

30 July 92.

My dear Bernard,

I have come across a most interesting example of the difference in steel due to working, & the rate of cooling; as this appears to be the only explanation.

In a rail intended for street car service shown opposite:—



A test piece from the head gives only  $\frac{2}{3}$  the tensile strength and little over  $\frac{1}{10}$  of the elongation, while pieces from the web show.

From Osmond's researches, the state of the C in head & web should be very different. Do you know of any one who would like to have samples of this, with the physical results, to work up the chemical physics of it?



If "carbide of iron" is obtainable  
it sh<sup>d</sup> be from such an example  
as this. Dr. Dudley does not  
seem to have gone into this much;  
I thot<sup>t</sup> of R. W. Hunt who does so  
much R'y inspection & tests,  
but perhaps not much investigation.

You may think of some one who  
w<sup>d</sup> be sufficiently interested in  
it. I suppose you w<sup>d</sup> hardly  
care to take it up yourself;  
and I have not time for any  
such investigations at present.

It has been awfully hot  
at the beginning of the week, but  
cooler the last day or two.

Yours sincerely

William.

(The physical reasons for the difference are evident enough. The web & flange are thoroughly rolled to reduce them to their thickness, & anne the rolls at a "black heat". The head passes thro' the rolls at a high heat, & cools slowly afterwards. It comes out at a "dangerous temperature" as Brown w<sup>d</sup> say, when the molecular changes in the condition of the C are still possible.)



W. B. A.

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