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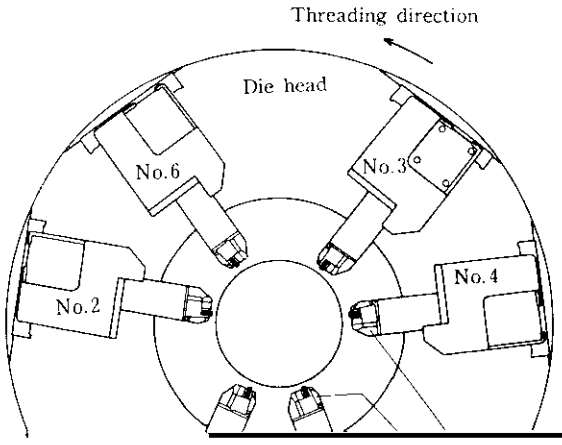
Development of Machine Diagnostic Apparatus for Threaders and Upsetters of Tubes

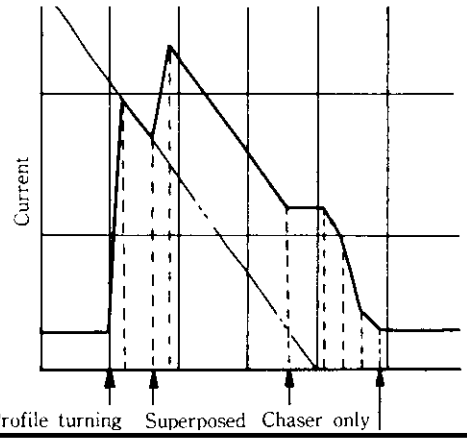
Tadashi Okamura, Yutaka Funyu, Toshihisa Tane

Synopsis :

Machine diagnosis techniques in the OCTG finishing line, especially those on the threading machine and tube upsetter, are necessary for quality control and improvement. This paper mainly describes the diagnosis logic. For the threading machine, we developed the "ratio change method" of each power spectrum according to the threading phase. For the upsetter, we developed the "pattern change method" for both upsetting force and displacement. Conventional operations will be shifted to more scientific operations by these diagnosis techniques in the OCTG finishing line.

Development of Machine Diagnostic Apparatus for Threaders and Upsetters of Tubes*


Threading direction
Die head
No.6
No.3
No.4
No.2


Current
Profile turning
Superposed
Chaser only

equal to or larger than 40 kg/cm^2 does not change the

wall thickness 8.94 mm. As in the case of current pattern, the threading phases closely relate to the frequency

6–8 kHz band width is different between abnormal and normal chasers

spectra obtained by vibration analysis

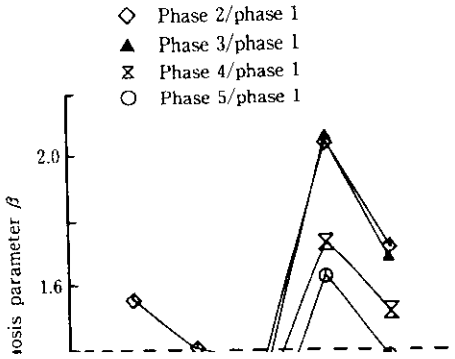
According to the finding described in (2), diagnostic

In this experiment, as in the analysis by current pattern, the frequency spectra obtained by abnormal and normal chasers were compared. The results are as follows:

logic can be formed as follows. A diagnostic parameter

$$\alpha = P_A/P_N$$

is defined, where P_N is the power of normal chaser in the



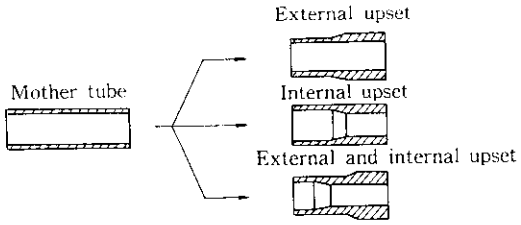
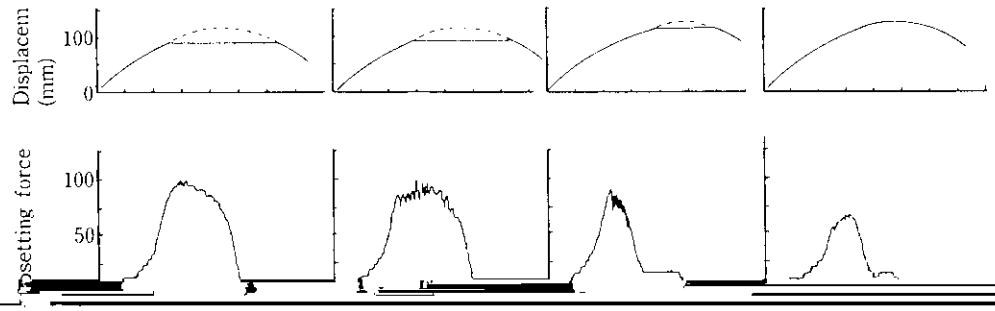


Fig. 10 Three types of upsetted ends

combination of distance of punch movement (i.e., cushion length), upsetting load, etc.[2)]

3.2 Determination of Measuring Position

Figure 12 shows the load cells attached to the punch holder. In measuring punch displacement, as in the case of upsetting load, the portion contributing to upsetting



Time (s)

Fig. 17 Characteristic pattern of upsetting force and punch displacement by slipping of tube (API J-55 TBG 73.0 mmϕ × 5.51 mm$t$, clamping force = 162 kg/cm^2)

Table 1 Diagnosis logics of upsetter

is possible to diagnose whether or not a tube slipping during upsetting process has caused defective product. The diagnostic items and criterions described above are