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Features of rolling stock recycling technology in Japan

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Outline

- Basic restrictions prompt recycling
- Recycling technology in road vehicles
- Green engineering in rolling stock
- Recycling technologies in rolling stock
- Conclusion



Basic restrictions prompt recycling

Tightened landfill site and environmental rules



- All industrial waste undergoes intermediate processing before landfill.
- All landfill sites are required to secure authorization and to meet environmental standards such as drain water quality, groundwater quality, dust, smell and vibration.
- Because of difficulties in resident agreement to build conventional sites, landfill space became limited (2.5 years worth of space in 1993).
- For easier resident agreement 'Closed type' sites become common.
- Consequently, landfill cost is very high.



http://www.kajima.co.jp/tech/indust_waste/disposal/index.html
<http://www.hokurikukankyou.co.jp/flow/index03.html#no1>
<http://blogs.yahoo.co.jp/kmqhg970/35058813.html>

Basic restrictions prompt recycling

Competitiveness of dismantler and manufacturer



- Manufacturers can produce high quality products using high quality recycled material.
- Dismantlers can sell the material with higher price depending on the higher quality of materials they can produce.
- High-level dismantling techniques lead to an economic advantage.

Example of road vehicle recycling:

- Pressed car bodies with Cu concentration of less than 0.3 wt.% can be directly used as melting steel (whole body recycle).
- In case of whole body recycle no shredder residue is made, hence landfill is not needed.



http://www.japanmetal.com/gyoukai_link/recycle/dictionary_3.html
<http://tanabe.mankai.jp/tokyosteel.html>
<http://www.sankoseiko.co.jp/koutei.html>

Recycling technology in road vehicles

Whole body recycling causing no shredder residue



Original source:

Airdate 2013/05/01 20:00~20:43 (JST)

Program name Owari no Bigaku (Aesthetics of demise)

Broadcaster NHK General TV, Japan



Green engineering in rolling stock

Environmental efforts of railway operators



- Environmental management policy
- Annual environmental report
- Energy saving of rolling stock
- “Reduce, Reuse, Recycle” of wastes generated from railway service



<http://www.jreast.co.jp/eco/circulation/>



Recycling technologies in rolling stock

Structure design considering recycling



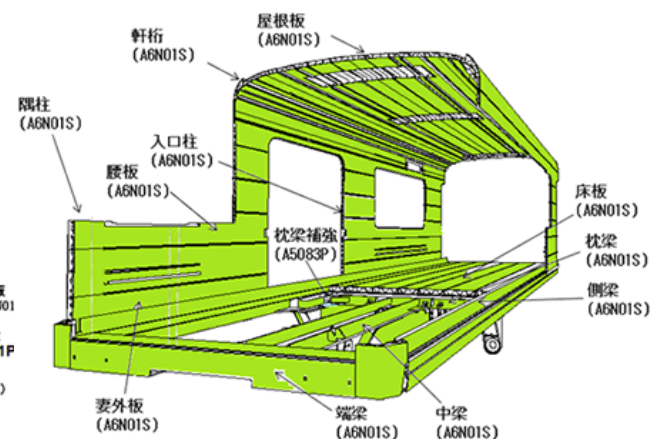
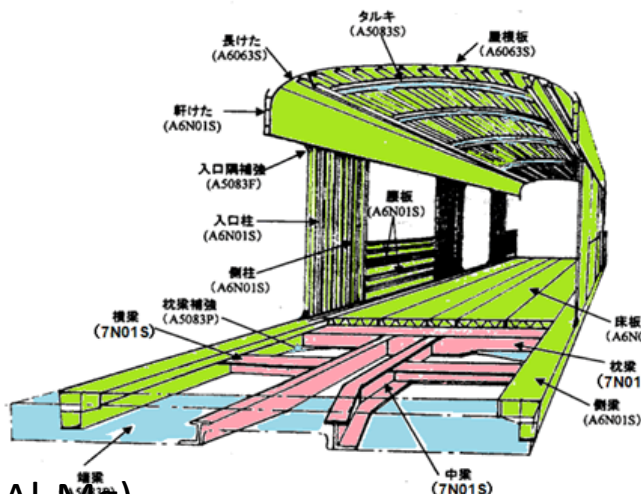
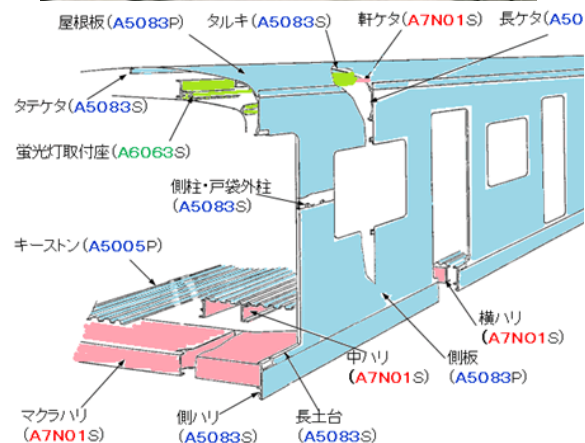
1960's



1980's



2000's



5000 series Al alloys (Al-Mg)
6000 series Al alloys (Al-Mg-Si)
7000 series Al alloys (Al-Zn-Mg-Cu)

Recycling technologies in rolling stock

Dismantling technology



Recycling technologies in rolling stock

Example of actual recycle rate



Automated guideway transit vehicles (1995)

Recycle rate 92~94%
Recovery rate 99%



Recycling technologies in rolling stock

Example of actual recycle rates



	Commuter EMU 	Commuter EMU 	Freight Wagon 	Shinkansen EMU 
Vehicle mass(ton)	35.0	30.0	18.3	39.0
Recycled mass(ton)	31.5(Fe28,Al 0.5,SUS1,Cu0.5, glass0.5, other metals1)	28(Fe15.5, Al 0.8, SUS6.0, other metals5.7)	18.1(Fe 18.1)	33.2(Fe14.8, Al11.6,other metals6.8)
Waste mass(ton)	3.5	2	0.2	4.3
Recycle rate(%)	90	93.3	99	88.5

(According to a report from Institution for Transport Policy Studies : <http://www.jterc.or.jp/english/Henglish.htm>)

Conclusion

Features of rolling stock recycling in Japan



- Recycling of industrial waste is a pursued national policy.
- Difficulty of using landfill site, as well as escalation of landfill cost greatly influence the national policy.
- High-level dismantling technology leads to an economic advantage in road vehicle recycling.
- High-level dismantling and recycling are carried out also in railway rolling stock.
- Recyclability is carefully considered in the design stage.
- Environmental management policy of railway operators encourage these actions.





END

Thank you for your attention.

