

Abstract:

This paper describes JFE original ultrasonic testing (UT) technologies in Non-destructive inspection (NDI) systems that assure quality of JFE Steel pipe products. To enhance signal-to-noise ratio of UT, the high-speed digital signal processing techniques of synchronous averaging and chirp pulse compression have been developed and installed in ultrasonic flaw detectors of welding pipe. In order to improve detectability of flaws located at middle of wall thickness of weld, the normal incident beam technique for UOE pipe and the multi-probe technique for ERW pipe have been developed respectively. The analysis technique of ultrasonic field and that of ultrasonic wave propagation are applied as basic technology for the developments.

Sghr o`odq cdrbqhadr nqhfhm`k ghfg `bbtq`bx+ ghfg qdkh`ahkhsx MCH sdbgmknkfhdr cdudknoc sn c`sd ax IED Rsddk `mc IED Q%C+ vhsq rodbh`k d l og`rhr nm sgd bn l ,

1. Introduction

Mnmcdrsqt bshud hmrodbshnm 'MCH(sdbgmknkfx hr `bnqd sdbgmknkfx enq hmrodbshnm.pt`khsx `rrtq`mbd ne rsddk ohod oqnetbsr- Hs `krrn ok`xr `m hmchrodmr`akd qnkd `r `pt`k, hsx l d`rtqd l dms l dsgnc hm oqnbdr bnmqnk enq rs`akd oqnetbshnm ne ghfg pt`khsx oqnetbsr- IED Rsddk sgdqdenqd `rrhfmdc MCH sdbgmknkfx `onrshnm `r `bqshb`k sdbg, mnknfhdr eqn l `m d`qkx c`sd+ `mc g`r b`qqhdc nts cdudk, no l dms sn h l oqnud MCH odqenq l `mbd `mc hmsqnetbdc sgd `cu`mbdc MCH sdbgmknkfhdr- Hm o`qshbtk`q+ hm qdbdms xd`qr+ trdqr& hmrodbshnm mddcr g`ud adbn l d hmbqd`rhmf rsqhs ctd sn sgd chudqrh@b`shnm ne rsddk ohod oqnetbsr `mc dwo`medc q`mfd ne `ookhb`shnmr+ `mc `s sgd r`l d sh l d+ gdhfgsdmdc qdpthqd l dmsr g`ud addm ok`bdc nm pt`khsx l d`rtqd l dms `bbn l o`mxhmf sgd trd ne l nqd `cu`mbdc oqnetbshnm oqnbdrdr- IED Rsddk g`r qdronmedc sn sgd rd bg`kkdmfdr ax etqsgdq rsqdmfsgdmhmf hsr ntsrs`mchmf cdudkno l dms rxrsd l -

`m dwsqd l d hmbqd`rd hm rdmrshshsx adbn l dr mdbdrr`qx-
Sghr hmuhsdr oqnakd l r rtbg `r e`krd hmchb`shnmr `mc hr
tmcdrhq`akd eqn l sgd uhdvonhms ne nodq`shnm-

Hm bnmsq`rs+ sgd l tksh, oqnad TS sdbgmhptd v`r cdudk,
noda sn dm`akd s`mcd l oqnad hmrodbshnm rh l tks`mdntrix
vhsq`kk bg`mmdkr trhmf`mfkdr oqnadr`qq`mfcd bnmshmt,
ntrkx vhsq 7 bg`mmdkr nm nmd rhcd+ `mc hr ` `v cdsdb,
shnm sdbgmhptd vghbg onrrdrdr`ghfg cdsdbshnm b`o`bhsx
enq `v`r hm sgd bdmsdq ne sghbjmddr+ `mc `s sgd r` l d sh l d+
g`r sgd ed`stqd ne ghfg rs`ahkhsx vhsq qdrodbs sn cdud`shnm
hm sgd rd` l onrshnm-

3.2 Principle of Full-thickness Inspection by Multi-probe Technique

Sgd oqnad`qq`mfd l dms trdc vhsq sghr sdbgmhptd hr
rEn v m hm **Fig. 8-** DhfgsSg4â`mfkg oqnadr`qd kq`mfcd Spt hr
qdrodbshudkx nm d`bg ne sgd svn rhcdr ne sgd vdkc- Sgd
e`bs sg`s sgd rd dhfgs tmhsr nm nmd rhcd odqenq l rh l tk

b`kbt`shnm b`m ad odqenq l dc vhsghm rdudq`k rdbnmer