direct quenching technique for seamless steel pipes—V). Hiroaki Kawasaki, <i>et al.</i>	S1305
656	The influence of Mn phosphate coating upon make-up property of API connection. Kazushi Maruyama, <i>et al.</i>	S1306
657	Study on chemical compositions of ultra high-strength oil well casing. Hiroaki Kawasaki, <i>et al.</i>	S1307
658	The periodicity of chip formation in auscutting. Yasuo Fujioka, <i>et al.</i>	S1308
659	Improvements of gear hobbing in SCM440 with HB300. Tsuyoshi Kouoka, <i>et al.</i>	S1309
660	Effect of Ca on machinability of 4600 type steel made by sinter forging. Tatsuo Hisada, <i>et al.</i>	S1310
661	Charpy impact property of H-shape's fillet rolled from C.C.-slab. Noriyuki Kuriyama, <i>et al.</i>	S1311
662	Effect of high pressure patenting on the mechanical properties of drawn pearlitic steel wires. Yutaka Kanetsuki, <i>et al.</i>	S1312
663	Influence of spheroidizing annealing on hardenability of steel. Masanori Sakamoto, <i>et al.</i>	S1313

- 664 Effects of hot rolling conditions on mechanical properties of low alloy steel for structure purposes after spheroidizing. Chieko Matsumoto, *et al.* ..... S1314
- 665 On the properties of the 120 kg/mm<sup>2</sup> grade stud bolts manufactured from the high strength wire rod. Osami Serikawa, *et al.* ..... S1315
- 666 Quality in wire rods made from lengthwise C.C. hot slabs. Kinya Wakimoto, *et al.* ..... S1316
- 667 Mechanical properties of HSLA bar steels. (Controlled rolling in bar products—I). Tetsuya Sampei, *et al.* ..... S1317
- 668 Fatigue behavior and various properties of HSLA bar steels. (Controlled rolling in bar products—II). Takashi Abe, *et al.* ..... S1318
- 669 Development of controlled-rolled high-toughness steel plate for low-temperature service—I. Hiroshi Tamehiro, *et al.* ..... S1319
- 670 Development of controlled-rolled high-toughness steel plate for low-temperature service—II. Rikio Chigiiwa, *et al.* ..... S1320
- 671 Test results on notch toughness and weldability of controlled rolled steel plates. (Application of controlled rolled steel plates to flat bottom cylindrical LPG storage tanks—I). Yoshinori Nakagawa, *et al.* ..... S1321
- 672 Influence of crystallographic textures on the anisotropies of mechanical properties in control-rolled steel. Hirosuke Inagaki, *et al.* ..... S1322
- 673 The effect of rolling and accelerated cooling conditions on strength and toughness. (Study of accelerated cooling process after controlled rolling—I). Tamotsu Hashimoto, *et al.* ..... S1323
- 674 Study on the strength and toughness of direct-quenched and tempered steel plates. Nozomi Komatsubara, *et al.* ..... S1324
- 675 The effects of minor elements on the strength and toughness of direct-quenched and tempered steel plates. Seiichi Watanabe, *et al.* ..... S1325
- 676 A study of through thickness fracture toughness in SHT steel. Akinori Inami, *et al.* ..... S1326
- 677 Development of low carbon-equivalent thick plate by accelerated cooling after SHT rolling. (Effect of accelerated cooling after controlled rolling—II). Shuichi Suzuki, *et al.* ..... S1327
- 678 The effect of the direct quenching on the properties of the control-rolled bainitic steel. Katsuhiro Itayama, *et al.* ..... S1328
- 679 Development of OLAC facilities in plate mill. (Utilization of OLAC in plate mill—II). Kazuyosi Arikata, *et al.* ..... S1329
- 680 Line pipe steels produced by on-line accelerated cooling (OLAC). (Utilization of OLAC in plate mill—III). Kazuaki Matsumoto, *et al.* ..... S1330
- 681 Production of the structural steel plates with yield strength of 36 kg/mm<sup>2</sup> by on-line accelerated cooling process. (Utilization of OLAC in plate mill—IV). Yoshitaka Yamasaki, *et al.* ..... S1331
- 682 Various properties of the structural steels with yield strength of 36 kg/mm<sup>2</sup> by on-line accelerated cooling process. (Utilization of OLAC in plate mill—V). Yoshitaka Yamasaki, *et al.* ..... S1332
- 683 Bainitic steel by accelerated cooling after controlled rolling. Masakazu Niikura, *et al.* ..... S1333
- 684 Production of extremely low carbon equivalent HT-50. (Continuous on-line-control process—I). Yasumitsu Onoe, *et al.* ..... S1334
- 685 Strengthening mechanism of ultra low C<sub>eq</sub> HT-50. (Continuous on-line-control process—II). Hirofumi Morikawa, *et al.* ..... S1335
- 686 Usability of ultra low C<sub>eq</sub> HT-50. (Continuous on-line-control process—III). Yasuo Sogo, *et al.* ..... S1336
- 687 HT-80 steel plate with low yield ratio. Hisatoshi Tagawa, *et al.* ..... S1337
- 688 Influence of  $\gamma$  precipitation on  $\alpha$  recrystallization during hot deformation in ferritic stainless steels. Yuichi Higo, *et al.* ..... S1338
- 689 Hot charge rolling of ferritic stainless steel sheets. (Development of low C-17Cr-Nb, Cu stainless steel sheets—IV). Tatsuo Chinju, *et al.* ..... S1339
- 690 Ridging behavior in hot deformed  $\alpha/\gamma$  duplex stainless steel. Yasuhiro Maehara, *et al.* ..... S1340
- 691 Hot-workability and its testing methods of high Mo duplex stainless steels. Kuniaki Osada, *et al.* ..... S1341
- 510 Workability of compound powder of stainless steel at high temperature. Akira Azushima, *et al.* ..... S1160
- 692 Influence of heat treatment parameters of hot rolled strips on the properties of SUS430 cold-rolled strips. Tsuyoshi Azuma, *et al.* ..... S1342
- 693 The effect of heating rate of final annealing on the mechanical properties of cold-rolled 17%Cr stainless steel sheets. Kouichi Akita, *et al.* ..... S1343
- 694 Effect of tempering condition on mechanical properties of 13Cr-3.8Ni cast steel for hydraulic runner casting. Yoshitaka Iwabuchi, *et al.* ..... S1344
- 696 Effect of alloying elements on mechanical properties of low C-17%Cr-7%Ni hard material. (Development of high strength stainless steel—III). Hiroshi Hiramatsu, *et al.* ..... S1346
- 697 Effect of chemical composition on delayed cracking of deep-drawn cup of 17%Cr-7%Ni-2%Cu steel. Hidehiko Sumitomo, *et al.* ..... S1347
- 698 The effect of alloying elements and hot working on the mechanical properties of machine structural

alloy steels. Katsunori Takada, <i>et al.</i> .....	S1348
699 Effect of molybdenum on the fracture toughness of cases. Kunio Namiki, <i>et al.</i> .....	S1349
700 On the grain growth characteristics of boron-treated case-hardening steels. (Optimum combination of hardenability and grain-size control—III). Susumu Kanbara, <i>et al.</i> .....	S1350
701 Deboronization of boron steel. (Boron concentration profile of deboronized region). Tsuyoshi Inoue, <i>et al.</i> .....	S1351
702 Study on optimum chemical composition of base material. (Development of case hardening steel with high toughness and strength phase—I). Hideyuki Kawamoto, <i>et al.</i> .....	S1352
703 Case hardening properties and mass effect data of 3.8Ni–1.6Cr–Mo–V steel. (Development of case hardening steel with high toughness and strength phase—II). Michihiro Ito, <i>et al.</i> .....	S1353
704 High strength steels for sour gas environments. Hirokichi Higashiyama, <i>et al.</i> .....	S1354
705 Effect of metallurgical variables on SSC susceptibility of high strength steels for OCTG. Hirofumi Morikawa, <i>et al.</i> .....	S1355
706 Effect of alloying elements on sulfide stress corrosion cracking. Hiroshi Miyoshi, <i>et al.</i> .....	S1356
707 Effect of heat treatment conditions on sulfide stress corrosion cracking. Takaki Sato, <i>et al.</i> .....	S1357
708 Effect of segregation on sulfide stress corrosion cracking. Takaki Sato, <i>et al.</i> .....	S1358
709 Effects of micro alloying elements. (Low alloy steels in hydrogen sulfide environment—II). Yuichi Yoshino. .....	S1359
710 Sulfide stress corrosion cracking resistance of AISI 410 and 420 steels. Toru Shimada, <i>et al.</i> .....	S1360
711 Effects of the specific volume of test solution and Cl <sup>−</sup> on shell type 3-point bent beam test. (A study on sulfide stress corrosion cracking test—III). Kazuo Yamamoto, <i>et al.</i> .....	S1361
712 Test machine for sulfide stress corrosion cracking of full size pipe. (A study on sulfide stress corrosion cracking test—IV). Kazuo Yamamoto, <i>et al.</i> .....	S1362
713 Trapping of hydrogen by precipitates and inclusions in steel. Makio Iino, <i>et al.</i> .....	S1363
714 Studies on the test method for hydrogen induced cracking. Teruo Kaneko, <i>et al.</i> .....	S1364
715 Effects of applied stress on the hydrogen cracking of line-pipe steels. Nobuhiro Seki, <i>et al.</i> .....	S1365
716 Development of anti-HIC ERW high test line pipe by decreasing S and P contents. Jun-ichi Karasawa, <i>et al.</i> .....	S1366
717 HIC susceptibility of low P steel for line pipe. Hazime Akazawa, <i>et al.</i> .....	S1367
718 The relation between the susceptibility to HIC and the possibility of the pipe failure. (Hydrostatic burst test of pipe with hydrogen induced crack—II). Nobuo Totsuka, <i>et al.</i> .....	S1368
719 Corrosion of steel in CO <sub>2</sub> –H <sub>2</sub> O system. Iwao Matsushima, <i>et al.</i> .....	S1369
720 Electrochemical study of stress corrosion cracking of high strength steel in H <sub>2</sub> O–CO–CO <sub>2</sub> environments. Yasushi Torii, <i>et al.</i> .....	S1370
721 Improvement in stress corrosion cracking resistivity in liquid ammonia of quenched and tempered 60 kgf/mm <sup>2</sup> high tensile strength steels by surface decarburization. Osamu Furukimi, <i>et al.</i> .....	S1371
723 Effects of Co and Mo contents on the strength, ductility and microstructures of maraging steels. Hiroyuki Morimoto, <i>et al.</i> .....	S1373
724 The effect of cold-rolling on the strength, ductility and microstructure of 18%Ni maraging steel. Hitoshi Nakamura, <i>et al.</i> .....	S1374
725 Strengthening and toughening of 350 kgf/mm <sup>2</sup> grade maraging steel by cold rolling. Seiichi Muneki, <i>et al.</i> .....	S1375
726 Susceptibility to gaseous hydrogen embrittlement of 280 kgf/mm <sup>2</sup> grade maraging steels with two different chemical compositions. Yoshikuni Kawabe, <i>et al.</i> .....	S1376
727 Effect of section size on tensile strength of welded joint in various maraging steel sheets. Mitsutane Fujita, <i>et al.</i> .....	S1377
728 Mechanical properties in various remelted 10Ni–8Co steels. Junji Takahashi, <i>et al.</i> .....	S1378
729 Effect of hot work on mechanical properties of Fe–Ni–C alloys. Yoshikazu Fukuhara, <i>et al.</i> .....	S1379
730 Mechanical testing at liquid helium temperature. Toshio Takano, <i>et al.</i> .....	S1380
731 Effects of C and N contents on the mechanical properties of SUS 304 and 316 austenitic stainless steels at low temperatures down to 4°K. Ritsu Miura, <i>et al.</i> .....	S1381
732 Charpy impact test at 6 K for structural materials. Toshio Ogata, <i>et al.</i> .....	S1382
733 Effect of cold-rolling on the Charpy impact value of austenitic stainless steels at cryogenic temperature. Toshio Ogata, <i>et al.</i> .....	S1383
734 An investigation on the production of 9% nickel seamless steel tube. Yasuhiro Sayama, <i>et al.</i> .....	S1384
735 Quality of STPL70–9% nickel seamless steel tube. Yasue Koyama, <i>et al.</i> .....	S1385
736 Low temperature toughness of 6% Mn steels. Masato Murakami, <i>et al.</i> .....	S1386
737 Effects of hot rolling and cooling conditions on low temperature toughness of 5.5Ni steel. Koji Shibata, <i>et al.</i> .....	S1387
738 Effect of additional elements on hot cracking property of Invar type 36%Ni steel in welding. Kiyohiko Nohara, <i>et al.</i> .....	S1388
739 The weldability of Fe–36%Ni alloy. (Development of Fe–36%Ni alloy for LNG storage tank—I).	

Keizi Ohsaki, <i>et al.</i>	S1389
740 Mechanical properties of Fe-36%Ni alloy. (Development of Fe-36%Ni alloy for LNG storage tank-II). Kouji Mukai, <i>et al.</i>	S1390
741 Rust preventive surface treatments and their weldability for Fe-36%Ni alloy. (Development of Fe-36%Ni alloy for L.N.G. storage tank-III). Takenori Deguchi, <i>et al.</i>	S1391

## Symposia\*

### — IRONMAKING —

November 1, 1981 13:30~17:20

Chairman: Yuji Togino

Theme I. Blast Furnace Instrumentation Technology and Process Control Technology—Recent Situation and Future Outlook

1 Present situation and future outlook of blast furnace instrument and control technology. Teiji Shibutani, <i>et al.</i>	A109
2 Identification of materials and measurement of oxygen partial pressure in experimental blast furnace by means of optical method and oxygen sensor. Yoshikazu Kuwano, <i>et al.</i>	A113
3 Measuring of burden and gas distribution in blast furnace shaft. Hideo Kanoshima, <i>et al.</i>	A117
4 Gas distribution control sensors and information processing for blast furnace operation. Tadaaki Iwamura, <i>et al.</i>	A121
5 Development of instrumentation technology for blast furnace process control. Yoshiyuki Matoba, <i>et al.</i>	A125
6 Development of diagnostic techniques for lining erosion of blast furnace. Yoshiro Kawate, <i>et al.</i>	A129

### — STEELMAKING —

November 1, 1981 13:30~17:20

Chairman: Yoshio Miyashita; Vice-chairman: Tetsuro Ohashi

Theme II. The Behavior of Oxide Inclusions in Continuous Casting

7 On the producing method of clean steel slabs in continuous casting. Yutaka Yoshii, <i>et al.</i>	A133
8 Countermeasures for reducing large inclusions in continuously cast slabs. Minoru Yamamura, <i>et al.</i>	A137
9 Mechanism of formation of non-metallic inclusions and countermeasures in continuously cast slabs. Tadao Watanabe, <i>et al.</i>	A141
10 The behavior of non-metallic inclusions in the continuously cast blooms. Isamu Wakasugi, <i>et al.</i>	A145
11 Composition and configuration of inclusions in continuously cast slabs accompanied with slightly deoxidizing. Eiichi Takeuchi, <i>et al.</i>	A149

### — PLASTIC WORKING AND OTHER FABRICATION PROCESSES —

November 2, 1981 13:30~17:20

Chairman: Tadaaki Yanagisawa

Theme III. Application of Continuously Cast Steel for Heavy Gauge Shapes

12 Application of flange spreading method to CC beam blank. Kiyotaka Morioka, <i>et al.</i>	A153
13 Rolling of large wide flange beams from continuously cast slabs. Chihiro Hayashi, <i>et al.</i>	A157
14 Technique for rolling heavy gauge shapes from continuously cast steel. Masashi Yamashita, <i>et al.</i>	A161
15 Rolling method of universal channel from continuously cast slab. Hiroshi Bōda, <i>et al.</i>	A165

### — PROPERTIES OF IRON AND STEEL —

November 2, 1981 13:30~17:20

Chairman: Tadahisa Nakamura; Vice-chairman: Shigetomo Nunomura

Theme IV: Fracture Toughness in Low Strength and High Ductility Steels

16 Current status of the measurement of fracture toughness in high ductility steels. Shigetomo Nunomura, <i>et al.</i>	A169
17 Measurements of $J_{10}$ and $J-R$ curve in reactor pressure vessel steels by the electrical potential method and the application of this method to the evaluation of neutron irradiation embrittlement. Tsuneo Kodaira, <i>et al.</i>	A173

\* The preprints of symposia were published in *Tetsu-to-Hagané* (Journal of The Iron and Steel Institute of Japan), 67 (1981), No. 9, A109 to A219, in Japanese.

---

18	Some problems in $J_{IC}$ measurement using the electric potential and $R$ curve methods. Yakichi Higo, <i>et al.</i>	A177
19	The role of AE in fracture toughness test of ductile structural materials. Kazuhiko Kuribayashi, <i>et al.</i>	A181
20	The evaluation of fracture toughness in nuclear pressure vessel steel weldments. Yasuhiko Tanaka, <i>et al.</i>	A185
21	The evaluation of $J_{IC}$ values in structural low alloy steels and 9%Ni steel. Toshiya Akiyama, <i>et al.</i>	A189
22	Elastic-plastic fracture toughness of high toughness steels. Yoshifumi Nakano, <i>et al.</i>	A193
23	The application of negative pressure-fracture strain diagrams to the evaluation of fracture toughness in low strength-high toughness steels. Sakae Saito, <i>et al.</i>	A197

November 1, 1981 13:30~17:20

Chairman: Masao Kanao

## Theme V. High-temperature, Low-cycle Fatigue Properties of Steels

24	$\alpha \rightarrow \sigma + \gamma$ transformation behavior during cyclic deformation at elevated temperatures in two phase stainless steel. Kameaki Tsuzaki, <i>et al.</i>	A200
25	Effects of temperature and strain rate on low-cycle fatigue properties of carbon steel and chromium-molybdenum alloy steel plates. Kenji Kanazawa, <i>et al.</i>	A204
26	Prediction of low cycle fatigue life of low alloy steels at elevated temperature. Asao Narumoto, <i>et al.</i>	A208
27	Evaluation of high-temperature fatigue properties of materials by strain range partitioning method. Katsuyuki Tokimasa, <i>et al.</i>	A212
28	Crack propagation in high-temperature low-cycle fatigue of steels. Ryuichi Ohtani.	A216