

## PAPERS ON SHOT PEENING PUBLISHED IN THE WORLD FOR THE LAST THIRTEEN YEARS

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### ABSTRACT

*This paper deals with the trend of recent research on shot peening included in "JICST" file, which is Japan Science and Technology Corporation, Information Center for Science and Technology. In order to clarify the recent trend of research on shot peening, 1507 papers are referred and classified. The following results are obtained; (1) The most important purpose of shot peening is the improvement of fatigue strength. (2) Residual stress is discussed as the most effective factor for the peening effects. (3) Low alloy steel, carburized steel and spring steel are most discussed materials. (4) The countries where many papers were published are Japan, Germany, U.S.A., U.K. and France.*

### KEY WORDS

*Shot peening, research paper, JICST file, JSSP, purpose of shot peening, factor of peening effect, work material, country.*

### 1. INTRODUCTION

Shot peening is the working process that started about 130 years ago <sup>1)</sup>. It was called "sand blast" in those days, and its purpose was mainly used for the descaling of machine parts or for the blasting to the stones. However, it had been already used for the improvement of the fatigue strength of springs when it was introduced into Japan.

At present, shot peening is used for improving the characteristics of various machine parts such as fatigue <sup>2), 3), 4)</sup>, wear <sup>5)</sup> and scc <sup>6), 7)</sup> and for forming the body of aircraft, etc. This process, therefore, is remarkably different from grinding or machining that are mainly used for the shaping of the machine parts.

In order to clarify the recent trend of research on shot peening, 1507 papers searched out in the JICST file by using "shot peening" as a key word were researched on the purposes of shot peening, work materials and countries where many papers on shot peening were published.

The Card (ver.7) which is a software for personal computer was used for classifying those papers.

## 2. RESULTS AND DISCUSSION

### 2.1 Purpose of shot peening and factor for peening effects

At first, the purposes of shot peening were searched by using the key words such as fatigue, wear, SCC and peen forming. As shown in Fig.1, a large number of papers are published on the fatigue strength as the purpose of shot peening.

Factors relating to peening effects were searched by using the key words such as residual stress, hardness, surface roughness and structure. Residual stress is discussed as the most effective factor for the peening effects as shown in Fig.2.

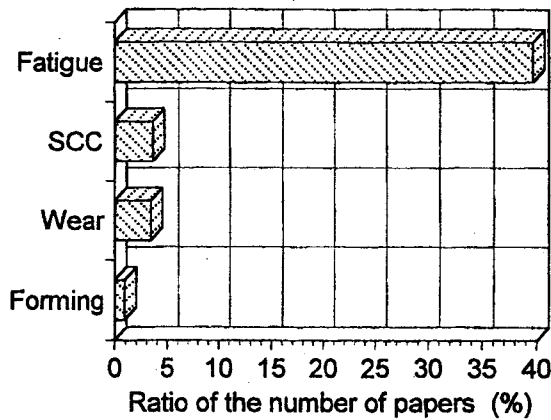


Fig. 1 Purposes of shot peening

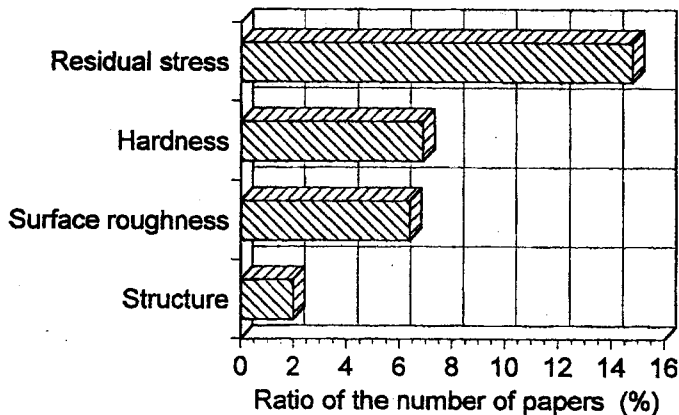


Fig. 2 Factors relating to peening effects

## 2.2 Work material

Figure 3 shows the number of papers searched by using "work material" as a key word. Low alloy steel, carburized steel, spring steel and stainless steel were mainly studied on steels, and aluminum alloy and titanium alloy being used in the aerospace industry were mainly studied on nonferrous metals.

In the same way, the number of papers in Japan are shown in Fig.4. The results suggest that shot peening is mainly used in the automobile industry in Japan, because a large number of papers were published on the carburized steel being used for automobile parts.

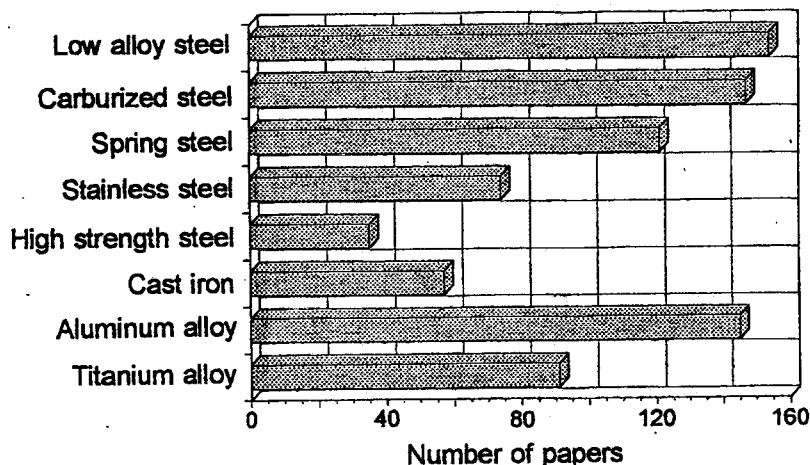


Fig. 3 Number of papers searched by using "work material" as a key word

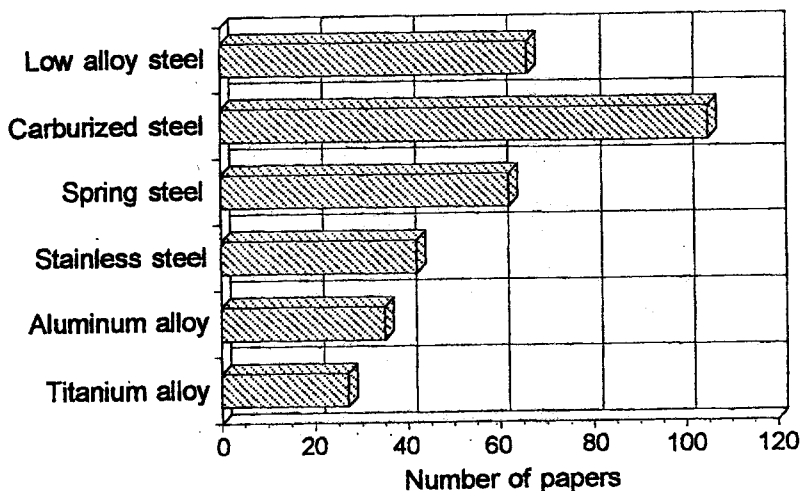


Fig. 4 Number of papers searched by using "work material" as a key word (Japan)

Figure 5 shows the number of papers searched by using "work material" as a keyword in Japan. A large number of papers on Low alloy steel were published from 1992 to 1994 and on carburized steel were published in 1994. Recently, the number of papers on stainless steel have been on the increase.

Figure 6 shows the comparison of number of papers published in five countries on spring steel and carburized steel. The number of papers on carburized steel are more than those on spring steel in Japan and USA. On the contrary, the number of papers on spring steel are more in Germany and UK, and both of them are comparable in France.

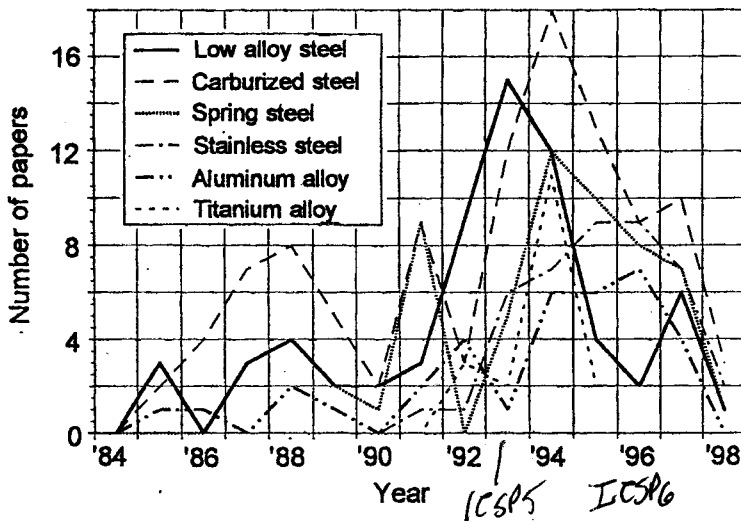


Fig. 5 Transition of number of papers searched by using "work material" as a key word (Japan)

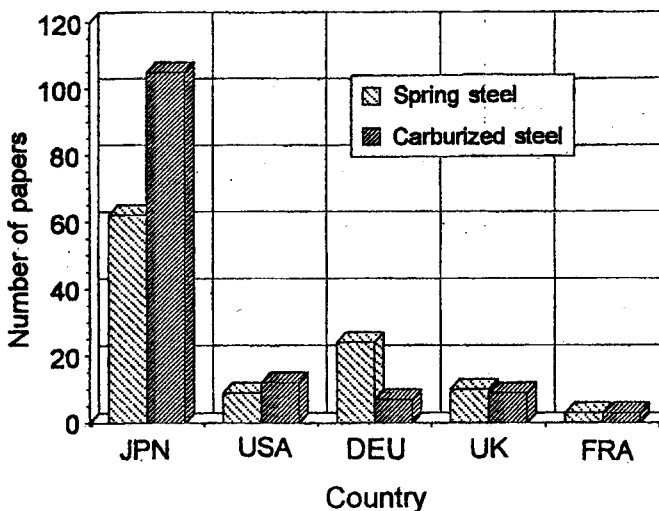


Fig. 6 Comparison of number of papers published in five countries on spring steel and carburized steel.

### 2.3. Country

Figure 7 shows the comparison of the number of papers published in five countries on shot peening. The result shows that the country where the most papers have been published is Japan, but this reason can not be known exactly whether the number of papers published in Japan are the most of all countries or those results were researched in Japan.

The transition of the number of papers published in the five countries are shown in Fig. 8. Two remarkable peaks are recognized. One is Germany in 1987 and another is Japan in 1994. This may be concerning with the host country of ICSP, and it may be also concerned with the financial conditions on Japan.

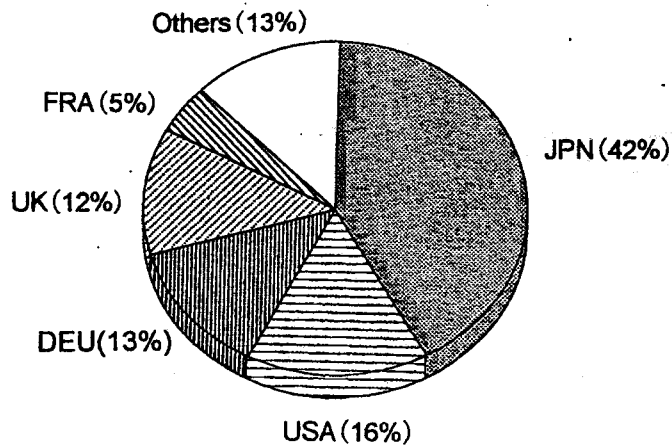


Fig. 7 Comparison of number of papers published in five countries on shot peening

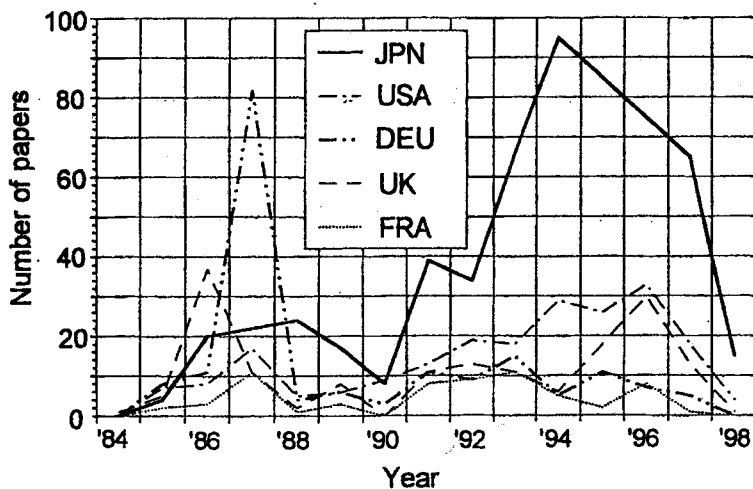


Fig. 8 Transition of number of papers published in five countries

In Japan, the trend of the research on shot peening is similar to that of the world, and the number of papers increased remarkably after 1991. On this, it may be also concerning with the start of JSSP, which is "The Society of Shot Peening Technology of Japan". The president of the society is Prof. Iida who is the member of The International Scientific Committee on Shot Peening.

#### **4. CONCLUSIONS**

In order to clarify the recent trend of research on shot peening, 1507 papers published for the last thirteen years were researched and classified. The following results are obtained.

- (1) The most important purpose of shot peening is the improvement of fatigue strength.
- (2) Residual stress is discussed as the most effective factor for the improvement of fatigue strength.
- (3) Low alloy steel, carburized steel, spring steel are most discussed materials.
- (4) The countries which many papers are published are Japan, Germany, U.S.A., U.K. and France.

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