

**Abstract:**

IED Rsddk g`r cdudknodc Mh,`ccdc ghfg bnqqrhrnm qdrhrs`ms vd`sgdqhm f rsddkr vghbg dwo`mc sgd q`mfd ne `ookhb`shnm ne vd`sgdqhm f rsddkr vghkd qdctblmf sgd khed bxbkd bnrs 'KBB( ne aqhcfd r: `mc `bnqqrhrnm drsh l`shnm sdbgmknkfx `mc qtrs rs`ahkhy`shnm sqd`s ldmsr `r `ookhb`, shnm sdbgmknkfhdr enq sgd rd vd`sgdqhm f rsddkr- @m ntskhmd ne sgd rd oqnc tbsr `mc sdbgmknkfhdr hr oqdrmsdc hm sghr o`odq`hm sgd @dkc ne vd`sgdqhm f rsddkr+ IED Rsddk g`r cdudknodc svn `cu`mbdc Mh,`ccdc vd`sgdqhm f rsddkr vghbg dm`akd KBB qdctbshnm hm ghfg `hqanqmd r`ks dmuh, qnm ldmsr- IED, @BK Sxod 0 hr ` 0-4 \$Mh, /-2 \$ Ln rsddk vghbg bnmrhcdr dbnmn lx vghkd l`hms`hmhm f qdrhrs`mbd sn r`ks bnqqrhrnm- IED, @BK Sxod 1 hr `m tksq`, knv B, 1-4 \$Mh rsddk vhsq ghfgdq qdrhrs`mbd sn `hqanqmd r`ks- Sn rtoonqs sgd nosh l t l `ookhb`shnm ne vd`sgdqhm f rsddkr hm aqhcfd r: sgd bn lo`mx `krm cdudknodc `mdv rnesv`qd+ a`rdc nm unkt lhm ntr dwonrtqd c`s`+ vghbg l`jdr hs onr, rhakd sn drsh l`sd sgd sghbjmdrr knrr ne vd`sgdqhm f rsddk ctd sn `s lnrogdqhb bnqqrhrnm nudq sgd khedsh ld ne sgd aqhcfd- Trhm f sghr rnesv`qd+ hs hr onrrhakd sn oqnonrd sgd l nrs rths`akd vd`sgdqhm f rsddk enq sgd `bst`k aqhcfd knb`shnm- Svn mdv rtqe`bd sqd`s ldms sdbgmknkfhdr vghbg oqn lnsd oqnsdbshud qtrs enq l`shnm vghkd l`hms`hmhm f sgd fnnc `ood`q`mbd ne aqhcfd r vdqd `krm cdudknodc `mc bn l ldqbh`khydc- BTOSDM BN@S L hr ` 0, bn`s oqnc tbs

vhsq dwbdkk dms bn`s`ahkhsx+ vghkd d, QTR l ddsr sgd mddc enq qdkh`akd d`qkx enq l`shnm ne oqnsdbshud qtrs- Sgd rd qtrs rs`ahkhyhm f sqd`s ldmsr oqnonrd ax IED Rsddk `qd dmuhqnm ldms, eqhdmcckx+ bnms`hmhm f mn dmuhqnm ldms`k kn`c rtars`m bdr rtbg `r Bq `mc Oa- @r ` `cchshnm`k `cu`m, s`fd+ sgd rd qtrs rs`ahkhyhm f sqd`s ldmsr b`m `krm ad `ookhdc `r `oqh l`qx oqh l dq trhm f `oqd, bn`s sqd`s ldms rxrsd l `s sgd ok`sd l hkk+ sgd qdax qdctblmf bn`shmf bnrsr-

**1. Introduction**

The use ratio of weathering steels in steel bridges has increased rapidly, approximately tripling in the last 10 years, and now exceeds 15%<sup>1)</sup>. The background to this dramatic increase includes (1) social conditions which require materials that reduce the life cycle cost (LCC)







### **3.1 Corrosion Estimation System for Weathering Steels**

It is important to determine in a simple manner the corrosion resistance method which will enable the greatest reduction in LCC in the actual construction environment and to reflect this quickly in the design of the bridge structure. As a method which meets this requirement, JFE Steel developed software for calculating corrosion of weathering steels at any desired bridge construction site in Japan using the corrosion test results discussed in section 2.2. An outline is presented below.

With this software, it is possible to reflect the infu



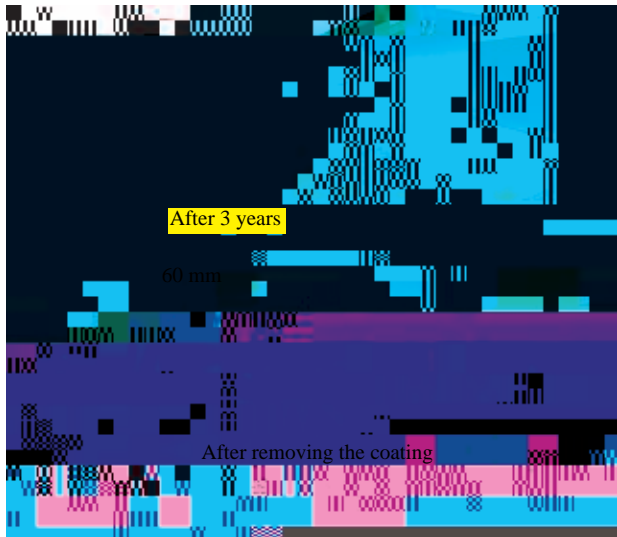


Photo 4 Appearance of mock-up bridge treated by e-RUS and rust outflow on plaster board after 3 year-exposure in coastal area

and e-RUS, in addition to shop coating after bridge fabrication and site coating, both of these treatments can be applied as pre-coat treatments at the plate mill before the plates are shipped. **Figure 7** shows the pre-coat treatment system. As with existing primary primer treatments, pre-coat weathering steels with a thin film of rust stabilization treatment do not dirty the work site as a result of primary rust-proofing during storage and allow application of the final top coat after only simple surface preparation. **Figure 8** shows an example of the cost composition for work in conventional shop coating. Because surface preparation accounts for a large percentage of coating costs, application of the pre-coat treatment system, which makes it possible to simplify the product blasting process, can be expected to reduce coating costs.

**Photos 5** and **6** show bridges in which CUPTEN COAT M and e-RUS pre-coat treatment steel products

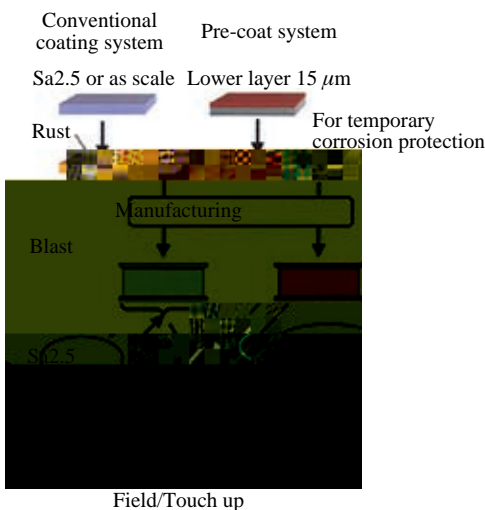


Fig.7 Pre-coat system of new surface treatment



Photo 5 Appearance of World-cup-kyo Bridge applied with CUPTEN COAT M treatment and pre-coat system (Yokohama City)



Photo 6 Appearance of Maruyama-bashi Bridge applied with e-RUS treatment and pre-coat system (Okaya City)

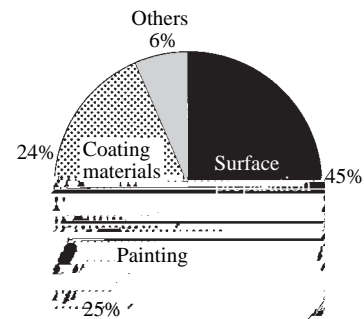


Fig.8 Example of cost composition for conventional coating system

were applied. Because a reductions in LCC and coating costs can be expected when the pre-coat treatment system is adopted, increasing use is considered probable in the future.

#### 4. Conclusion

JFE Steel's weathering steels for bridges and related application technologies were described. The developed Ni-added high corrosion resistant weathering steels have high resistance to salt corrosion and provide corrosion resistance in environments with high concentrations of airborne salt exceeding 0.05 mdd, where the conven-

tional JIS SMA could not be used, and are expected to reduce the life cycle cost (LCC) of bridges. New software using a corrosion life estimation technology makes it possible to select the optimum weathering steel material for the actual construction site at the time of bridge design. JFE Steel's rust stabilization treatments, which preserve the scenic beauty of weathering steel bridges, are both environment-friendly types, and when used together with the pre-coat treatment system, make it possible to reduce bridge coating costs. With the trend toward cost reduction in public works projects and high priority attached to LCC, weathering steels will play an increasingly large role. The developments described in this report are expected to make a large contribution to expanding the application of weathering steels not only in bridges, but also in other fields.

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