사출 성형 가스 제거 장비

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가벤
GAVEN

나노 기술의 결정체! 세계최초 가스 수분의 완벽한 해결!

㈜한텍코리아 대한전기공업㈜

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GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN의 정의

사출성형기 내의 용융된 수지가 금형으로 사출하기 직전 가벤(GAS VENT NANO TECHNOLOGY)을 통하여 용융수지내 GAS 및 수분을 분리 배출하는 장치이다.

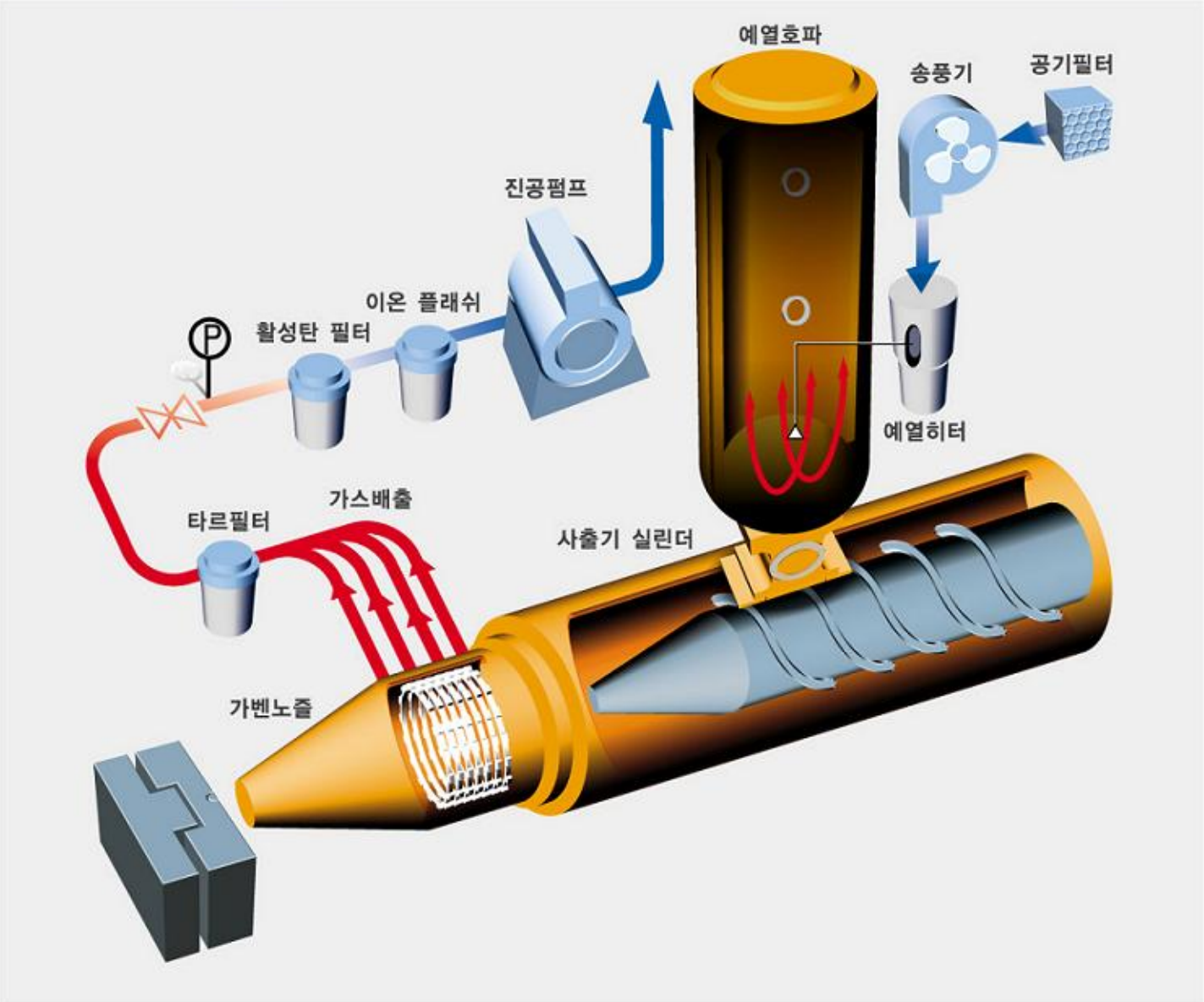
GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN 의 개발 목적

플라스틱 제품 사출성형시 제품의 불량 원인이 되는 GAS 및 수분을 획기적으로 제거하여 불량률 최소화, 사출영역 확대, 재생수지 사용으로 생산원가 절감을 실현한 세계 최초로 개발한 GAVEN 이다.

GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN SYSTEM



GAVEN
GAS VENT NANO TECHNOLOGY

기존의 가스 제거 방식

A

PLASTIC원료 → 제습기 → 용융 → 금형

(열풍 공급시 원료에 함유된 GAS 미제거)

B

PLASTIC원료 → 진공제습기 → 용융 → 금형

(진공 예열시 원료에 함유된 GAS 미제거)

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기존의 가스 제거 방식

C

PLASTIC원료 → SCREW내 GAS 제거장치

→ 용융 → 금형

(GAS 제거시 고가의 제품 사용)

D

금형 내 가스 배기장치

(가스배출이 미미함)

GAVEN
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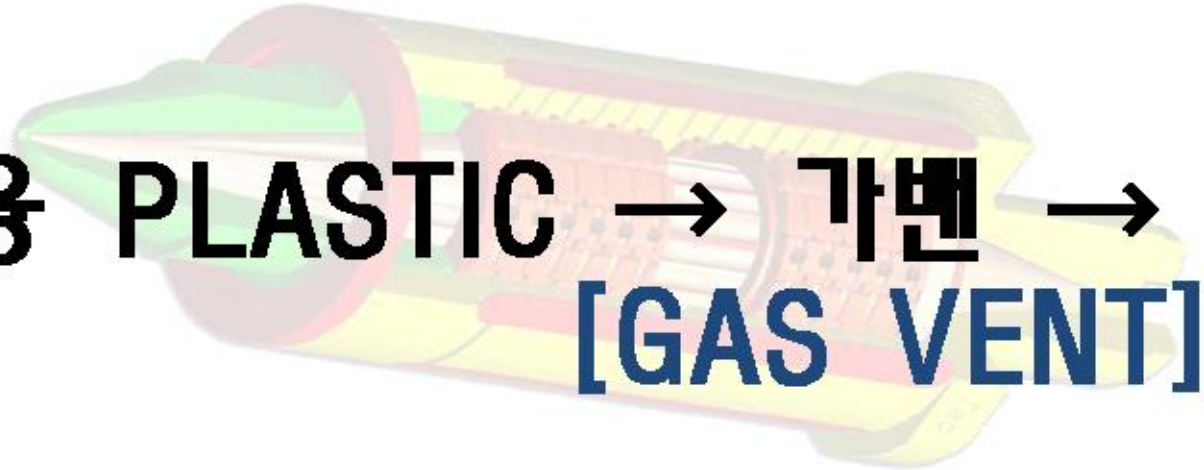
GAVEN 의 가스 제거 방식

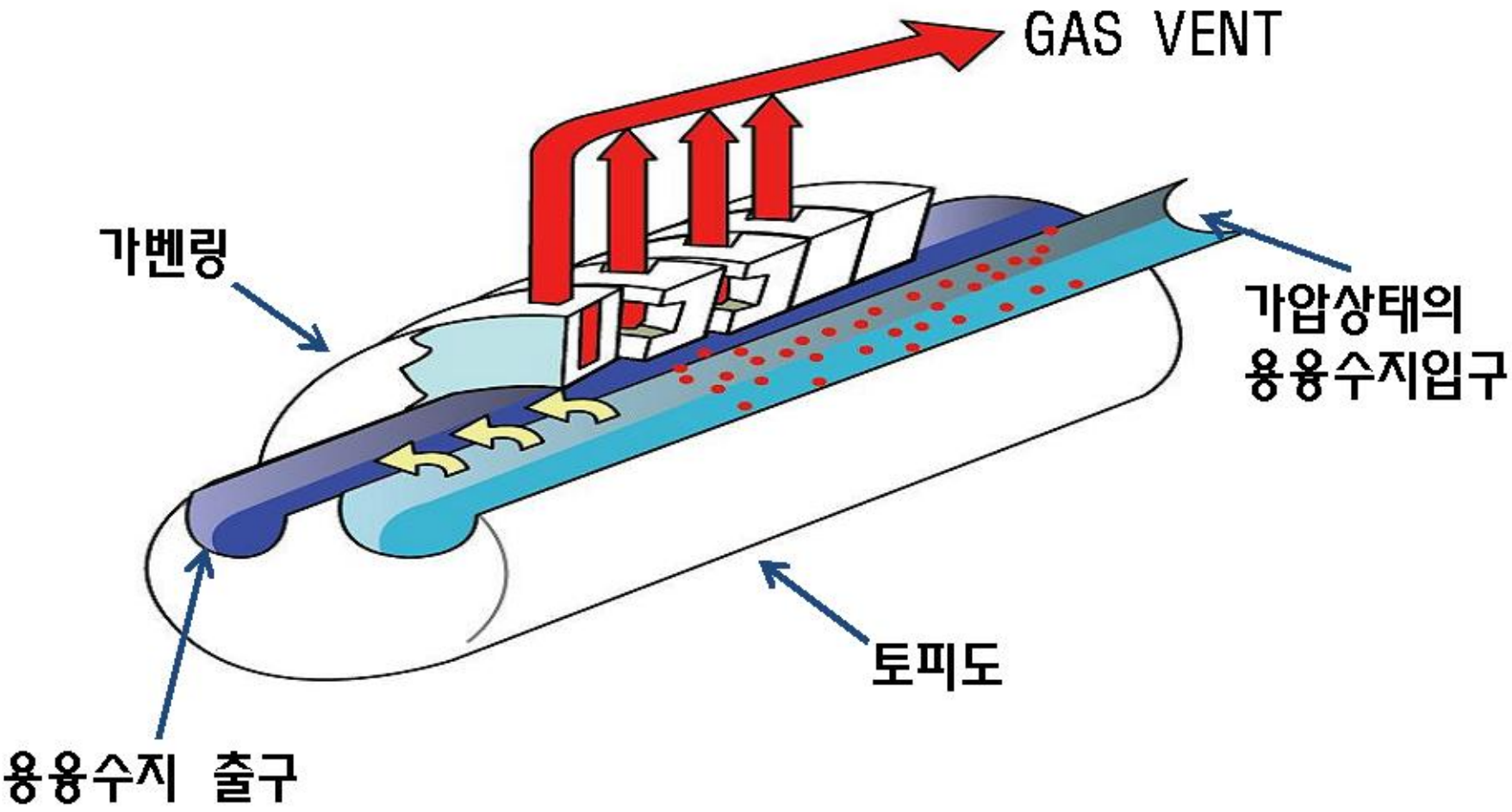


용융 PLASTIC → 가벤 → 성형

[GAS VENT]

GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN 의 원리



GAVEN
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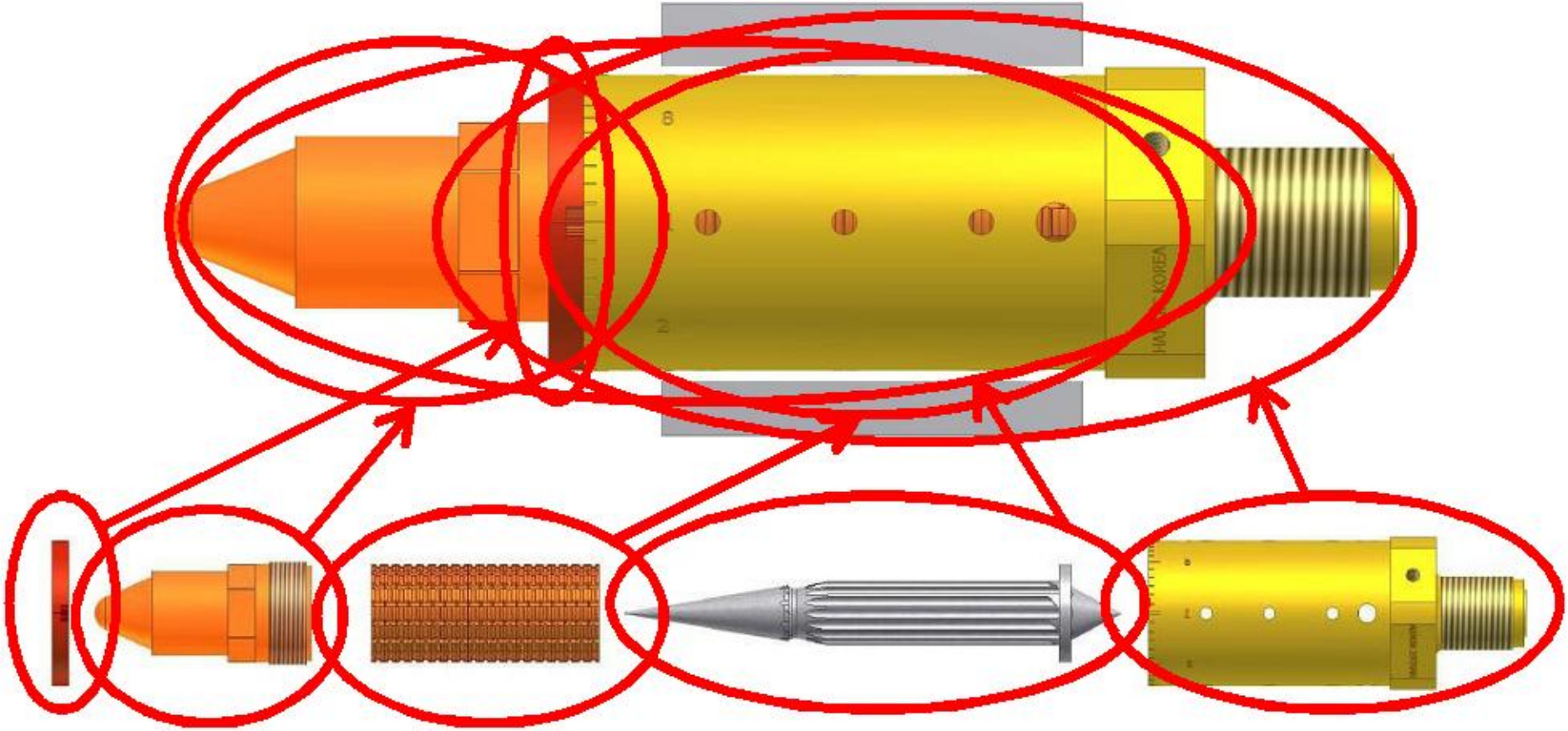
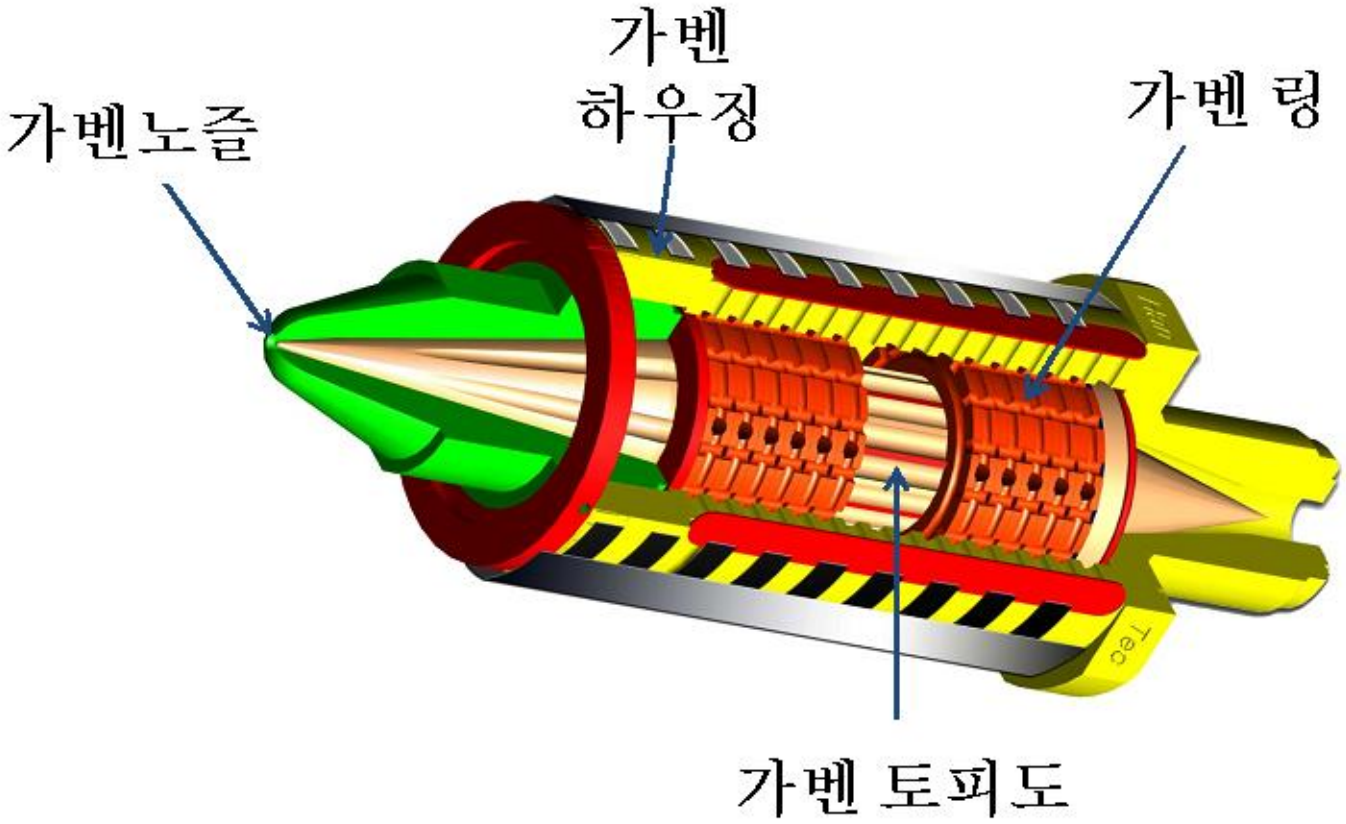
GAVEN 의 구조



GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN 의 내부구조



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GAVEN UNIT 구조

GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN 사양

■ 가벤

(단위 : mm)

사 양 / 형 식	하우징	토르크 게이지	단노즐	장노즐	센서타입
GA-80	Ø40×154	50Nm	Ø27.5×53	Ø27.5×73	CA×Ø2.5×100
GA-150	Ø59×200	80Nm	Ø27.5×70	Ø27.5×90	CA×Ø2.5×100
GA-300	Ø70×230	120Nm	Ø50×70	Ø50×90	CA×Ø2.5×100
GA-600	Ø80×293	180Nm	Ø80×107	Ø80×130	CA×Ø2.5×150
GA-1000	Ø90×320	220Nm	Ø95×125	Ø95×160	CA×Ø2.5×150

1. 본 사양은 제품의 품질향상을 위하여 예고 없이 변경될 수 있습니다.
2. GAVEN HEATER는 GAVEN 및 NOZZLE의 용량입니다.
3. 본 사양 외 대용량도 제작합니다.
4. 나사 사양은 옵션입니다.

GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN UNIT 사양

■ 가벤유니트

(단위 : mm)

사 양 / 형 식	예열 호파 (ℓ)	예열 히터 (kW)	가벤히터		송풍기 (ℓ /min)	진공펌프 (ℓ /min)	규 격 (W×D×H)
			하우징(kW)	노즐히터(W)			
GAU-80	20	1.5	1	300	5.2	20	535×456×800
GAU-150	45	3	1	300	5.2	30	585×456×900
GAU-300	90	5	1	300	5.2	30	670×486×1120
GAU-600	180	7	1	300	9	30	915×530×1650
GAU- 1000	300	9	1	300	9	30	960×600×1940

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GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN 의 효과

- PLASTIC 원료의 성형시 완벽한 GAS 제거
- 용융수지의 혼합
- FILTERING 기능을 통한 이물질 제거
- 계량시 흘림방지 및 CHECK 효과

GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN 의 효과

- 성형 조건 범위 확대

  (가스 제거에 따른 초 박막 생산 도전)

  (정밀 부품 성형 가능)

  (전사율 향상)

GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN 의 효과

- 성 에너지화

  -> 원료의 단순예열로 과다한 전기, 압축공기, 냉각수 LINE제거

- 전기 사용량

동급의 사출기 사용시 비교				
기기	MODEL	전기사용량	냉각수	압축공기
제습기	DHDD-50	9KW	20 L/MIN	0.4 L/MIN
GAVEN	GA-150	3KW	무	무

GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN 의 효과

-> 원료의 단순예열로 과다한 전기, 압축공기, 냉각수 LINE제거

- 6Kw x 8시간/日 x 30日 x 50원 = 72.000
- 6Kw x 20시간/日 x 30日 x 50원 = 180.000
- 월간 180.000 x 12개월 = 년간 2.160.000

-> 대형 사출기 2000TON – 3000TON 적용

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GAVEN 의 효과

- 제습기 사용시 원료 500KG/HR 공급장치
  - 전기 사용량 80 ~ 100Kw 소요
  - 전력비 월간 100Kw x 20HR x 30日 x 50원 = 3.000.000
  - 월간 3.000.000 x 12 = 년간 36.000.000
- GAVEN 사용시 원료 500KG/HR 공급장치
  - 전기 사용량 약 15Kw 소요
  - 전력비 월간 15Kw x 20HR x 30日 x 50원 = 450.000
  - 월간 450.000 x 12 = 년간 5.400.000
- 전체 소요전력의 약 1/6로 전력비 절감효과

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GAVEN 의 효과

❖ 금형 청소 주기 감소

(가스, 수분이 금형내로 유입금지)			
업체	제품·원료	설치전	설치후
N사	자동차부품 / PA	3일 가동후 1회 세척	10일 가동후 1회 세척
S사	자동차부품 / PA	7일 가동후 1회 세척	15일 가동후 1회 세척
M사	가전부품 / POM	3일 가동후 1회 세척	15일 가동후 1회 세척

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GAVEN 의 효과

❖원가절감

재생재 기존 대비 사용률 향상

업체명	종목	설치전	설치후
D사	가전	분쇄재 30% 사용	분쇄재 100%사용
N사	자동차	외산 원자재로 신재만 사용 (국산 원자재 사용시 가스불량 발생)	원자재 사용하면서 분쇄재도 사용 중

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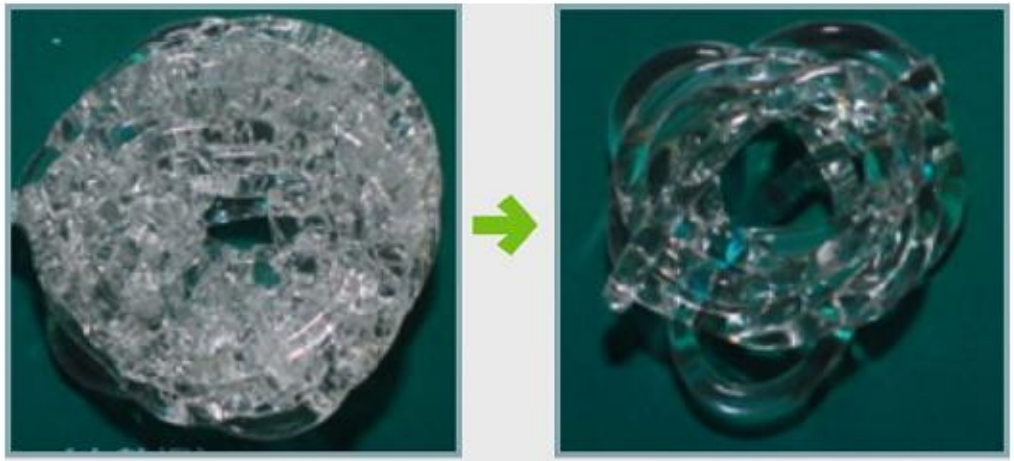
GAVEN 의 효과

- **성형 공장의 환경 개선**
  - GAS, 악취, 유해 물질을 활성탄 필터와 이온후레쉬로 포집정화
  - 불필요한 UTILITY의 제거 (전기, 압축공기, 냉각 LINE)
  - 과다한 원료 적재공간 제거 및 간소화
  - 과다한 크기의 건조장치 공간 제거 및 간소화

GAVEN
GAS VENT NANO TECHNOLOGY

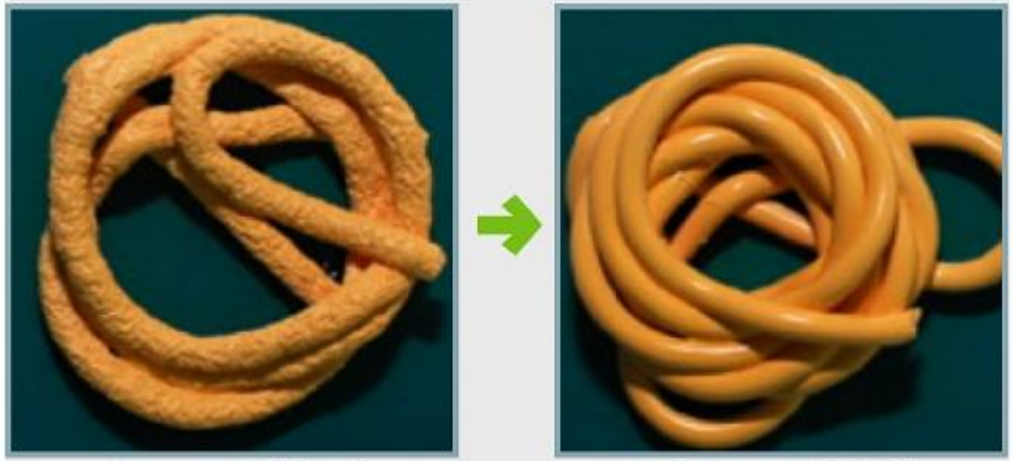
GAVEN 의 성공사례

❖ 가스 불량요인 획기적 제거(100% 재생수지 사용)



GAVEN 사용 전 GAVEN 사용 후

원료명
PC



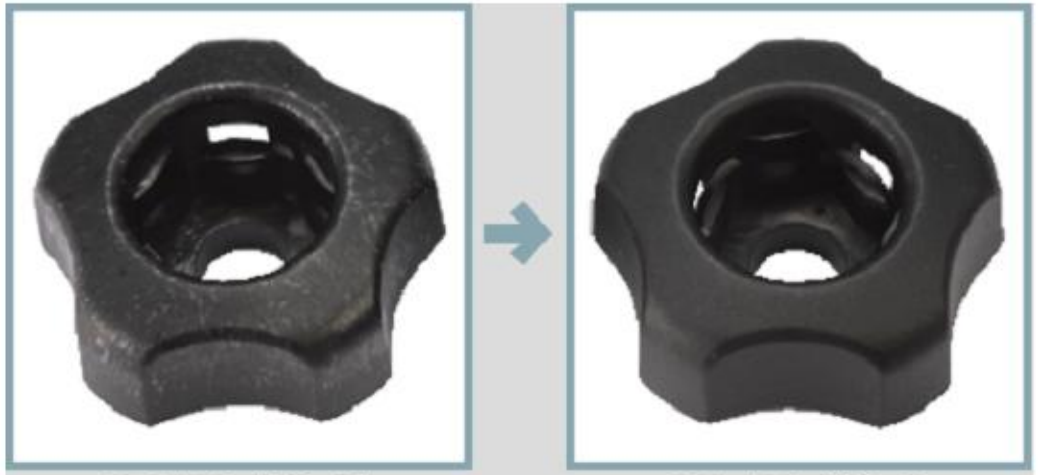
GAVEN 사용 전 GAVEN 사용 후

원료명
POM

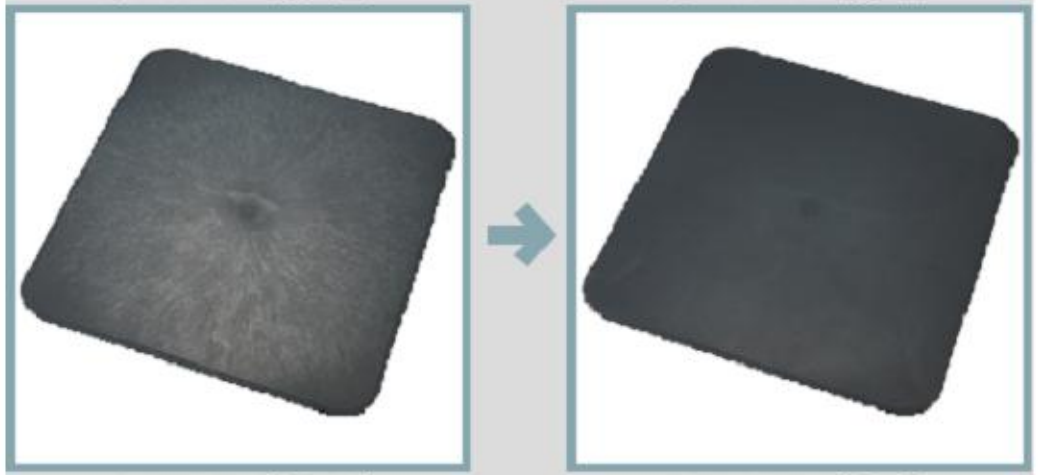
GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN 의 성공사례

❖ 가스 불량요인 획기적 제거(100% 재생수지 사용)



GAVEN 사용 전 → GAVEN 사용 후



GAVEN 사용 전 → GAVEN 사용 후

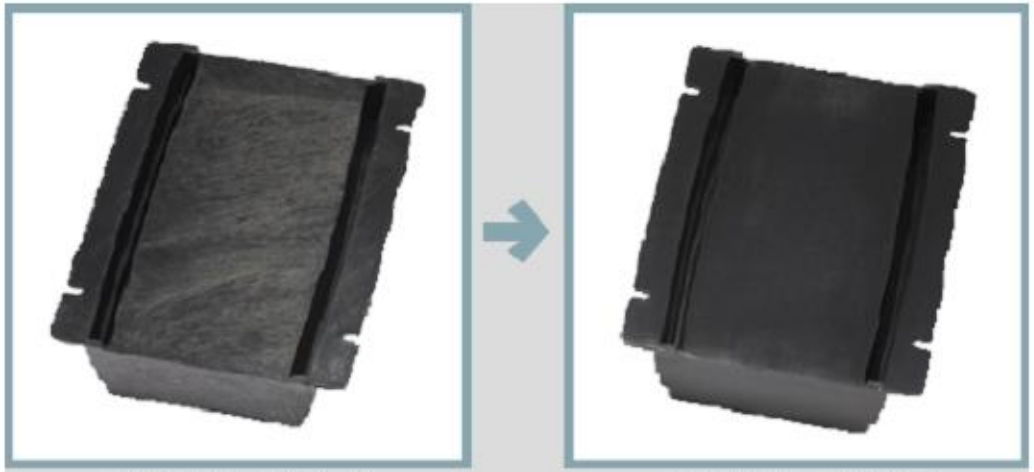
원료명
PA(재생수지)

원료명
PA+G/F(재생수지)

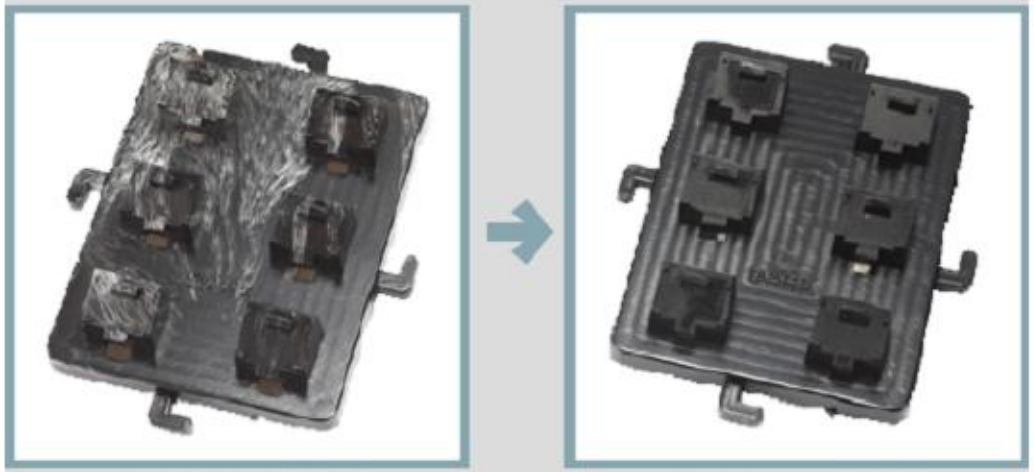
GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN 의 성공사례

❖ 가스 불량요인 획기적 제거(100% 재생수지 사용)



GAVEN 사용 전 → GAVEN 사용 후



GAVEN 사용 전 → GAVEN 사용 후

원료명
PA+G/F(재생수지)

원료명
PA+G/F(재생수지)

GAVEN
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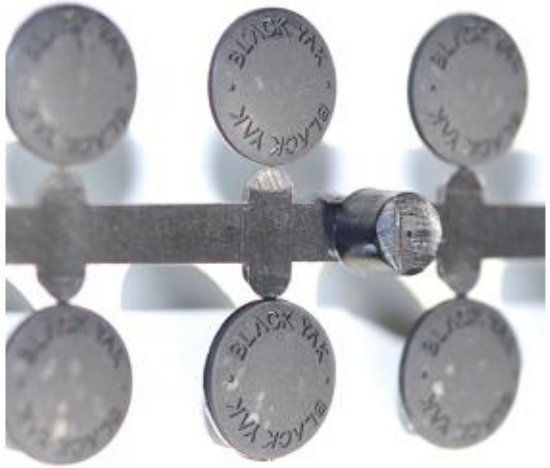
GAVEN 의 성공사례

PET - G/F 30 %		
일반 노즐 사용	GAVEN 사용	RESIN
		MOLD

GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN 의 성공사례

PA6		
일반 노즐 사용	GAVEN 사용	RESIN
		MOLD

GAVEN
GAS VENT NANO TECHNOLOGY

GAVEN 의 성공사례

내열 ABS		
일반 노즐 사용	GAVEN 사용	
		RESIN
		MOLD

GAVEN
GAS VENT NANO TECHNOLOGY

해외 기사(Plastic Rubber Asia 2월)

Gas venting system

A new gas venting equipment from a South Korean developer is said to guarantee smoother production, allow for minimal rejects and improved surfaces.

In a project between dehumidification equipment supplier *Daehan Electric*, *Hantech Korea* and *Hando Steel*, the parties have collaborated to bring down costs and improve product quality in their latest system known as GAVEN (gas vent nano system). Citing defective manufacturing as the primary cause of rejects, as a result of gases being emitted when resins are melted, *Hando Steel* has combined *Daehan*'s dryer and *Hantech*'s patented gas venting nozzle to introduce this new technology.

Generally, moisture in the air is extracted before the materials are heated to melting point. This is done after materials have been dried for 4-8 hours to avoid chemical reactions. But the developers of the new equipment say that the dehumidification and vacuum drying processes are not able to extract gas emissions completely, thereby causing defective end-products. However, *Hando Steel* says GAVEN extracts the gas before a mould is inserted. "It removes water in the materials as well as the gas from atmospheric moisture in the completely melted materials," says the company.

The new system is suitable for highly hygroscopic materials like engineering resins

Power-driven nozzle

The existing drying technique, says *Hando Steel*, has a high reject rate, especially when highly hygroscopic materials like nylon and acetal are used, because it does not completely remove gases that are emitted in the heated cylinder:

- ➜ plastic materials (the first drying)
- ➜ dehumidification drying
- ➜ hopper dryer drying
- ➜ cylinder (heating, gas rising)
- ➜ finished product

GAVEN, which comprises the nozzle, preheating and vacuum components, has fewer steps:

- ➜ plastic materials
- ➜ cylinder (heating, gas rising)
- ➜ gas vent nozzle (gas removal)
- ➜ finished product

Daehan manufactures the drying system that includes a hopper dryer and preheating equipment. Since the hopper and preheating functions are condensed into one system, the size of the equipment is reduced. The preheating equipment removes 90% of the water in the first step, thus relieving stress and load off the equipment.

Hantech has developed the nozzle, which is the heart of this new technique. Generally, a nozzle serves as the passageway for materials to flow to a mould. However, *Hantech*'s nozzle is pneumatically-driven and helps the materials to flow in a rotational movement. The materials, without gases and water, pass through and are moulded.

The rings allow the gas to pass through but not the resin

The gas venting system consists of concentric rings inserted in the middle of a cylinder, one above the other. The small spaces between the rings allow only gases to be extracted. Meanwhile, gases created during the processing are extracted by means of a vacuum pump. These are later purified using negatively charged ions or anions. *Hando Steel* explains this principle by referring to a fabric known as Goretex. The membrane of the fabric has about 1.4 billion pores per sq cm, each of which is approximately 20,000 times smaller than a water droplet, making it impenetrable to liquid water while still allowing smaller sized water vapour to pass through. The result is a material that is breathable and waterproof. Hence, applying this principle in its system, *Hando Steel* says though resins will not be able to pass through, gas in a steam state will be able to.

Fail-proof system

Apart from minimising defects and bringing about quality improvements, GAVEN allows for the homogeneous mixing of colours and materials and filters impurities. In addition, it removes tar and lengthens the life span of a mould, says *Hando Steel*.

In trial runs, to compare GAVEN with vacuum and dehumidification drying, the developers of the equipment say that it was able to completely remove gas from the melt. When the nozzle in front of the injection cylinder is removed and GAVEN is installed, the material is ready for the mould. In contrast, a dehumidification or vacuum drying machine requires up to six hours to process the material. This is a distinguishing factor of GAVEN since it matches the optimal conditions for an injection moulding process. Furthermore, only the nozzle needs to be replaced as it can be applied to any injection moulding machine. *Hando Steel* says its new equipment can be applied in all types of processes, particularly for the production of automotive, electronic/electrical parts and processes that utilise engineering resins like ABS, PBT, PA6/6.6, PC, POM, PSF, PES, PPS, PAL, PEI and PEEK.

GAVEN has been used to produce the product on the right rendering a better surface quality

As the demand and usage of engineering resins increases, *Hando Steel* sees a 20-30% rise in demand for dehumidification equipment in South Korea. *Hando Steel* has applied for two patents in South Korea for its new equipment and is applying for an international patent as well, stating that there is no other company in the world that offers the gas venting technology. "Japanese injection moulding machinery makers *Kawaguchi* and *Toshiba* did market vent-type injection machines for a while but it is thought that they failed due to the high prices," says *Hando Steel*. It also went on to say, "The Japanese products were not able to completely remove gas from materials because their machines vent gas in the middle of the heating cylinder when the materials are not melted completely. Hence, materials that flow through the venting system are not gas-free."

The company says that its product has generated interest from all over the world, including Japan and the US. It will display GAVEN at the Koplas exhibition to be held in March in Seoul. ◆

GAVEN
GAS VENT NANO TECHNOLOGY

해외 기사/광고(Japan Plastic 2월/Modern Plastic 3월)

SPECIAL ADVERTISING SECTION

'Gas Vent Nano System' solves gas venting

Part processed with (left) and without GAVEN.

Hando Steel Co.

Current material drying procedures are ineffective because they do not remove all of a material's moisture, especially from highly hydroscopic materials such as nylon and acetal. Daehan Electric Co., Hantech Korea Co., and Hando Steel Co. have worked together to develop the 'Gas Vent Nano System' (so-called 'GAVEN') to reduce the cost of plastics processing, to streamline the process, and to improve product quality.

Daehan Electric Co. has played an unrivaled role in the field of dehumidification equipment among the plastic manufacturing companies in Korea, while venture company Hantech Korea Co. developed the 'Gas Vent Nozzle' and was awarded for it a domestic patent and has applied for an international patent. Hando Steel Co. has combined the two firms' expertise to develop GAVEN, which as proven itself the best way to vent an injection molding machine and improve parts' appearance and reduce cycle times.

Solving the biggest problem

The primary cause of defects in plastics processing is the gases created during plasticizing. We cannot expect complete removal of gas with the current processes, which takes moisture out of the air but not out of the material. This water ends up being released in a processing machine's barrel and creates defects.

GAVEN is divided into nozzle, preheating, and vacuum parts. Daehan Electric Co. supplies a controller and a hopper dryer/preheater system that removes 90% of water.

Hantech' nozzle is the core and know-how of this new technique. It is equipped with an engine and helps plastic to flow out like a noodle, and rotate. At this moment, plastic without gas and water passes through and is molded after gas is removed. GAVEN offers convenience, cost reduction, and quality improvement at the same time.

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총 론

본 개발 공법으로 생산된 GAVEN은 국내 및 전세계에도 전무한 상태의 세계 최초의 개발품으로서 ENG PLASTIC (PA, PBT, PC, POM etc..)을 주원료로 한 생산 공정의 업체는 절대적으로 필요한 제품입니다.

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총 론

특히, 임해 공업단지, 농공단지 등 수분이 많은 지역 업체에게 더욱 권장합니다.

1차 생산 후 해외 시장(일본, 미국)에서 수주를 받아 납품 및 생산 중이며 고객 제위와 함께 고부가가치의 생산성 확보로 고객의 오래된 염원을 풀어드리며, 귀사 발전에 지대한 영향을 미칠 것을 바라며 경청해주셔서 감사합니다.

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