JFE TECHNICAL REPORT
No. 24 (Mar. 2019)

H S e S ee S ee We Red c A b e

FUNAKAWA Yoshimasa[*1] NAGATAKI Yasunobu[*2]

Abstract:

Re e f f e eff c e c eg a a e bec g c ea b ea. T e de e g c e a e a e ab g c eg a a de e- ed c e. B d e g ed c a e e ec c ca c effec e e f e ef- c e c. A g g e g ee e a 980 MPa g ade e e e g a g e ed ece e ea. M e e, a g a bec e a cab e a b e e f ce e e be. A g e a , a e e a g e g ee a d - a ed e be a e e e e ed.

S ce e c ea e e f ac f a e e a e ee e g e ed, a e e c ce e c a ea g e e de e a d d ce e g e g ee. Ve a d c g a e JFE c a ea g ce ea e e ce e e d g e e e de e ed a ee. S face ea e a e e f ab f g e g ga a ea ed ee ee a d a bee a ed a b e.

1. Introduction

The concentration of carbon dioxide (CO_2), which has been a cause of global warming, is increasing significantly by the increase in economic activity. Especially, the amount of CO_2 from automobiles occupies about 20% in CO_2 emission[1)] so that reducing CO_2 emission from automobiles is one of the important issues to prevent global warming. Since the amount of CO_2 emission from driving an automobile is proportional to the weight of the vehicle with any drive system[2)], the weight reduction of automobiles is an important matter to reduce CO_2 emission. Even in the case of electric vehicles (EV), because a battery weighing from 100 kg to 200 kg has to be installed, the

standard in 2025. The hybrid system body structure will be similar to that of the conventional gasoline engine automobiles. This indicates that the requirement for high strength steel of structural bodies should be the conventional type. In EVs without a gasoline engine, the weight distribution will change due to a decreased volume of excess space in the front of the cabin and extra weight due to the installation of a battery weighing over 100 kg. As a result of these changes, the requirements for automobile body parts are as follows.

(1) Higher strength to support and protect the battery.
(2) Weight reduction in the rear part of vehicles to optimize the weight distribution for improvement of steering performance.
(3) Weight reduction of undercarriage (suspension) parts to reduce the weight of the lower body.

JFE Steel plans to supply materials suited to the needs described above.

3.

suppressing slag generation in arc welding and controlling the shape of the weld metals, etc., JFE steel Corporation continues to find new solutions to those problems.

In Fig. 3, it was mentioned that the use of high strength steel sheets for cold-stamping had started. In the HS process, high strength is also obtained by heating a sheet to a high temperature and pressing the sheet with a die. Although the HS process is able to obtain a good shape more easily, it involves issues that are different from those in cold-stamping of high strength steel sheets. **Table 1** shows the issues both of the cold-stamping process and of the hot-stamping process.[5] In the cold-stamping process, the issues are: (1) forming of low ductility steel sheetsen64(upw 10 0 0 10 53.8583 661.1659 Tm[with a die)Tm8d)0.5(of)-92.9s42F(>)]TJETEMCh9S

increased by adding austenite forming elements and in the annealing process with higher temperature.

JFE Steel Corporation is actively engaged in the development of technology applications for various

Fig. 7 Effect of JAZ™ on bulge forming height of high strength steels

galvannealed hot-dip zinc-coated steel sheets with JAZ™ is higher than that without JAZ™. Because the high lubricating film reduces frictional resistance with die, even when forming high strength steel sheets, it is possible to obtain higher stretch formability than that expected from the elongation of the steel sheet. Thus, JAZ™ is an effective surface treatment for improving formability of high strength steel sheets.

5. Conclusion

In response to the stricter regulations in the future, the strength of steel sheets has increased in the last 10 years. However, with the large trend toward EVs, higher performance will be required in automotive structures. In order to realize the high requirements industrially, social expectations will be on high strength and high ductility steel sheets with a better LCA. In the future, JFE Steel will continue to work energetID lly to develop new high performance high strength steel sheet and technologies.

References

1) Estimation of amount of global warming gas emission in Japan. Ministry of the Environment of Japan. 2013.
2) List of automobile fuel consumption by Ministry of Land, Infrastructure and Transport of Japan. (http://www.mlit.go.jp/jidosha/jidosha_fr10_000024.html)
3) Nishino, K. Fuel regulation being strict in the world. MITUSI & Co. Global Strategic Studies Institute (MGSSI). 2016.
4) Total Engineering. Research.Prediction of automobile industry in 2025. 2016.
5) Seto, K. Tokushuko. 2017, vol. 66, no. 3, p. 1.
6) Takashima, K.; Sawanishi, C.; Taniguchi, K.; Matsuda, H.; Ikeda, R. National Meeting of JIW. 2017, vol. 100, p. 16
7) Kurihara, T.; Osaka, S.; Iwase, K.; Osawa, K. Tetsu-to-Hagane. 1982, vol. 68, no. 2, p. 144–149.
8) Matsudo, K.; Shimomura, T.; Osawa, K.; Okuyama, K.; Kinoshita, M.; Osaka, S. NKK Technical Report. 1980, no. 84, p. 14–24.
9) Nakaoka, K.; Araki, K.; Takada, Y. Nose, J. NKK Technical Report. no. 75, p. 14–19.
10) New Products & Technologies. JFE Technical Report. 2013, no 18, p. 129–131.
11) Iwama, T. SAE Technical paper. 2016, no. 2016-01-0355.
12) Iwama, T.; Fujita, T.; Yamazaki, Y.; Inazumi, T. ; Suzuoki, H.; Kasahara, T.; Nakano, Y.; Furui, K. Transaction of The Society of Automotive Engineers of Japan. 2013, vol. 44, p. 1125–1130.
13) Hoshino, K.; Higai, K.; Taira, S. Study on Application of “JAZ*” (JFE Advanced Zinc) to High-Strength Galvannealed Steel Sheet. JFE Technical Report. 2013, no. 18, p. 89–95.