www.heat-treatment.co.kr

YOUNGPOONG HEAT TREATMENT

THE BEST HEAT TREATMENT COMPANY OF KOREA

대한민국 대표 열처리 기업 – **(주)영풍열처리**

(주)영풍열처리
Youngpoong Heat Treatment co.,Ltd

www.heat-treatment.co.kr

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THE BEST HEAT TREATMENT COMPANY OF KOREA

YOUNGPOONG

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CEO 권숙철
Kwon Sook Cheol

끊임없는 혁신을 통해 발전하는 영풍열처리가 되겠습니다.

(주)영풍열처리는 표면경화 열처리 및 진공열처리를 통해
자동차부품 및 금형 열처리를 하는 전문기업으로
"창조 · 혁신 · 집중"의 사훈아래 31년간 축척된 노하우와 기술력을
바탕으로 꾸준히 성장해온 기업입니다.

오늘날 기업체들은 산업구조 고도화와 기술집약의 경향에 따라 품질 및 생산혁신이 요구되는 글로벌 시대에 직면하고 있습니다. 당사는 급변하는 산업구조에서 첨단기술을 확보하고 혁신적인 관리를 통한 경쟁력을 확보하고자 합니다.
1987년 창립일 이후, 31 년간의 전문 열처리 경험과 고유기술을 바탕으로 새로운 것에 대한 도전을 두려워 하지 않고, 100% 고객만족, 품질향상, 생산혁신이라는 경영지표 아래 국내 자동차부품 열처리의 선두주자가 되도록 노력하겠습니다.

당사를 아껴주신 고객 여러분께 감사드리며 앞으로도 여러분의 끊임없는 성원과 지도 편달 부탁드립니다.

Today, enterprises are faced with a global age in which quality and production innovations are required following the trend of the industrial structure enhancement and technology intensiveness. We intend to secure highly advanced technologies in such a rapidly changing industrial structure and secure competitiveness through innovative management.

Since our founding in 1987, we have endeavored and will continue to become a leader in heat treatment of domestic automotive parts under the management indices of 100% customer satisfaction, quality improvement, and production innovations without fearing to meet challenges for newness based on our 31 years of specialized heat treatment experiences and unique technologies.

Thank you for your continuing support and guidance.

● 회사연혁 · 인증현황

History & Certification Status

영풍열처리 회사연혁 ● Youngpoong Heat Treatment's Corporate History

1987 ~ 2016's

1987 영풍열처리 설립 Youngpoong Heat Treatment was established
1999 산질화 (OXY-NITEC)자체기술 개발
Developed oxy-nitriding (OXY-NITEC) own technology
2003 SQ-MARK 인증획득 Acquired SQ-MARK certifications
2005 진공퍼지식 침탄기술 도입 Introduced vacuum purge carburizing technology
2007 TS 16949 & ISO 9001/2000 인증획득 Acquired TS 16949 & ISO 9001/2000 certifications
2010 진공침탄 N-QUENCH 기술도입
Introduced vacuum carburizing N-QUENCH technology
2011 기업부설 연구소 설립 Established an annexed research institute
2012 개별 열처리로 특허등록 [특허 제 10-1190193]
Registered patent for individual heat treatment
플러그 고주파 퀜칭 특허등록 [특허 제 10-120381]
Patent registered for plug high frequency
ISO 14001 인증획득 Obtained ISO 14001 certifications
(주)영풍열처리 법인전환 Youngpoong Heat Treatment converted into a mcorporated
2013 대구시 스타기업 인증 획득 Acquired Daegu Star Company certifications
2014 현풍공장(2공장) 완공 Completed construction of Hyunpung Factory
뿌리기술 전문기업 인증 획득 Acquired root technology specialized company certifications
2016 대구시 스타기업 100 선정 Selected among 100 Daegu Star Companies
CNC선반 도입 Introduced CNC lathe

2017

2017 헬리컬기어 표면경화처리방법 특허 등록 [특허 제 10-1714016]
Registered patent for surface hardening treatment method of helical gear
윤곽경화 기술 도입 Introduced contour hardening technology
현대자동차, 현대파워텍 업체 등록
Registered as a Hyundai Motors Hyundai Powertech company

영풍열처리 인증현황 ● Youngpoong Heat Treatment's Certification Status

스타기업인증서

기업부설연구소인증서

이노비즈인증서

특허증

SQ인증서

SQ인증서

PSQ 인증서

OSSAS

ISO 14001

IATF

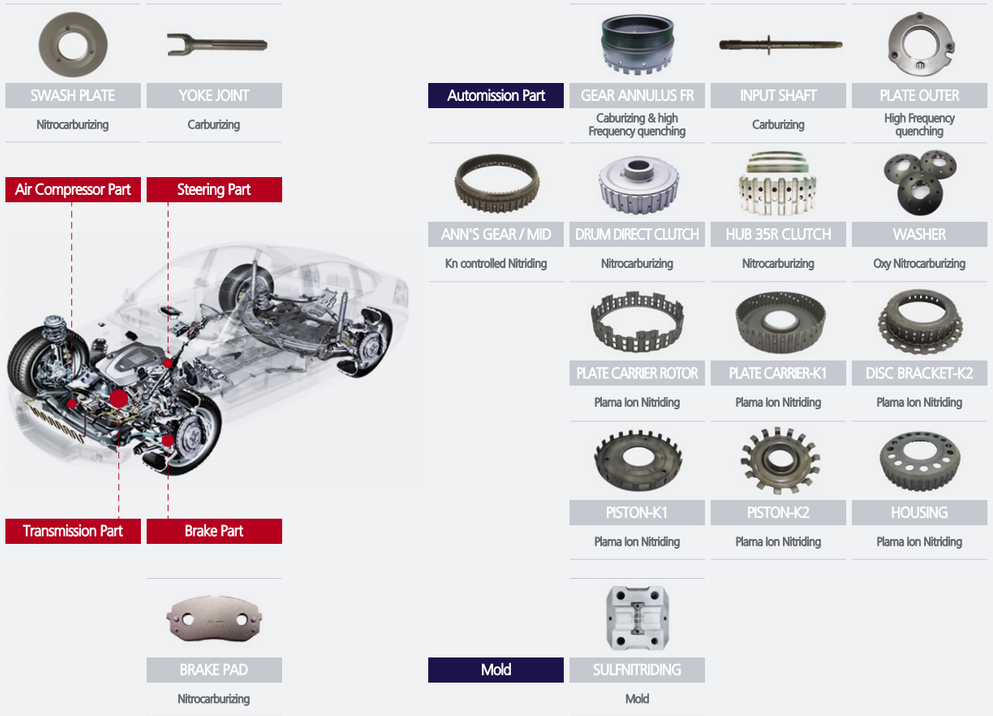
● 비전

Vision

친환경, 고품질 열처리를 통한
Global Leading 열처리 기업으로 도약을 시작합니다.

주요 생산 품목 [MAIN PRODUCTION ITEMS]

자동차 부품 부문



금형 질화 부문

- 고강도, 내마모성, 고내구성 및 변형제어 기술 보유
  High strength, abrasion resistance, high durability and strain control technology
- 다이캐스팅, 프레스, 단조, 압출, 몰드 금형 외
  Die casting, press, forging, extrusion, mold, etc.

주요 거래 업체 [MAJOR DEALERS]

(주)영풍열처리 Youngpoong Heat Treatment co.,Ltd → 경창산업주식회사, KYUNG CHANG, SAMSUNG, 상신브레이크 → HYUNDAI, KIA, HYUNDAI POWERTECH, ZF, VW

● 보유설비

Equipment

가스 연질화로 (Nitrocarburizing Furnace)

Size : W760×H800×L1,240 / BATCH TYPE / No : 7 Furnace

특징 Characteristics

(1) 질소 퍼지식으로 친환경적임
Eco-friendly with nitrogen purge

(2) 냉각실과 가열실이 구분되어 있어 연속 생산 가능
Cooling room and heating room are separated, so continued production is possible

주요생산품 Main Products

HUB, DRUM Clutch type etc.

산질화로 (OXY-Nitrocarburizing Furnace)

Size : Φ1,000×L2,000 / PIT TYPE / No : 5 Furnace

특징 Characteristics

(1) Steam을 이용한 산화피막 형성
Oxidation film formed using steam

(2) 레토르트 구조로 내부 청결상태 유지 용이
Retort structire makes it easy to maintain cleanliness inside

주요생산품 Main Products

Washer, Rod, Shaft etc.

Kn 제어질화로 (Kn Controlled Nitriding Furnace)

Size : W760×H800×L1,240 / BATCH TYPE / No : 4 Furnace

특징 Characteristics

(1) 질소 퍼지식으로 친환경적임 Eco-friendly with nitrogen purge

(2) 냉각실과 가열실이 구분되어 있어 연속 생산 가능
Cooling room and heating room are separated, so continued production is possible

(3) 화합물층 선택상 형성 가능
Formation by selecting phase of compound layer

주요생산품 Main Products

MID ANN's Gear

Kn 제어질화로 (Kn Controlled Nitriding Furnace)

Size : Φ1,000×L2,000 / PIT TYPE / No : 1 Furnace

특징 Characteristics

(1) 레토르트 구조로 내부 청결상태 유지 용이
Retort structire makes it easy to maintain cleanliness inside

(2) 화합물층 선택상 형성 가능
Formation by selecting phase of compound layer

주요생산품 Main Products

MID ANN's Gear

● 보유설비

Equipment

플라즈마 이온질화 (Plasma Ion Nitriding Furnace)

Size : Φ1,500×L2,400 / No : 3 Furnace

특징 Characteristics

(1) 챔버 상하 작동(자동화 시스템)
Chamber up and down operation (automated system)
(2) 400℃ ~ 600℃ 사이 질화 처리 가능
Can be nitrided between 400℃ and 600℃
(3) 10^{-5} Torr 진공 플라즈마 공정
10^{-5} Torr vacuum plasma process

주요생산품 Main Products

Housing, Piston, Plate Carrier etc.

침류 질화로 (Sulf-nitriding)

Size : Φ1,000×L2,000 / No : 1 Furnace

특징 Characteristics

(1) 처리중 H_2S 가스가 누출되지 않도록 안전 시스템 구축
Constructed safety system to prevent H_2S gas from leaking during processing
(2) 진공 N2 치환 후, 열처리 진행
After vacuum N2 replacement, proceed with heat treatment

주요생산품 Main Products

Mold type etc.

침탄(질화)로 (Carburizing Furnace)

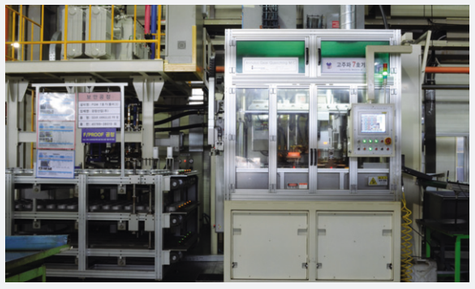
Size : W760×H800×L1,240 / No : 6 Furnace, 5 Furnace

특징 Characteristics

(1) 질소 퍼지식으로 친환경적임
Eco-friendly with nitrogen purge
(2) 제어 정밀도 우수
Excellent control precision

주요생산품 Main Products

ANN's Gear, Shaft ect.



고주파 플러그 퀜칭 (Induction Plug Quenching)

Size : Φ1.500mm / L2.400mm / No : 7 Machine

특징 Characteristics

(1) Plug로 치수 변형 최소화 기술 보유
Plug has minimized dimension modification technology
(2) 공정 자동화로 작업성 및 생산성 향상
Process automation improves workability and productivity

주요생산품 Main Products

ANN's Gear

윤곽경화기 (Contour Hardening Machine)

1MW / No : 1 Machine

특징 Characteristics

(1) 고출력 단시간 가열
High output short-time heating
(2) 듀얼주파수 사용으로 기어 윤곽경화 가능
Dual frequency use allows gear contour hardening
(3) 로봇화 라인으로 생산성 증대
Increased productivity with robotized line

PLATE 고주파기 (PLATE Induction Machine)

No : 1 Machine

특징 Characteristics

(1) 자동화 라인
Automation line
(2) 2개의 가열존으로 생산량 증가
Increased production with 2 heating zones

주요생산품 Main Products

PLATE OUTTER / INNER

CNC 가공기 (CNC Processing Machine)

No : 5 Machine / Maker : Fuji Company

특징 Characteristics

(1) 자동화 라인
Automation line

쇼트피닝기 (Shot Peening Machine)

No : 1 Machine

특징 Characteristics

(1) 인덱스 방식
Index method
(2) 2개의 쇼트피닝 단계
Two shot peening steps
(3) 자동화
Automation

Nitriding Part

Highest Quality

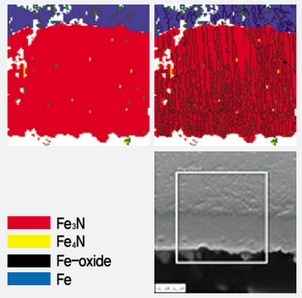
+ Nitrocarburizing / Oxy-Nitrocarburizing
+ Kn Controlled Nitriding

● 가스 연질화

Nitrocarburizing

- 표면에 (FexN)을 형성하여 내마모성, 내식성, 피로강도를 향상시키는 공법
  A method of improving wear resistance, corrosion resistance and fatigue strength by forming (FexN) on the surface
  - $2NH_3 = 2[N] + 3H_2$
  - $CO_2 + H_2 = CO + H_2O$
  - $2CO = 2[C] + O_2$

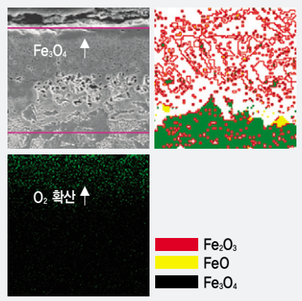
[N] : 활성화 질소 · FexN형성	[N] : Activated nitrogen · FexN formed
[C] : 활성화 탄소 · 촉매 역할	[C] : Activated carbon · Catalyst role



● 가스 산질화

OXY-Nitrocarburizing

- 가스연질화 후 Steam or Air 를 투입하여 표면에 산화피막을(Fe_3O_4) 형성하는 표면처리 공법
  Surface treatment method of forming an oxide film (Fe_3O_4) on the surface by injecting steam or air after nitriding
- 안정된 Fe_3O_4 층은 내식성에 탁월함
  Stable Fe_3O_4 layer is excellent for corrosion resistance
- 기술력[Technology]
  - 염수분무 테스트에서 270hr 내식성 검증 완료
    270hr corrosion resistance tested in salt spray test



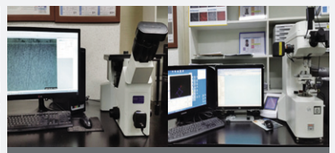
생산 공정 [Production Process (ex)HUB Clutch)]

Cleaning

Anti - Nitriding

Heat Treatment

Sand Blast


Inspection

주요 생산부품 [Major Parts Produced (HUB · DRUM Clutch · Washer etc.)]

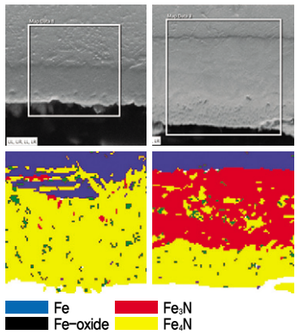
● Kn 제어질화

KN Controlled Nitriding

- 특성[Characteristics]
  - 요구되는 특성에 따라 선택상 형성 가능
  - Selectable phase can be formed according to reguired characteristics

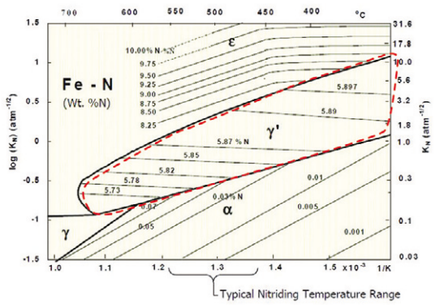
  화합물층 상분석[Analysis of the compound layer]
  - ε 상(Fe_3N) : HCP 구조, 높은 경도, 낮은 인성
  - ε phase (Fe_3N) : HCP structure, high hardness, low toughness
  - γ′ 상(Fe_4N) : FCC 구조, 높은 인성, 조밀 구조
    γ′ phase (Fe_4N) : FCC structure, high toughness, dense structure

  기술력[Technology]
  - EBSD를 통한 화합물층 상분석 결과 Fe_4N 단상 또는 Fe_3N과 Fe_4N이 혼재된 상 형성 기술 확보
    Securing the condition of Fe_4N single phase or mixed phase of Fe_3N, Fe_4N as a result of EBSD analysis

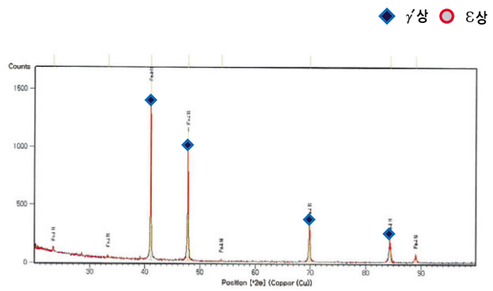


주요생산부품 (Annulus Gear)

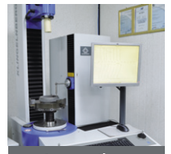
XRD 상분석 (Phase analysis of Compound layer)



Y단상 (Only γ′ Phase)



생산 공정 [Production Process (ex)Annulus Gear)]


Inspection

Cleaning & Sand blast (Auto)

Stack

Heat treatment

IBD selector

Inspection

Shot blast

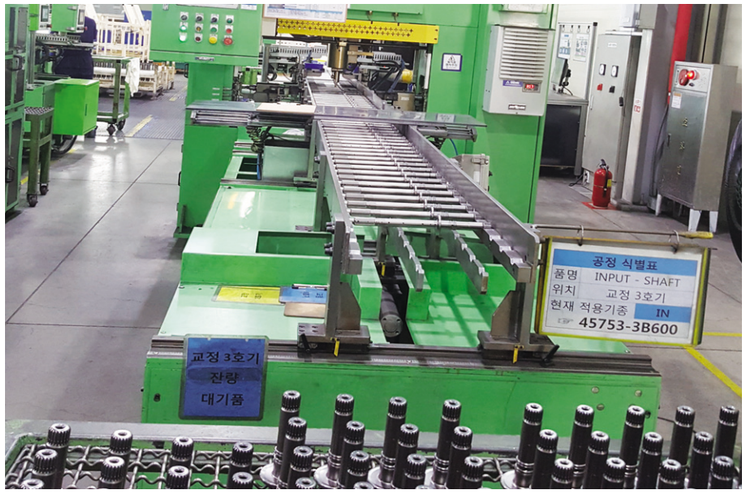
CNC Processing

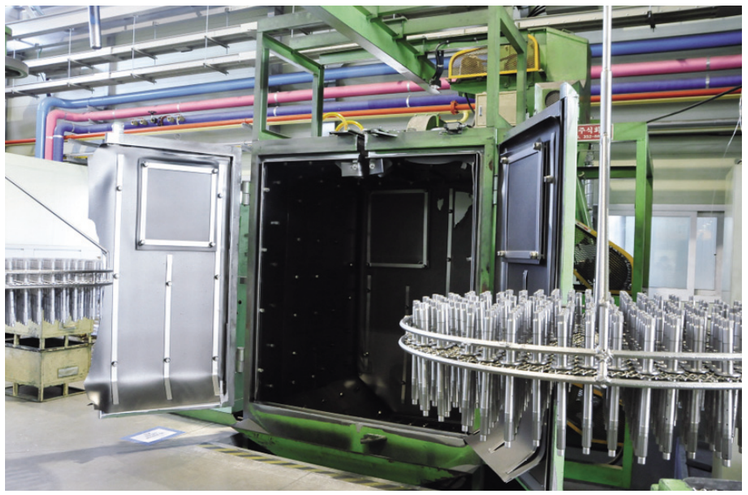
Inspection

Carburzing, Induction, New Technology Part

Highest Quality

+ Plasma Ion Nitriding / Sulf - Nitriding
+ Carburizing / Induction Plug Quenching
+ Contour Hardening Technology
+ Cnc Machining Line





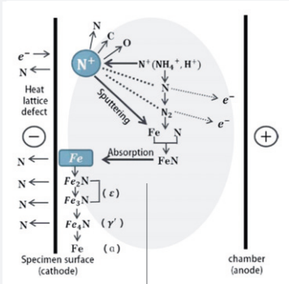
● 플라즈마 이온질화

Plasma Ion Nitriding

- N_2 + H_2 ➡ 2[N] + 2H → Electrical Force
- 2[N] + Fe ➡ FeN + N
- FeN + Fe ➡ Fe_2N + N
- Fe_2N + Fe ➡ Fe_3N + N
- Fe_3N + Fe ➡ Fe_4N ⊕ [N]

$Fe_{2\sim3}N$ (ε) → High Activity / Elcotrical + Chermical Force

Diffusion or Reaction



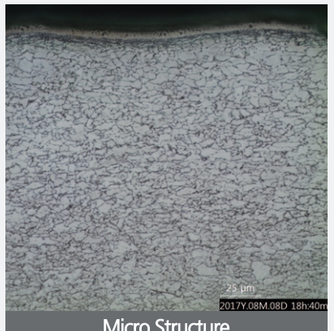
Plasma Region

- 질화속도 향상 : 스퍼터링에 의해 높은 질소 포텐셜을 가짐, 낮은온도 열처리 가능
  Improved nitriding speed : High nitrogen potential by sputtering, low temperature heat treatment is possible
- 내부식성 향상 및 기공 관리 용이
  Improved corrosion resistance and easy pore management

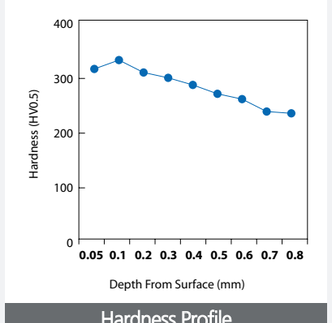
주요 생산부품 [Major Parts Produced (Housing, Piston, Plate carrier etc.)]

생산 공정 [Production Process (ex)Bracket)]

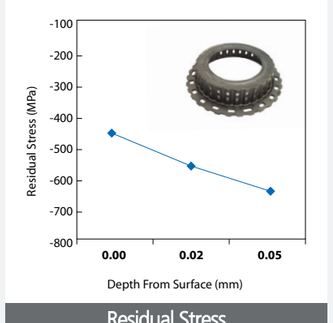
품질 분석 [Quality Analysis (ex)Bracket)]



Micro Structure



Hardness Profile

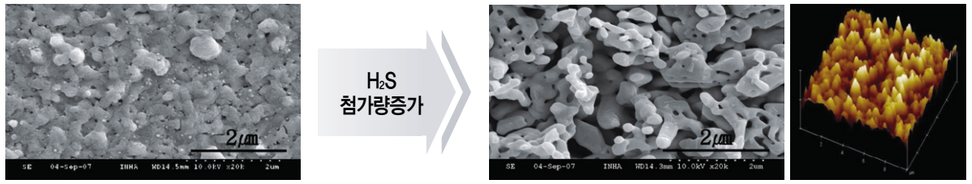


Residual Stress

● 침류질화

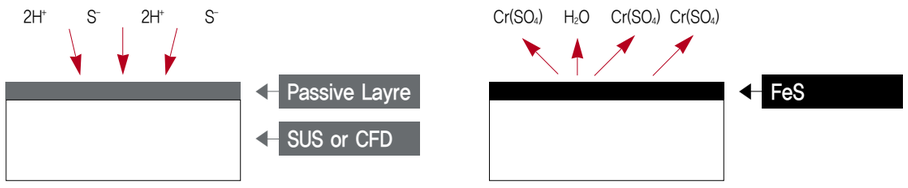
Sulf - Nitriding

- 철강재료의 표면에 질화물(Fe_xN) 및 황화물(F_eS_x)을 생성시키는 표면경화법
  A surface hardening method of producing nitride (Fe_xN) and sulphide (FeS_x) on the surface of a steel material
  - Fe_2^+ + H_2S ➡ FeS_x + $2H^+$
- FeS_x 층의 다공성 표면조도 : 충격흡수용이, 마찰열로 인한 접착 방지
  Porous surface roughness of FeS_x layer : Easy to absorb shock, and prevents adhesion due to frictional heat



출처 : vol31,no5, oct, 1993

- 난질 재료 질화 용이
  Easy to nitriding a poor material
  - CrO_3 (Passive Layer) + H_2S ➡ $Cr(SO_4)_3$ + H_2O + S



- 난질재료 처리 예시[Examples of Sulf-Nrtriding]

소재 Materials SUS304
- 화합물층 Compound Layer : 5.5 ㎛
- 침 류 층 Sulf Layer : 4.2 ㎛
- 경화깊이 Hardening Depth : 0.05 ㎜
- 표면경도 Surface Hardness : Hv(100gf) 1,142
- 심부경도 Deep Hardness : Hv(100gf) 289

소재 Materials SKD61
- 화합물층 Compound Layer : 8.0 ㎛
- 침 류 층 Sulf Layer : 2.7 ㎛
- 경화깊이 Hardening Depth : 0.10 ㎜
- 표면경도 Surface Hardness : Hv(100gf) 1,343
- 심부경도 Deep Hardness : Hv(100gf) 289

소재 Materials FCD700
- 화합물층 Compound Layer : 11 ㎛
- 침 류 층 Sulf Layer : 3.0 ㎛
- 경화깊이 Hardening Depth : 0.03 ㎜
- 표면경도 Surface Hardness : Hv(100gf) 733
- 심부경도 Deep Hardness : Hv(100gf) 307

● 침탄(질화)열처리

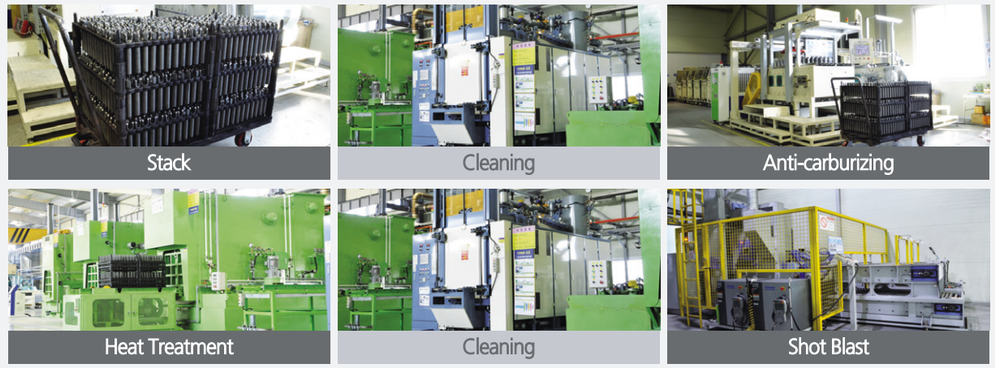
Carburizing

- 표면에 탄소를 확산 침투시킨 후에 담금질하여 표면부를 경화
  After the carbon is diffusion on the surface, hardeniry from guenched
- 침탄 후 담금질 공정에서 냉각실을 질소 복압 후 냉각 (산화방지)
  During gunenching after carburizing,
  the cooling chamber is an atmosphere in which nitrogen is pressurized. (Oxidation prevention
- 피로강도와 내마모성 향상
  Improved fatigue strength and abrasion resistance
- 침탄 반응 $C_4H_{10} + 2(O_2 + N_2) \leftrightarrow 2CO + 5H_2 + 2N_2$
  Carburization reaction $C_4H_{10} + 2(O_2 + N_2) \leftrightarrow 2CO + 5H_2 + 2N_2$

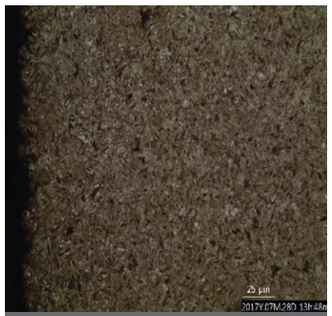
주요 생산부품 [Major Parts Produced (Shaft, Clutch Type etc.)]

생산 공정 [Production Process (ex)Shaft of Auto-Transmission Part)]

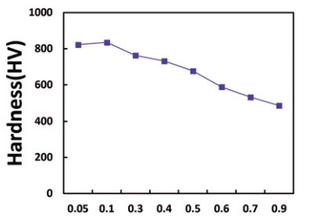
생산 공정 [Production Process (ex)Shaft of Steering Part)]



품질 분석 [Quality Analysis (Shaft of Auto-Transmission Part)]



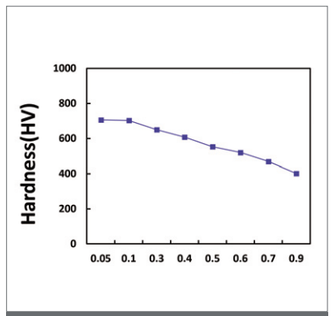
Micro Structre



Hardness Profile

품질 분석 [Quality Analysis (Shaft of Steering Part)]

Micro Structre



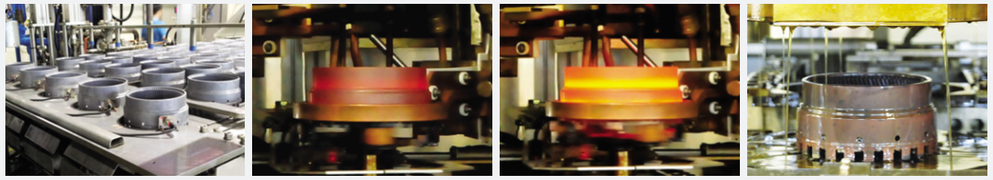
Hardness Profile

● 고주파 플러그 퀜칭

Induction Plug Quenching

- 표면에 유도전류를 흘려 급속가열 후 냉각시키는 표면 경화처리
  A metnod of rapid heating and cooling by surface mdnction heatrng
  가열시간이 짧아, 변형이 적음
- Heat treatment time is short and deformation is small
  필요부분만의 국부 열처리 용이
- Local heat treatment only where necessary
  표면부 경화조직 형성, 심부 연성 유지
- Surface hardened structure formed, and care ductility maintained

생산 Flow [Production Flow (Automation)]



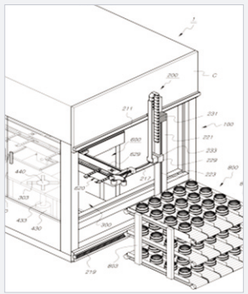
기술력 [Technology]

(1) **제품의 Loading 및 Unloading 공정 자동화**
- 작업 속도 향상 및 생산성 증대

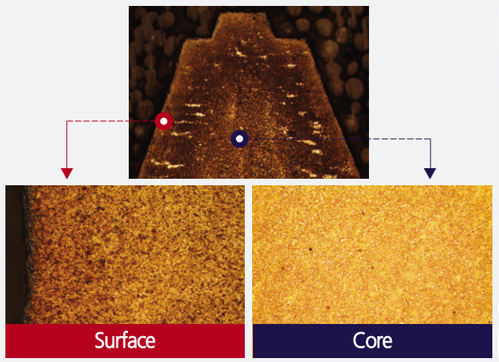
(1) Automation of loading and unloading Processes
- Speed of work improved and productivity increased

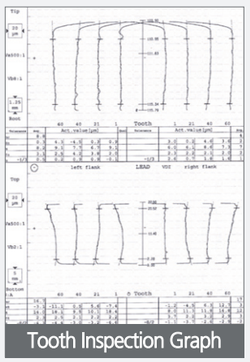
(2) **냉각시 플러스 사용**
- 변화량 최소화

(2) Plus used for guenching
- Deformation is small



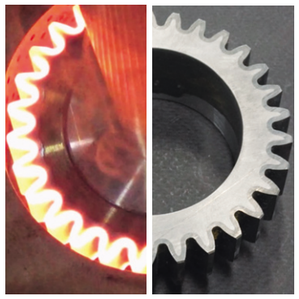
품질분석 [Quality Analysis]





● 윤곽고주파 기술

Contour Hardening TECHNOLOGY

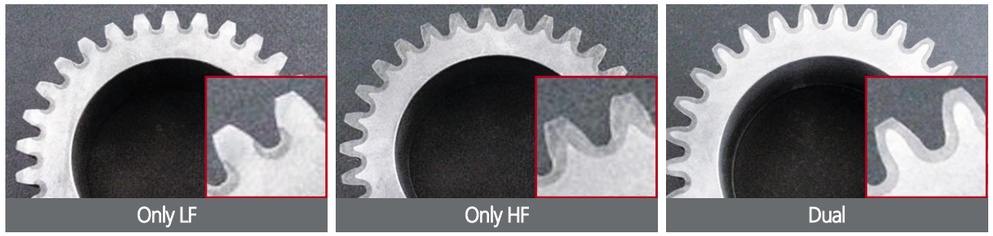


- 표면의 굴곡, 형상에 따라 **균일** 표면 경화기술
  Uniform surface hardening technology according to surface curvature and shape
- 내피로성 및 내마모성 개선으로 **내구성** 향상이 목적
  Improved durability targeted by improving fatigue and abrasion resistance
- 순간적인 경화로 필요한 부위만 가열 진행 (에너지 절감)
  Instantly heatmg only the reguired parts (energy savings)

SINGLE FREQUENCY		DUAL FREQUENCY
110KW MF×4.5s	Energy 1/3	(198KW MF+40KW HF)×0.6s
= 495KWs		= 143KWs

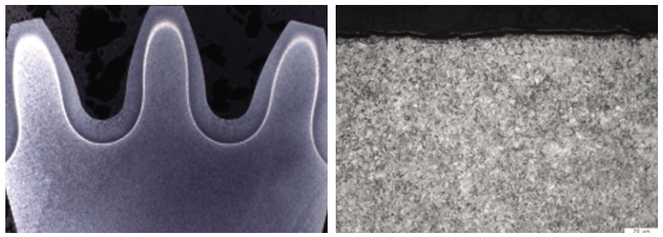
주파수에 따른 경화 패턴 [Hardening Pattern According to Frequency]

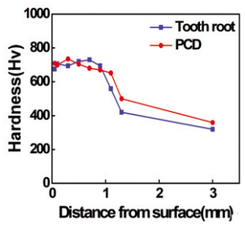
듀얼 주파수 사용으로 균일 패턴 형성 Uniform pattern formed using dual frequency
(1) 저주파(LF) : 기어 치저 구간 경화 (1) Low frequency (LF) : Gear low zone hardening
(2) 고주파(HF) : 기어 치끝 구간 경화 (2) High frequency (HF) : Gear end zone hardening



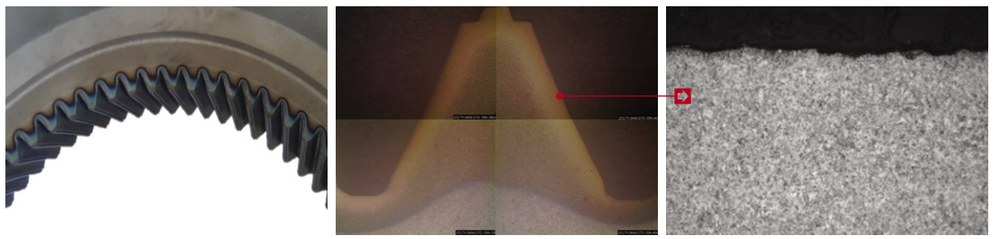
기술력 [Technology]

(1) **SPUR Gear**(SCM440, QT)





(2) **Helical Gear**(SCr420HB, QT) : Uniform Hardening Pattern

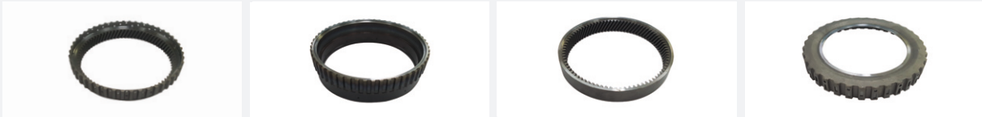


● CNC 가공라인

CNC Machining Line

CNC 자동화 5라인 [CNC Automation Line #5 (Fuji Company Machine)]

주요생산부품(용접 압입경 가공) [Major Parts Produced (Welding indentation Hardness Processing)]



공정 흐름 [Process Flow(Automation)]

Loading

Processing Station(2 Spindle)

PPG

Cleaning

Unloading

Inspection