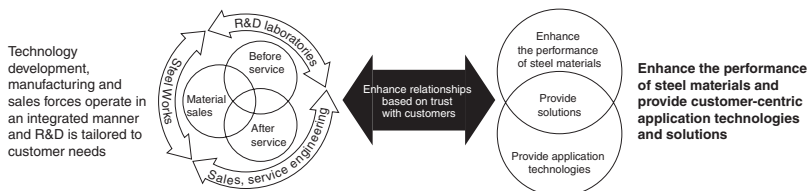


12 Research and Development

Technology development that addresses customer needs : Ensuring our leading reputation among customers



(1) Changes in research and development costs

Years ended March 31

(Unit: 100 million yen)

Fiscal Year	FY2006	FY2007	FY2008	FY2009	FY2010
Total	187	201	221	228	227

(2) Examples of main research and development projects

Year	Projects
2006	"Dr. STAMP," friction analysis technology for galvaneeded (GA) steel sheet
	Development and implementation of highly-precise simultaneous piercing technology of large variant holes by hydroforming
	The Wakayama Steel Works' No.4 blast furnace achieved new Japan record for the operation days
	New technology for evaluating crash performance of components and systems towards a proposal for the next-generation body structure
	Class X100 and X120 ultra-high-strength, large-diameter welded steel pipe
	The first application of "FCA (Fatigue Crack Arrestor) Steel" with superior fatigue-resistant characteristics to bridges
	Noise reduction technology for the gear unit was selected for the most recent model of Shinkansen
"STBC-SR pile" of cast-in-place concrete pile reinforced by steel pipe with inner ribs of welded metal	
2007	"Spot Welding Method by Seven Steps Current" for high-tensile-strength steel sheet
	Nickel (Ni)-based alloy that is the most resistant to metal dusting in the world
	High strength steel plate for hull structures of yield strength of 460Mpa with superior fatigue property; this steel was developed based on the FCA (Fracture Crack Arrestor) technology and has twofold longer fatigue life expectancy than conventional steels
	"FCA-W Steel Plate", the world's first high-tensile-strength plate for improving the fatigue strength of welded joints
	High corrosion dual phase stainless steel for urea processing plant "DP-28W" (Joint development with TOYO Engineering Corporation, The material is applied to an actual plant)

Year	Projects	
2007	High strength type "Pile head connection method with outer steel ring and in-filled concrete" of short term works and high-quality construction (joint development with Shimizu Corporation)	
	"SSAT-35", a new titanium alloy with an optimal balance between workability and strength	
	Innovative continuous casting technologies (PCCS & SSC) for high-quality steel plates	
2008	Quench-hardenable steel sheet for hot stamping "SUMIQUENCH SCSQ30B"	
	Chrome-free electrogalvanizing steel sheet for motor case "NEO COAT T2"	
	Walking Control Technology in Hot Strip Finishing Mill	
	Ultra high strength steel plates for building structures "SSS1000" (Joint development with Osaka University, Kyoto Institute of Technology, NIKKEN SEKKEI Ltd., and KATAYAMA STRATECH Corp.)	
	SM-composite pile method with concrete-filled steel pipe	
	Steam generator tubes to be used in advanced nuclear power plant	
	The advanced bogie track with rail-interaction-force monitoring system	
	Evaluation technique for local strength in spot weld of steel sheet using small specimen	
	Solution growth method to grow silicon carbide	
	Single crystal highly-active visible light responsive photocatalyst (Joint development with Osaka Titanium technologies Co., Ltd.)	
	2009	"CLEANWELL [®] DRY", an environmentally-friendly premium connection, which does not contain heavy metals
		"VAM [®] 21", a premium connection with good performance, used connecting oil country tubular goods
		Non-heat treated nitrocarburized high-strength crankshaft steel (joint development with Honda R&D Co., Ltd.)
Three-Dementinal Hot Bending Quench (3DQ) Mass Processing Technology which enables steel components with a hollow tubular structure to acquire ultra high-tensile strength		
Anti-entrapment mold flux with properties of high viscosity and high surface-tension which crystallizes into melilite as a main phase.		
New Analytic Technology for Automobile Collision Simulation (Joint development with Mazda Motor Corporation and Corus, the British and Dutch steel company)		
Stainless steel sheet for polymer electrolyte fuel cell separator		
optimization design simulation technology for an exterior unit of an air conditioner		
Cold forging method of one piece stainless steel fuel union for high grade vehicle engines.		
Fine grain stainless steel sheet for the long fatigue life diaphragm of the hydrogen compressor		
New Temperature Measurement and Control Technologies for Manufacturing of High-tensile Strength Hot Strip		
2010	Manufacturing process innovation in high carbon and chromium steel wire for needle bearings	
	"NAR-DP-28W" , high-chrome duplex stainless steel on urea plant, with superior weldability (jointly developed with Toyo Engineering Corporation)	
	Technology that serves to reduce radiation exposure of workers at nuclear plants through manufacture of material which reduces the content of cobalt and a film processing technology to reduce release of metal ion from tubes	
	Resource-saving, high-strength electromagnetic steel "SXRC"	
	Heat resistant stainless steel sheet "NAR-AH-7" for advanced high-temperature heat exchangers (jointly developed with Sumitomo Metals (Naoetsu), Ltd.)	
	"High-precision drop weight impact test machine" that is used to accumulate data and develop technology aimed at further enhancing automobile safety	

Year	Projects
2010	New molten pig iron dephosphorization technology with powder top blowing for realization of high efficiency production of low phosphor steel with low environmental load
	Development of "VAM@21", the world's highest-performance threaded connection ((jointly developed with Vallourec S.A.)
	Heat release steel sheet as heat sink material for ultra-thin TVs
	Further reduction in welded light-weight H-beams that are used for housing construction
	Dual-wall exhaust manifold by press forming (jointly developed with Sumitomo Metals (Naoetsu) Ltd., Toyota Motor Corporation, Sango Co., Ltd).

(3) Main prize winning technologies (last 20 years)

① Okochi Memorial Prizes (Okochi Memorial Foundation)

Year	Awards	Projects
1992	Production Prize	Development of High Strength and Corrosion Resistant Ni Base Alloy O.C.T.G.
1994	Production Prize	Development of High Speed and High Performance Bogie Trucks for Railway Vehicles
1995	Production Prize	Development of High Reliability Heat Exchanger Tube for Nuclear Power Plants
1996	Production Prize	Development of Roll Pair Cross Rolling Method for High Accuracy and Productivity in Steel Rolling Process of Flat Products Joint award with Nippon Steel Corporation and Mitsubishi Heavy Industries, Ltd.
1998	Technology Prize	Development of Stainless Steel Pipe for Supply of Ultra-Hi-Purity Gas Joint award with Sumikin Stainless Steel Pipe Co., Ltd. And Tohoku University
1999	Production Prize	Die-Forged Crankshaft Performance Enhancement and Development of High Production Total System
2003	Production Prize	★New-generation Technologies for the Production of Medium-Size Seamless Pipes and Tubes
2006	Grand Production Prize	★Development of new-generation technologies for the high-quality, high-efficiency and environmentally friendly steelmaking process
2008	Grand Production Prize	★Development of advanced stainless boiler tube for ultra-supercritical (USC) coal-fired thermal power plants
2010	Production Prize	★Development of Technologies that Extend Campaign Life of Blast Furnaces*

※ Award details: Achievement by the Wakayama Steel Works' No. 4 blast furnace for the world's longest continuous operation of 10,001 days (27 years and 4 months)

Major technologies: Unique development of simulation technologies which enable inner conditions to be quantitatively evaluated, and operation and repair technologies based on such evaluation

Impacts: (1) Omission of the relining that requires a long repair period and high costs (each relining costs approximately 30 billion yen for a large furnace) for three times

(2) Development of a simulation model enables to design a facility that realizes an efficient and stable operation of a blast furnace. Adoption of the model, when designing a new furnace or at a repair time, contributes to reduction in CO₂ emission.

★ We have received Okochi Memorial Foundation awards on technology development for all major manufacturing processes of seamless pipe, and have become **the first steelmaker to receive the Quadruple Awards.**

② Ichimura Industrial Prizes (New Technology Development Foundation)

Year	Awards	Projects
1992	Meritorious Achievement Award	Development of High Performance Ferritic Stainless Steel with Nb and Cu Joint award with Nippon Stainless Steel Co., Ltd.
1994	Contribution Award	Development of Wide Aluminum/Stainless Steel Clad Coil
1998	Meritorious Achievement Award	Development of Powder Top Blowing Process under Reduced Pressure
2002	Contribution Award	Development of High Performance 60-kg High Tensile Strength Steel Plate with Strikingly Improved Welding Capabilities
2005	Contribution Award	Development of Processing Technology to Promote the Generation of Protective Rust for Weatherproof Steel
2007	Contribution Award	Development of non-oriented electrical steel sheet for high-efficiency motors
2009	Contribution Award	Development of steel plate for improving the fatigue strength in welded joints

③ National Commendation for Invention (Japan Institute of Invention and Innovation)

Year	Awards	Projects
2003	Invention Award	Protective Rust-layer Accelerant Technology for Weather-Resistant Steel
2005	The Prize of the Minister of Economy Trade and Industry	New-generation Technologies for the Production of Medium-size Seamless Pipes and Tubes
2007	Invention Award	Development of mold flux for high-speed continuous casting
2008	Imperial Invention Prize	Development of super-high strength low-alloy steel oil country tubular goods (OCTG) for sour service
2009	Invention Award	Development of economical high-strength low-alloy steel for boilers (Joint award with Mitsubishi Heavy Industries, Ltd. and kyushu Institute of Technology)

④ Monodzukuri Nippon Grand Award (Ministry of Economy, Trade and Industry etc.)

Year	Awards	Projects
2007	Prime Minister's Award (Manufacturing and Production Process Category)	For the Invention of manufacturing method of high quality steel plates using nano-size particles
2009	Special Prize (Product and Technology Development Category)	Development of a high-strength Pb-free non-heat-treated steel for the application of fracture splitting connecting rods (Joint award with Honda Motor Co., Ltd.)
	Excellence Prize (Manufacturing and Production Process Category)	Blast furnace operation/maintenance technology that has achieved Japan's longest operating days
	Excellence Prize (Manufacturing and Production Process Category)	Development of an innovative production method allowing the production of flat hot-rolled high-tensile steel plates

- ⑤ The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology (Ministry of Education, Culture, Sports, Science and Technology)

Year	Awards	Projects
1998	Person of Scientific and Technological Merit	Development and promotion of steel tube and pipe for oil refining and petrochemistry
	Person of Scientific and Technological Research Merit	Research of analysis model on solidification and segregation of steel
1999	Person of Scientific and Technological Merit	Development and promotion of high efficiency dimensionally-stable electrode and high quality electrolytic galvanized steel sheets technology
2001	Person of Scientific and Technological Research Merit	Research of environmentally friendly free-cutting steel
2005	Prize for Science and Technology	Development of high quality and high speed round billet casting technology
2008	Prize for Science and Technology	Development of non-oriented electromagnetic steel sheet for high efficiency motors
2009	Prize for Science and Technology	Development of crash-box that improves fuel efficiency and crash safety (Joint award with Toyota Iron Works Co., Ltd.)
2010	Prize for Science and Technology	High-pressure fuel injection pipe for diesel engines
	Prize for Science and Technology	Heat-releasing pre-painted steel sheets

(4) Number of patent applications

Calendar year	2006	2007	2008	2009	2010
Number of applications	393	408	375	377	454

(5) Technical concierge for our customers “SMICAT”

We have established Sumitomo Metal Industries' Customer Service in Application Technology (SMICAT) to provide solutions for customer needs by leveraging the integrated technological abilities of Sumitomo Metals and its group companies. The latter include affiliated companies that have knowledge in non-steel areas. The integrated technological abilities of Sumitomo Metals Group enable us to respond to needs of our customers in a comprehensive manner.

E-mail : smicat@sumitomometals.co.jp

URL : <http://www.sumitomometals.co.jp/techinfo/smicat/knowledge.html>