Dear reviewer

Thank you very much for giving us valuable opinions to improve this paper. We will answer the following for each comment. We would appreciate it if you could agree with the publication of this paper.

Dr. Kenichi Masuda

(1) Correct abstract, keywords. An interesting and comprehensive introduction, with a properly presented - but too succinctly in my opinion - review of the literature.

In abstract and keywords, we added the following descriptions.

Abstract: ------------------Using the three-dimensional elasto–plastic finite element method, the amount of plastic lateral contraction (depression depth *d*) at the crack tip after fatigue loading is calculated quantitatively. The following main experimental results are obtained. In the region where ΔK is 5 MPam$^{1/2}$ or higher, the rate of fatigue crack growth da/dN at a constant ΔK value increase as t increases from 1 to 11 mm. The da/dN between $t = 11$ and 21 mm is the same. Meanwhile, in the region where ΔK is less than 5 MPam$^{1/2}$, the effect of t on da/dN is not observed. The effects of t and ΔK on the relation da/dN–$\triangle$K are considered physically and quantitatively based on *d*.

Keywords: ------------------------------ Plastic lateral contraction at the fatigue crack tip

(2) At the beginning, the paper lacks a list of symbols, markings and abbreviations. There must be nomenclature at manuscript. The authors consider the problems of material fatigue - many different quantities come up here and they need to be discussed. Nomenclature is essential in this type of papers.

We added Nomenclatures and symbols on pages 1~2.

(3) In my opinion, in the paper Authors were missing the tensile curve - there is no given strain hardening exponent - although it can be determined based on API, SINTAP or FITNET procedures. But it is worthwhile for the authors to provide the laboratory obtained tensile curve - to write on which specimens the parameters given in Table 2 were determined, how many specimens there were and what was the scatter of the results - what result from the set is given in Table 2.

We performed tensile test according to JIS standards, and two specimens were used. The difference between the results of the two tests was not large, so the average value of these was used in Table 2. The stress-strain curve obtained from the tensile test is shown in Figure 1. The stress-strain curve was approximated by Ramberg-Osgood power law, and a strain hardening exponent of 0.036 was obtained.

The above explanation was added on page 3, section 2.1. In addition, the value of the strain hardening exponent is included in Table 2.

(4) There is no information on the number of specimens used in the research program in the paper. The fact that values are given for four thicknesses, but in my opinion this is too scarce information. Fatigue tests generally have a very large spread and it seems to me that the authors should examine several specimens for one thickness to assess the spread of the experimental tests. Here, I expect explanations from the authors. As for the presentation of the results of the experimental research, their descriptions and discussions, I have no major reservations - they will disappear when the authors provide explanations to the questions that bother me.

FCG experiment was performed using one or two CT specimens for one specimen thickness, *t*. Such a method is employed in a usual FCG experiment using the CT specimen. Then, da/dN–ΔK relation was measured by performing a constant ΔK experiment, a ΔK increasing experiment, and a ΔK decreasing experiment. As for the measurement of K_{op}, during a constant ΔK test, the values were measured multiple times (up to 4 times) at an arbitrary crack length.

We added the above explanation on page 3, section 2.1.

(5) As for the numerical calculations, the description of the model itself is too poor. Too little information on modeling. In the title of the paragraph, the authors indicate elasto-plastic analysis, and then in their paper they write "Considering the stress-strain curve of the test material, an elastic-perfectly plastic body was assumed." There is no logic here - the material used by the authors is a material with reinforcement - sigma_0 = 510MPa, sigma_m = 577MPa, according to the formula from FITNET procedures, the strengthening index N = 0.3 * (1-sigma_0 / sigma_m) - so the strain hardening exponent in the R-O law is equal to n = 1/N - substituting the data, we get n = 28. The material is therefore very weakly hardening and I do not think that such a material can be replaced with an elastic-perfectly plastic material. Please explain this - I don't quite like it at paper.

I guess figure 10 should be improved. As for the analysis of the results, I have no major reservations - they will disappear once the Authors clarify the above doubts.

To sum up, I expect the authors to provide some clarifications and supplements in the manuscript. I consider it a minor revision / major revision. Then the paper should be submitted for re-evaluation.

*We added the following explanation on page 5 regarding the element division in the specimen thickness direction.

For element division in the specimen thickness direction, the half thickness of the CT specimen was divided into 40 parts (minimum element size = 20 μm) in the vicinity of the crack tip to ensure calculation accuracy. With an increase in the distance from the crack tip, the numbers of element division in the specimen thickness direction were 20 (element size = 150 μm), 10 (element size = 300 μm), and 5 (element size = 600 μm); they were gradually reduced.

*The stress-strain curve was approximated by Ramberg-Osgood power law (strain hardening exponent = 0.036), and the plastic lateral depression depth *d* at the crack tip was calculated by 3D-elasto-plastic FEM.

The newly calculated results are shown in Figures 11 (page 13) and 12(page 14). There are no major changes in the results.