Premium Cold Work Tool Steel

TD1

DC1

Premium Hot Work Tool Steel

SeAH Changwon Integrated Special Steel

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A NEW CHAPTER TO THE FUTURE

Changwon Plant, the base camp for SeAH CSS to be a leader in global steel manufacturing

SeAH CSS is a leading South Korean special steel manufacturer. It produces cutting-edge materials for use by such industries as construction, consumer electronics, power generation, machinery, and shipbuilding. Its Changwon Plant, which occupies an area of 641,000 square meters, boasts an annualized output of 1.2 million tons of steelmaking. It is also the only company in South Korea that produces stainless steel round bars and wire rods through an integrated production system for high-grade special steel.
The company leads South Korea's steel market in a number of product categories, including stainless steel, tool steels, and special alloys. In particular, as the nation's only steel industry player to have a fully-integrated production system for seamless pipes, it recently began operating a plant specializing in the manufacture of large-diameter products.

History

1966
Founded as Samyang Special Steel Co., Ltd.

1975
Changed its name to Korea General Special Steel Co., Ltd

1976
Opened its Central Research Lab

1977
Opened a special steel production plant in Changwon
(for round bars, pipes and plates)

1980
Recognized for its annual export of USD 100 Mil

1982
Changed its name to SAMMI General Special Steel Co., Ltd

1991
Opened its second special steel plant
(for steelmaking, rolling and processing)

1997
Annexed to POSCO group
(for round bars and pipe business)

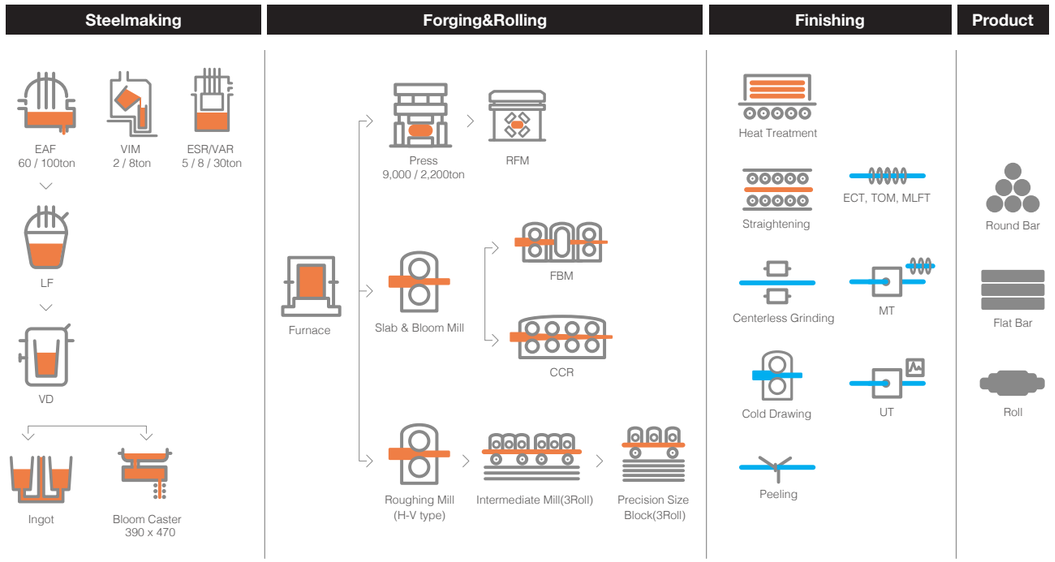
2006
Completed the 1st phase of its facility rationalization
(AOD, HV Mill, Second acid cleaning plant and more)

2007
Changed its name to POSCO Specialty Steel Co., Ltd

2012
Completed the 2nd phase of its facility rationalization
(60ton EAF, Bloom Caster, SBM and more)

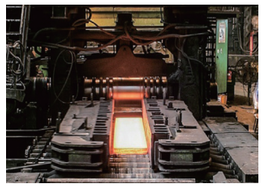
2015
Acquired by SeAH Group and changed its name to SeAH Changwon Integrated Special Steel Co., Ltd

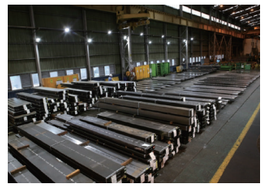
Manufacturing Process




Steelmaking


Forging


Rolling


Product

Premium Cold Work Tool Steel

TD1

Excellent cold work tool steel with enhanced hardness, toughness and wear resistance

Characteristics

TD1 is premium cold work tool steel which has low carbon-chrome differentiated with STD11(SKD11) and adds special element. TD1 provides enhanced hardness, toughness and high wear resistance after QT heat treatment.

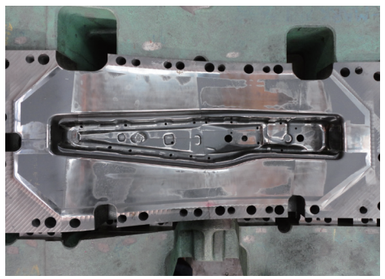
vs. STD11(SKD11)

- Enhanced Wear resistance & Galling resistance
- Reduced chipping failure in mold due to improve fatigue strength
- Reduced machining costs due to higher machinability
- Application Result(AHSS) : Extended mold life 15~75%

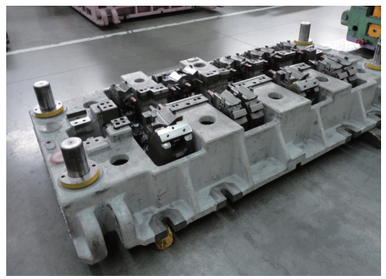
Applications

Mold and tool materials for cold work

Mold Materials for Advanced High Strength Sheet Steels



Drawing mold



Trimming mold

Physical Properties

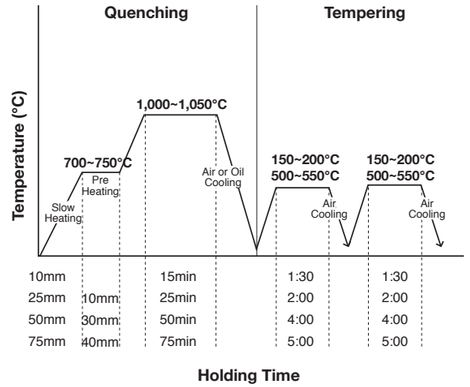
Thermal expansion Coefficient (X 10^{-6}/°C)	11.6 (27~100°C) 12.7 (100~200°C)	Specific gravity (g/cm^3)	7.65
Heat conductivity (W/m·K)	26.7 (Room Temperature)	Young's modulus (GPa)	220

Mechanical Properties

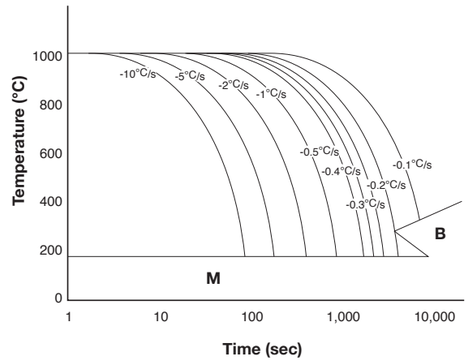
Heat treatment

Heat treatment under the same condition with STD11(SKD11) is possible.

QT Heat Treatment Cycle

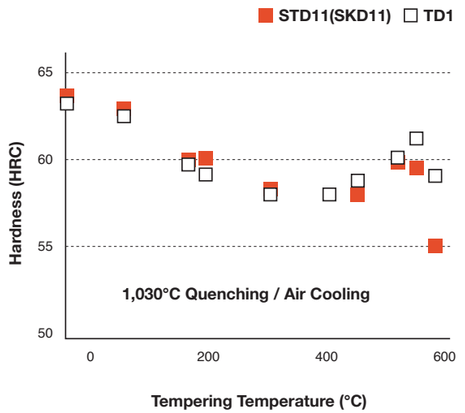


CCT Curve



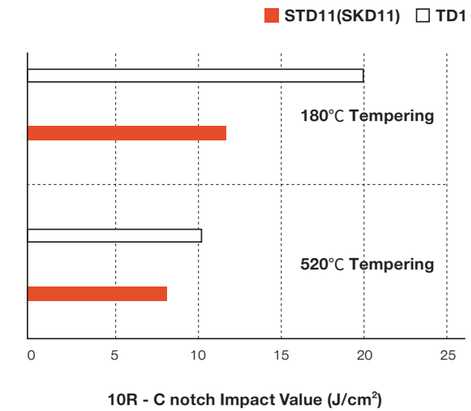
Hardness

TD1 can get required hardness under the same condition as STD11(SKD11) heat treatment.



Toughness

Enhanced toughness prevent cracking and chipping in molds and extends mold life.

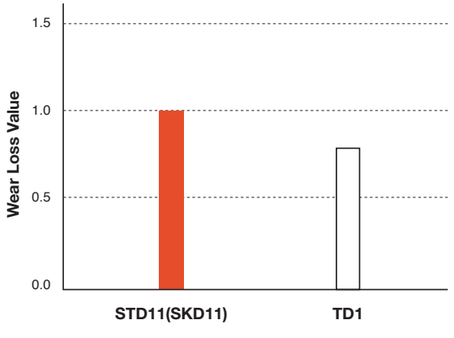


Mechanical Properties

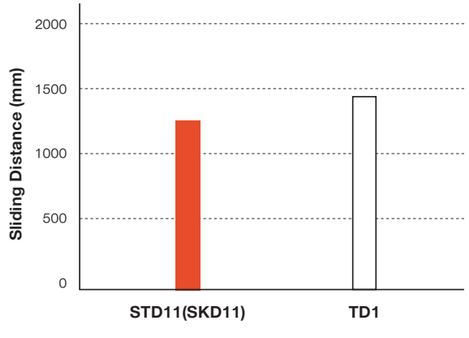
Wear Resistance

The optimal alloy design improves wear and galling resistance and extends mold life.

Wear resistance (Disc on Plate Test Result)



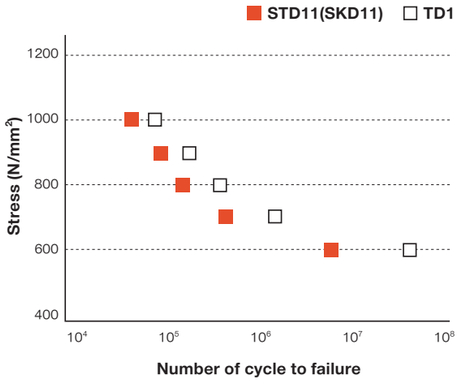
Galling resistance (Scratch Test Result)



* Wear loss of STD11(SKD11) is 1

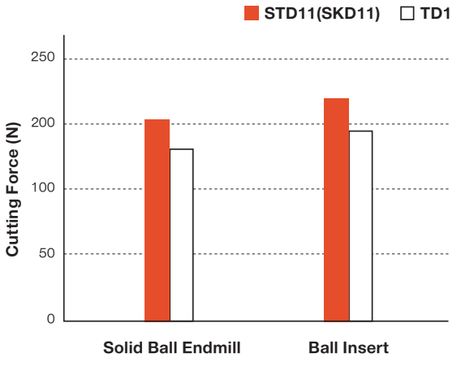
Fatigue Strength

TD1 improves fatigue strength in comparison to STD11(SKD11) due to fine carbide. and it can extend mold life.



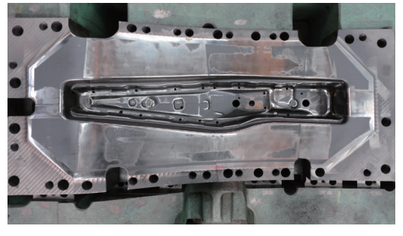
Machinability

TD1 can reduce machining costs due to higher machinability. (machining resistance 15%↓)



Applications

Center Pillar Outer (Drawing)



Steel plate : DP 980 / 1.6t

Surface treatment : TiCrN +MoS_2

Grade	Mold Life (Shots)
STD11(SKD11)	~100,000
TD1	135,000 (▲35%)

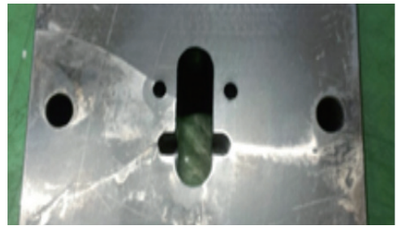
Steel Wheel (Drawing)

Steel plate : HR580

Surface treatment : TD

Grade	Mold Life (Shots)
STD11(SKD11)	~30,000
TD1	50,200 (▲65%)

Door Hinge (Drawing)

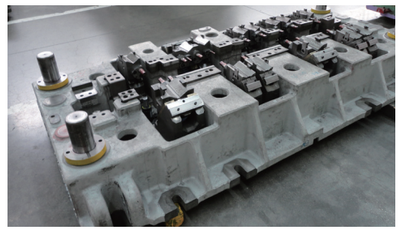


Steel plate : HR340LA / 4.0t

Surface treatment : TD

Grade	Mold Life (Shots)
STD11(SKD11)	~280,000
TD1	312,000 (▲12%)

Sill Side Inner (Trimming)



Steel plate : CP1180 / 1.2t

Grade	Mold Life (Shots)
STD11(SKD11)	~200,000
TD1	346,700 (▲75%)

Premium Hot Work
Tool Steel

DC1

Hot work tool steel suitable for high-cycle,
large-size hot work molding

SeAH

Characteristics

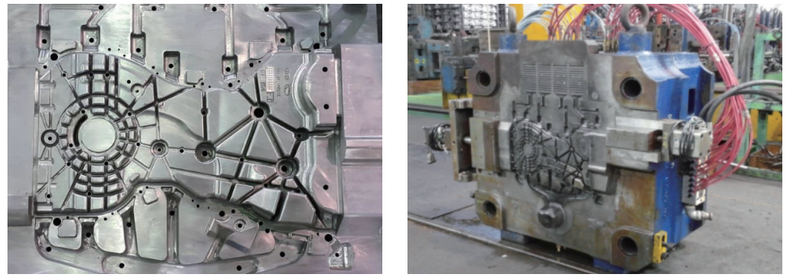
DC1 is a high-quality hot-work tool steel. It is differentiated with STD61(SKD61) by adding special element to be suitable for high cycle and large scale hot-work molding.

vs. STD61(SKD61)

- Higher resistance to heat crack due to excellent hardness/toughness balance
- Extended mold life due to improved resistance to softening and wear resistance at molten aluminum
- Reduced machining costs due to higher machinability

Applications

Hot-work tool steel for large scale die casting and hot press forming



Timing chain cover die steel

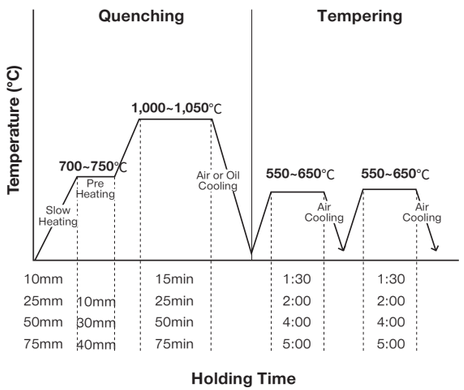
Physical Properties

Type	Thermo expansion Coefficient (X 10^{-6}/°C)	Heat conductivity (W/m·K)
25°C	11.5	25.3
700°C	14.1	27.4

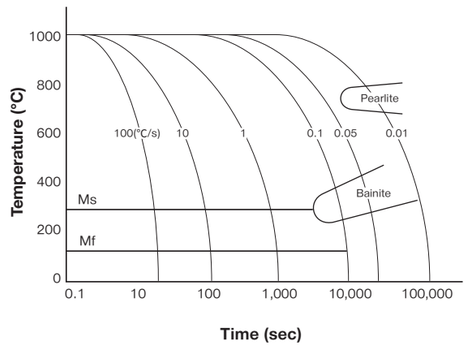
Heat Treatmet

Heat treatment under the same condition with STD61(SKD61) is possible.

QT Heat Treatment Cycle

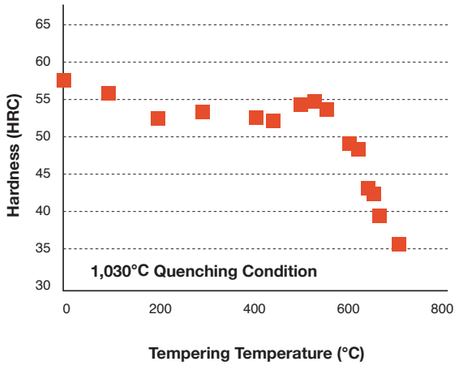


CCT Curve



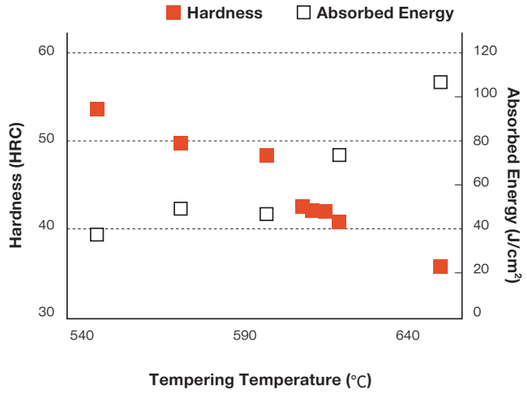
Hardness

DC1 can get required hardness under the same condition as STD61(SKD61) heat treatment condition.



Toughness

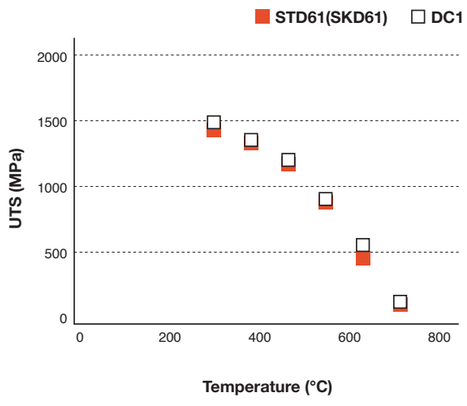
Extended mold life due to good balance between hardness and toughness.



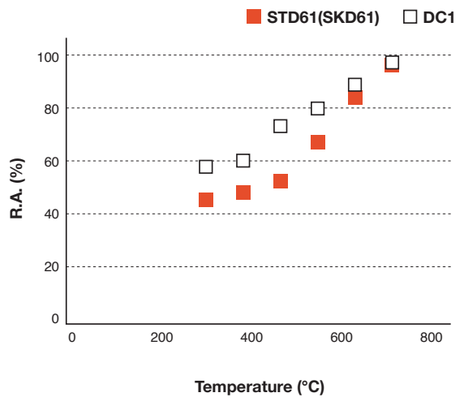
Tensile Properties

Reduce mold cracking due to improved tensile strength and reduction area compared to STD61(SKD61).

Tensile strength (MPa)



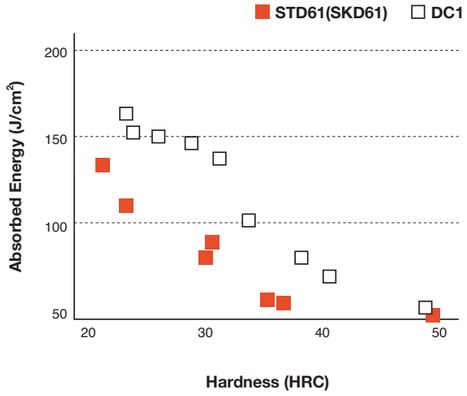
Reduction in area (%)



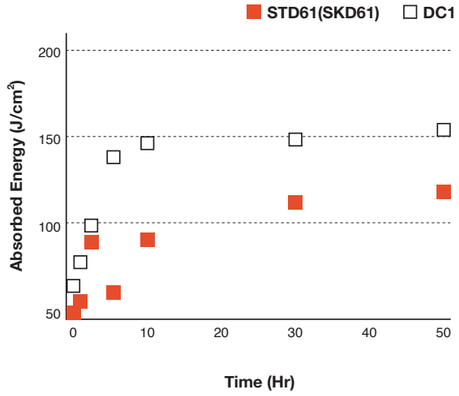
Toughness & Resistance to softening at 650°C

DC1 improves toughness and resistance to softening at Die Casting condition due to optimal alloy design.

Hardness / Toughness (After exposed to 650°C)



Softening Resistance (After exposed to 650°C)

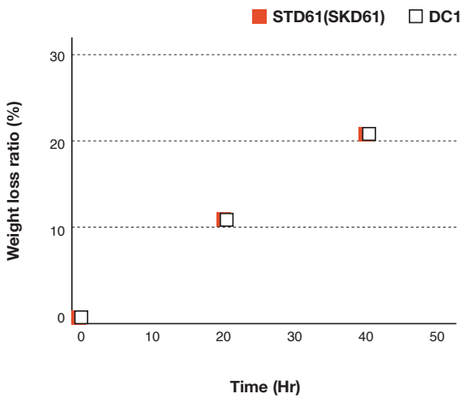


Mechanical Properties

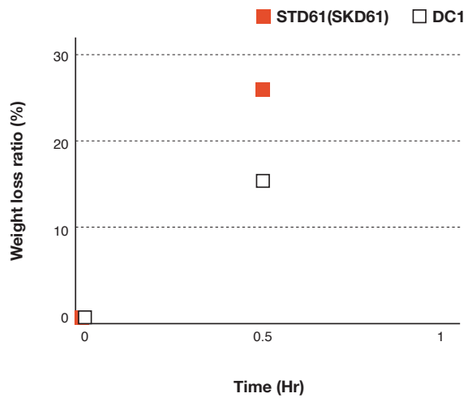
Reaction in Molten Aluminum

DC 1 has improved wear resistance due to enhanced anti-erosion properties and extends mold life.

Immersion test

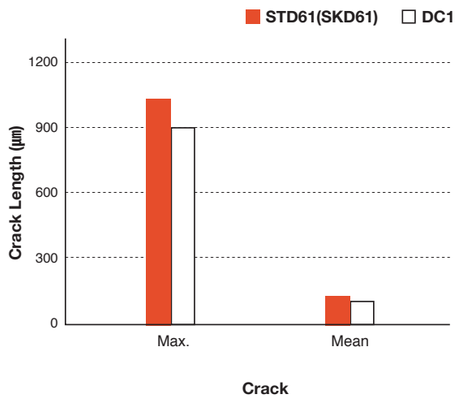


Erosion test



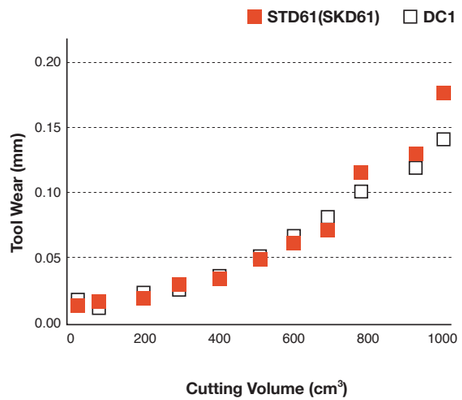
Heat Checking Properties

Improved toughness and strength than STD61(SKD61) reduces cracks generated by heat check and extends mold life.



Machinability

DC 1's higher machinability compared to STD61(SKD61) can reduce machining costs.



Korea

Head Office
147 Jeokyeon-ro, Seongsan-gu, Changwon City, Gyeongsang South Province 51708 t.055-269-6114 f.055-269-6901

Seoul Office
Floor 29 of SeAH Tower 3, 45 Yanghwa-ro, Seoul 04027 t.02-6970-2000 f.02-6970-2182

Busan Sales Branch
Floor 4 of SeAH Building, 267-gil, Hakgam-daero, Sasang-gu, Busan 46984 t.051-313-2259 f.051-311-2105

Outside Korea

China
RM 902, Aetna Tower, No.107 Zunyi Rd., Shanghai, China t.86-21-5228-0781

Japan
706, Cent Urban Building, 3-23-15 Nishi-Nakajima, Yodogawa-ku, Osaka, Japan 532-0011 t.81-6-6838-8777 f.81-6-6838-8784

Thailand
399 Interchange 21 Building 22nd floor, 12R Sukhumvit Road, Klongtoey-nua, Wattana, Bangkok, Thailand

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