Drilling time
A series of drilling time with respect to $T_{on}$ are presented in Figure 7. The figure shows that around 5–6 seconds are required to machine the hole. Shortest $T_{on}$ gives shortest drilling time. The graph shows the trend of increasing the drilling time with the increase of $T_{on}$. Longer drilling time could be due to lower energy produced by the parameters combination of higher $T_{on}$ or higher electrode that was consumed in the machining. Observation on the drilling given on the latter figure could explain this phenomenon.

Electrode wear
Similar situation with drilling time was observed in the electrode wear during the drilling. The electrode wear that occurred during the machining with different pulse time is given in Figure 8. The increase of the pulse time increases the electrode wear. Nevertheless, the positive slope of the curve is not quite significant, as it was also observed in Figure 7.

Figure 7. Drilling time
Figure 8. Electrode Wear

Based on Figures 7 and 8, a hypothesis of the energy utilization can be proposed. The $I_s$ and $T_{on}$ proportionally enhance discharge energy in EDM. Therefore, adding the product value of the parameters should improve the discharge energy. Higher machining rate that make faster drilling can be expected from the high discharge energy. However, the experiments show that increasing the pulse time lengthens the drilling time and increases the electrode wear.

In EDM, besides eroding the workpiece material, electrical discharge could also wear the electrodes. Especially for the tiny copper diameter wire that was used in this experiments. Tiny diameter of copper electrode in this practice leads to a high wear sensitivity. Therefore, it is reasonable to predict that higher wear rate might be produced during the machining. This will be different with common practice of die sinker EDM to produce cavity where bulk copper electrode is employed. In this practice, heat generated during the discharge is spread and absorbed by the electrodes. The bulk copper is sufficiently capable to accept the heat and avoid much vaporization.

Figure 7 and 8 indicates that at higher $T_{on}$ the discharge energy was consumed more to wear the electrode than to erode the workpiece. Hence, the drilling time was increased. It could lead to a conclusion that better machining efficiency was attained at lower $T_{on}$. It means that in this condition, more energy is utilized to erode the material than to wear the electrode.

Drilling the hole at lower $T_{on}$ produces low discharge energy; consequently heat generated is also low. It gives an advantage of preventing the electrode wear for this practice where a very small diameter electrode is used. The lower discharge energy level was also believed to contribute the less recast layer at the hole surface. With low energy, excessive erosion of the workpiece is avoided. With this condition, the