

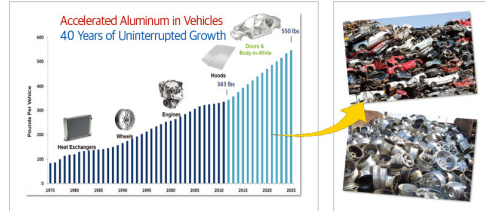
주조 및 가공재 동시 사용이 가능한 고강도 알루미늄합금

High-Strength Aluminum Alloys for Both Cast and Wrought Products

TRL2

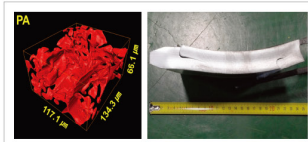
기술내용

- 자동차 연비 및 배출가스 규제에 인하여 차량 경량화를 위한 알루미늄 사용량은 지속적으로 증가할 것으로 예상
- 현재 알루미늄합금은 주조재와 가공재로 구분되어 사용되고 있으나 재활용시 혼합 처리되어 저급한 용도의 스크랩으로 취급
- 단일 조성 알루미늄합금의 주조품, 가공품 동시 적용 기술 개발을 통하여 재활용성 확보 및 자동차 부품 적용량 증가 기대

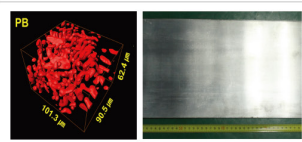


Source: Ducker Worldwide 2011

- 주조용 Al-Mg-Si 합금의 가공품 적용을 위한 가공특성 향상 기술 개발
- 2차상 형상 제어기술에 의한 균열발생 억제



기존 소재 : 압연불가

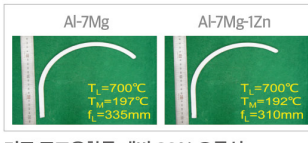


개량 소재 : 판재제조 가능

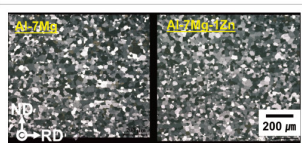
기계적 성질

구분	인장강도(MPa)	항복강도(MPa)	연신율(%)
주조재 T6	223	154	3.2
가공재 T6	249	180	11.5

- 주조품, 가공품 동시 적용을 위한 고강도, 고연성 알루미늄합금 개발



기존 주조용합금 대비 80% 유동성



기계적 성질

구분	인장강도(MPa)	항복강도(MPa)	연신율(%)
Al-7Mg	335	157	42.3
Al-7Mg-1Zn	350	158	42.6

우수성

- 기존 주조용 알루미늄합금을 주조품, 가공품 동시 적용이 가능하도록 개량함으로써 부품 설계 자유도 향상
- 주조품, 가공품 동시 사용이 가능한 고강도, 고연성 합금 적용을 통한 자동차용 알루미늄 부품 시장 확대
- 자동차용 알루미늄 판재, 압출재, 주조재 동시 사용을 통하여 소재 관리 용이성 및 재활용성 확보

- [특허] KR10-2016-0063923 알루미늄 합금을 이용한 가공재 제조방법

사업성

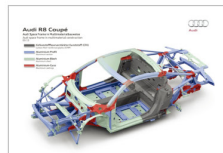
- 주조품, 가공품의 단일조성 소재 적용을 통한 알루미늄합금 자동차 적용량 증가가 기대됨
- 고강도, 고연성 소재는 차체, 범퍼 등에 적용하며 알루미늄 판재, 압출재 시장에서 경쟁력 확보

이전 가능 기술

- 주조용 알루미늄합금 가공품 적용 기술
- 주조/가공 동시 적용 고강도/고연성 알루미늄 소재 기술

활용분야

- 자동차 차체, 도어 • 범퍼빔, 임팩트 바



자동차 차체



도어



범퍼빔

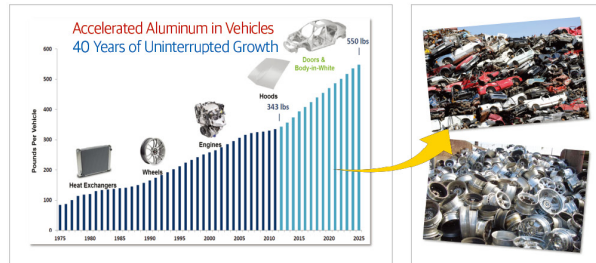
[Source] Audi, Reinfelden, Constellium

High-Strength Aluminum Alloys for Both Cast and Wrought Products

TRL2

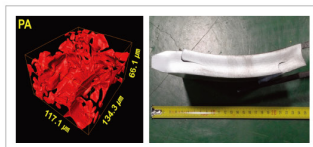
Technology Overview

- More aluminum is expected to be used in automobiles due to tightening regulations on their fuel efficiency and emissions.
- Currently, differentiation is made between cast products and wrought ones when they are initially used, but they are mixed when they are recycled and treated as scrap.
- This technology is applicable to both cast and wrought aluminum alloys, providing higher recyclability and wider applications in automobiles.

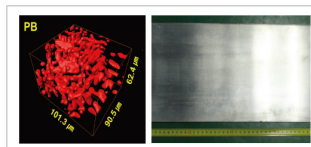


Source: Ducker Worldwide 2011

- Enhanced properties of cast Al-Mg-Si alloys for application to wrought products
- Inhibition of cracks based on secondary phase shape control



Existing material: Rolling is impossible

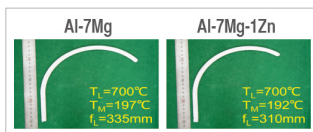


Improved material: Can be made into plates

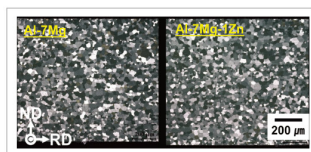
Mechanical properties

Material	Tensile strength (MPa)	yield strength (MPa)	Elongation (%)
Cast material T6	223	154	3.2
Wrought material T6	249	180	11.5

- High strength and high elongation aluminum alloy applicable to both cast and wrought products



Liquidity equivalent to 80 percent of existing cast alloys



Mechanical properties

Material	Tensile strength (MPa)	yield strength (MPa)	Elongation (%)
Al-7Mg	335	157	42.3
Al-7Mg-1Zn	350	158	42.6

Highlights and Strengths

- This technology allows existing cast aluminum alloys to be applicable to both cast and wrought products, increasing the freedom of part design.
- High strength and high elongation aluminum alloy applicable to both cast and wrought products can widen the application of aluminum parts to automobiles.
- Aluminum plates, extruded aluminum products and cast aluminum products can be used together, making material management and recycling easier.
- [Patent] KR10-2016-0063923 MANUFACTURING METHOD OF WROUGHT MATERIALS USING ALUMINUM ALLOY

Business Cases

- Use of single alloy for both cast and wrought products will broaden the application of aluminum alloys to automobiles.
- High strength and high elongation material is applicable to car body and bumpers, helping aluminum plates and extrusions to have greater competitiveness in the market.
- Applicable products and services
 - Car body, doors
 - Bumper beams, impact bars

Transferable technology

- Application of cast aluminum alloy to wrought products High strength and high elongation aluminum alloy applicable to both cast and wrought products



Car body (Source: Audi, Rheinfelden, Constellium) Door Bumper beam