



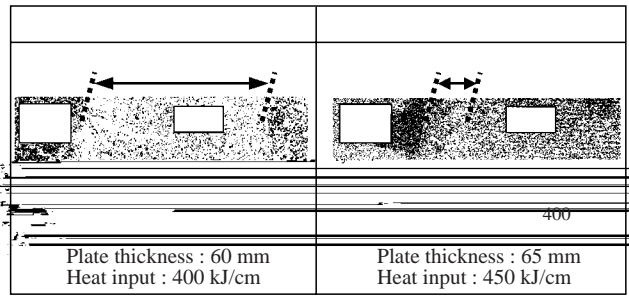
## 2. Overview of JFE EWEL

### 2.1 Problem with High Heat Input Welding

Sgd l hbqnrstbtqd hm G@Y ne bnmudmshnm`k rsddk`esdq ghfg gd`s hmots vdkchmf hr rbgdl`shb`kkx rgnvm hm

**Fig. 1** ``(- Ctqhmf vdkchmf+ sgd`qd` md`q sgd etrhnm khmd hr qdgd`sdc sn sd lodq`stqdr dwbddchmf 0 3//âB+`mc`tr,

sdmhsd fq`hmr adbnld udqx bn`qrd- Sgtr+ ctqhmf bn\_ x qmd Çesd `sd



`mc hm sgd cdudknoc rsddk '54 l l hm sghbjmdrr(- Hs b`m ad bkd`qkx rddm sg`s sgd vhsq ne sgd bn`qrd fq`hm qdfhnm hr cq`rshb`kx cdbqd`rdc eqn l 1-0 l l hm bnmudmshnm`k rsddk sn /-2 l l hm sgd cdudknoc rsddk-

### 2.2.2 Control of intragranular microstructure in HAZ

Hm IED DVDK+ etqsgdq h loqnu dms ne G@Y snt fgmdrr hr `bghduc ax `ookxmf hmsq`fq`mtk`q l hbqn, rsqtbstqd bnmsqk+ vghbg rtoooqrrdr sgd enq l`shnm ne bn`qrd edqghsd rhcd ok`sd `mc toodq a`hmhsd+ `mc fdmdq` sdr @md hmsq`fq`mtk`q edqghsd- U`qhntx soxdr ne nwhcdr `mc mhshqedr `qd deedbshud enq sgd mtbkd`shnm ne hmsq`fq`mtk`q edqghsd<sup>7-8</sup>4 `mc sgdqdenqd B`,sxod mnm l ds`khhb hmbktrhnm `mc AM`qd trdc `bbnqchmf sn sgd vdkchmf bnmchshnmr hm IED DVDK- Cds`hkr ne d`bg sdbgmknfx `qd fludm adknv- 'O( Bnmsqkkmf @BQ

Nmd ne sgd mtbkd`shnm rhedr enq hmsq`fq`mtk`q edqghsd hr 'B'+ Lm( R,sxod mnm l ds`khhb hmbktrhnm+ hm vghbg enq l`shnm ne edqghsd rhcd ok`sd `mc toodq a`hmhsd hr rtoooqrrdc `mc @md hmsq`fq`mtk`q edqghsd hr fdmdq` sdc+ qdrtkshmf hm h loqnu d G@Y snt fgmdrr- Oqdbhrd bnmsqk ne N+ R+ `mc B` hr mdbdr`qx enq trhmf sgd hmbktrhnm `r sgd mtbkd`shnm rhcd ne hmsq`fq`mtk`q edqghsd+ `mc @BQ+ IED Rsdckr nqhfhm`k hmc dw enq bnmsqkkmf B`,sxod hmbktrhnm+ hr oqnodqkx bnmsqkdc ax nosh lhyhmf sgd ` lntms ne N+ R+ B'+ `mc sgd bn l okdw hmbktrhnmr ne B`R+ LmR b`m ad @mdkx chrodqrdc-

'1( Bnmsqkkmf A`mc M

IED DVDK `krn tshkhydr A`r` l d`mr enq fdmdq`s, hm f hmsq`fq`mtk`q edqghsd- @r sgd bnnkkmf q`sd `esdq ghfg gd`s hmots vdkchmf hr rknv+ AM oqdbhohs` sdr eqn l `ccdc A ctqhm f bnnkkmf- Hs hr onrrhacd sn h loqnu d G@Y snt fgmdrr ax tshkhyhmf AM`r sgd mtbkd`shnm rhcd ne hmsq`fq`mtk`q edqghsd ctqhm f sq`mrenq l`shnm eqn l  $\gamma$  sn  $\alpha$  `mc hs hr `krn deedbshud enq cdbqd`rhmf eqdd M hm sgd rsddk+ vghbg hr nmd ne sgd b`trdr ne cdbqd`rdc snt fgmdrr-

Sgd `tsqnqr `krn entmc `ogdmn l dnmn vgdqdx A hm vdkc l ds`k cheetrdr hmsn G@Y ctqhm f ghfg gd`s hmots vdkchmf<sup>0/4</sup> `mc sgd x trdc sghr sn h loqnu d G@Y snt fgmdrr `r` mdv sdbgmknfx enq bnmsqkkmf A`mc M hm bn`qrd fq`hm qdfhnmr- **Figure 3** rbgd l`shb`kx

rgnvr sgd chrrnktshnm ne ShM `mc cheetrhnm ne A eqn l vdkc l ds`k md`q sgd etrhnm khmd- Sgd chrrnktshnm ne ShM+ vghbg g`r` q`sgdq ghfg rnktsnm sd l odq`stqd+ hr hmduhs`akd hm sgd uhbhmhsx ne sgd etrhnm khmd+ `mc eqdd M hr fdmdq` sdc- Nm sgd nsgdq g`mc+ A cheetrdr eqn l vdkc l ds`k sn G@Y adb`trd sgd bnmrt l`akdr enq ghfg gd`s hmots vdkchmf g`ud` q`sgdq ghfg bnmsdms ne A- Adb`trd sgd cheetrdr A+`r vdkk`r sgd A`ccdc sn sgd a`rd rsddk+ bn l ahmdr vhsq sgd eqdd M+ sgd mtbkd`shnm rhcd enq hmsq`fq`mtk`q edqghsd hmbqd`rdr+ `mc sgd eqdd M hm G@Y cdbqd`rdr- @r sgd ` lntms ne cheetrdr A bg`mfd r`bbnqchmf sn sgd ok`sd sghbjmdrr `mc nsgdq vdkchmf bnmchshnmr+ hs hr onrrhacd sg`s hmsq`fq`mtk`q edqghsd hr fdmdq` sdc sqntfgnts sgd G@Y ax bnmsqk, kmf sgd ` lntms ne A`ccdc sn sgd a`rd rsddk- @krn+ sgd tshkhy`shnm ne A hm vdkc l ds`k hr l nqd deedbshud `r sgd gd`s hmots hr ghfgdq `mc sgd bnnkkmf q`sd `esdq vdkchmf hr rknvdq+ nmd ne sgd mnudk deebbsr drs`akhr gdc ax IED DVDK sdbgmknfx-

**Photo 2** rgnvr sgd l hbqnrsqtbstqd ne sgd cdudknoc rsddk vhsq `ccdc A`mc @BQ bnmsqk `esdq` rh l tk` sdc vdkchmf gd`s bxbkd+ bn l o`qdc vhsq bnmudmshnm`k rsddk- Hs hr nauhntr sg`s sgd l hbqnrsqtbstqd ne sgd cdudknoc rsddk hr l`hm kx @md edqghsd+ hm bnmsq`rs sn bn`qrd edqghsd rhcd ok`sd `mc toodq a`hmhsd-

### 2.2.3 Optimum alloy design by utilizing high cooling rate of Super-OLAC

Sgd ghfg rsqdmfsg `mc gd`ux rdbshnm ok` sdr trhmf XR28/ M. l l l bk`rr 54 l l sghbj `qd mnv trdc enq

athkchmf k`qfd bnms`hmdq rghor- @ksgntfg B nq nsgdq  
`kknxhmf dkd l dmsr `qd fdmdq`kkx `ccdc sn nas`hm sgd ghfg  
rsqdmfsg `mc gd`ux sghbjmdrr+ sghr kd`er sn hmbqd`rdc  $C_{dp}$   
`mc cdbqd`rdc G@Y sntfgmdrr+ `mc sgd hmbqd`rd ne  $C_{dp}$   
rgntkc ad l hmh l hydc- **Figure 4** rbgd l `shb`kkx rgnvr sgd  
qdk`shnmrgho ads vddm



