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Organic Dry Film Lubricant Coated Steel Sheet with Excellent Press Formability

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Synopsis :

Kawasaki Steel has developed a new dry film lubricant with friction properties superior to those of conventional dry film lubricants by optimizing the glass transition temperature of a binder resin and adding polyethylene wax and inorganic lubricants. This report describes the effect of the developed dry film on the press formability of hot rolled steel sheets and galvanized steel sheets. The results of the development suggest that the new dry film lubricant expands the application of high strength steel sheets and galvanized steel sheets to automotive body panels. Furthermore, these steel sheets with the dry film lubricant showed the same alkaline degreasability, phosphatability and spot weldability as conventional steel sheets coated with rust preventive lubricating oil. These results also suggested that steel sheets with the dry film lubricant have excellent quality to be applied widely to automotive body panels.

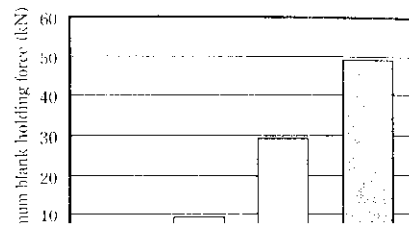
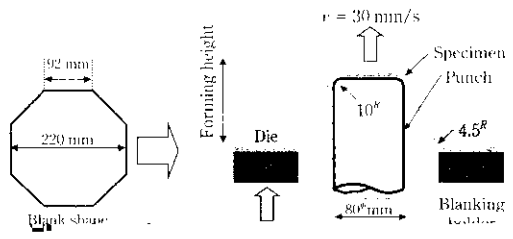
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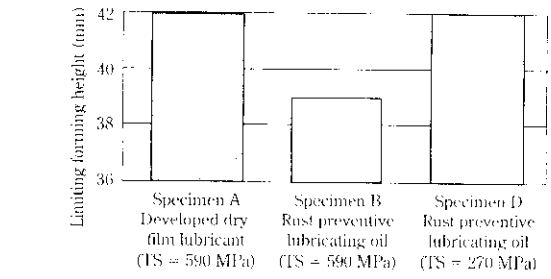
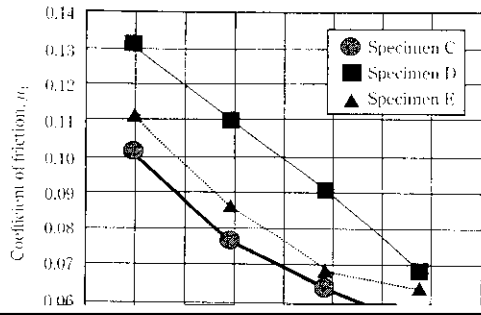
# Organic Dry Film Lubricant Coated Steel Sheet with Excellent Press Formability

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Table 1 Lubrication treatments and mechanical properties of test specimen

Specimen No.	Lubrication Treatment	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)
1	Control	210	380	15
2	Organic Solid Lubricant	210	380	15
3	Organic Solid Lubricant	210	380	15
4	Organic Solid Lubricant	210	380	15
5	Organic Solid Lubricant	210	380	15
6	Organic Solid Lubricant	210	380	15
7	Organic Solid Lubricant	210	380	15
8	Organic Solid Lubricant	210	380	15
9	Organic Solid Lubricant	210	380	15
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99	Organic Solid Lubricant	210	380	15
100	Organic Solid Lubricant	210	380	15



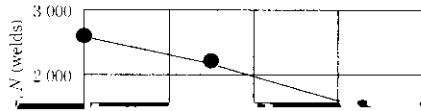


10 20 30 40 50 60 70 80 90  
Holding pressure (MPa)



Specimen	Proper welding current (kA)				
	8	9	10	11	12
Specimen F with dry film lubricant		Short nugget		Sputter	
Specimen G with rust preventive lubricating oil					

Fig. 13 Spot weldability of sheet steel with dry film lubricant (galvannealed sheet steel)



を示す。固形潤滑処理皮膜の厚さの増加にしたがい、電極寿命が短くなる傾向にある。しかし、滑動特性のよい、皮膜厚 2 $\mu$ m 程度で約 2000 点の連続溶接が可能であり、実用上問題のないレベルであった。なお、皮膜付着量約 3 $\mu$ m における電極寿命低下の原因は、溶接時に電極先端部へ皮膜が付着し、電極先端における局所的な電流密度上昇を起因とした電極磨耗が生じ、電極径が拡大した結果、ナゲット径確保が困難となったためと考えられる。

### 5 結 言

新たに開発した固形潤滑処理熱間圧延鋼板および GA 鋼板について、各種特性を評価し、次の結果を得た。