Table 1: Mixed carbides present in Stellite alloys

Carbide	Comment	Citation
M_3C_2	Chromium carbide which forms at low Cr/C ratio	[**nevilleAqueousCorrosionCobalt2**
M_7C_3	Chromium content carbide which forms at a slightly higher Cr/C ratio	[**nevilleAqueousCorrosionCobalt2**
$M_{23}C_6$	Chromium content carbide which forms at an higher Cr/C ratio	[**nevilleAqueousCorrosionCobalt2**
M_6C	refractory metal carbide	[**nevilleAqueousCorrosionCobalt2**
MC	refractory metal carbide	[**nevilleAqueousCorrosionCobalt2**

Dissertation title

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Abstract

A concise summary of the work and main results in no more than 200 words. The lifespan and reliability of components subjected to severe cavitation and corrosion erosion depend critically on material properties and failure mechanisms. The microstructure, and hence performance, of wear-resistant alloys used in such aggressive conditions is not dictated by chemical composition alone but is critically shaped by manufacturing process. Cobalt-based Stellite alloys are a primary choice for these applications, deriving their exceptional wear resistance from hard carbide phases embedded within a tough cobalt-alloy matrix. Traditionally, these alloys are produced by casting, which often produces a coarse and brittle carbide network. In contrast, powder metallurgy routes, such as Hot Isostatic Pressing (HIP), yield a significantly more refined and homogeneous microstructure, offering a pathway to superior durability. However it remains a critical question whether the microstructural refinement achieved through HIPing enhances toughness and fatigue resistance in high-carbon alloys like Stellite 1, particularly in the context of cavitation erosion. Here we show, by directly comparing a cast and a HIPed cobalt alloy (Co–30Cr–12W–2.5C by wt

Keywords: 3 to 5 keywords here, in the form: keyword, keyword

1. Introduction

The microstrucuture of stellite alloys consists of a cobalt-chromium solid solution and mixed carbides composed of a metal radical and carbon as listed in 1.

[**nevilleAqueousCorrosionCobalt2010**] [**nevilleAqueousCorrosionCobalt2010**]

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In cobalt-based and iron-based hardfacing alloys, mixed carbides present in the microstructure are composed of a metal radical and carbon for example M7C3, M23C6, M3C2 and MC In hardfacings with a fine microstructure the carbides may be too small to have their corrosion behaviour determined as they are formed in small quantities surrounded by the matrix phase. [27, 28]. The pure commercial versions of these carbides Cr3C2, Cr7C3, Cr23C6, Mo2C, NbC and TiC manufactured by sintering are too brittle to be used as hardfacings however, their large size will enable the corrosion behaviour to be evaluated.

2. Style guide

2.1. Page and text formatting

If you use the provided templates, the style requirements are already the default settings — so don't tinker with them! This LaTeX template is based on the Elsevier class but using 11pt (instead of the standard 10pt). We use the single-column format for practical reasons.

The document has to be prepared for the UK standard paper of A4 size with a text area of 16.45~cm by 21.9~cm using single columns at a 'normal' serif font (e.g., Times New Roman or Cambria) with font size 11pt.

2.2. Word count

The expected word count is between 5000 and 7000 words. The word count includes everything from the start of the Introduction to the end of the Conclusions, including text in figure captions and tables. Excluded from the word count is the front matter (from the title to the end of the abstracts and key words) and the end matter (acknowledgements, references, appendices).

If you try to cheat the word count by having a lot of important information in appendices: remember that appendices only provide supplementary material, not essential material for the assessment. The markers are not required to read any appendix during the marking of the dissertation.

2.2.1. Section and item numbering

Paragraphs are justified on both sides and start with an indent. Section numbering is numeric, with 'section' headings in bold but sub-section and subsub-section headings in italics. Each heading is preceded and followed by some space (about 6pt or half a line).

Figures, tables, and equations are numbered consecutively: Figure 1, Figure 2, Table 1, Table 2, (1), (2), and so on. That means that they are not sub-numbered for each section, so no Figure 1.2. However, a figure might have two or more graphs. In that case, each graph is labelled a), b) and so on. Similarly, equations can be single equations such as

$$e = mc^2 \tag{1}$$

or they could be a set of equations, using the environment 'subequation' from the subcaption package,

$$C_p = \frac{p}{\frac{1}{2}\rho U^2} \tag{2a}$$

$$C_P = \frac{P}{\frac{1}{2}\rho A U^3} \tag{2b}$$

When referring to these objects in the text, you can use either 'figure~1', 'Figure~1', or 'Fig~1', as long as you do it consistently. A specific graph in a multi-graph figure would be referred to as, for example Fig.~2b. Likewise, for referring to a table, you would use table, Table, or Tab.~**??**, and equations are referred to as Eq.~(1), Equations~(2) or equation~(2b).

Figure 1: Range of observed power output from a single turbine (blue shaded and cross-hatched region) and from an entire wind farm at the same site (red shaded region) against wind speed. Both are normalised by the rated power and number of turbines contributing to the power output (Data source: Vattenfall).

2.3. References

These must follow the style of the journal used in the 'References' at the end of this template, with an example for citing a journal article given by [**article**], for a contribution to conference proceedings by [**proc1**], and for a book by [**book1**] or a chapter <**?** >. If you do need to refer to websites, for example for data sources, an example is given by [**MIDAS**] or <**?** >.

You can create your own *.bib file using EndNote or Mendeley and then extract and format the cited references using BibTeX.

3. Methodology and Apparatus

Clear description of how you approached the problem and what you did (NOT, what somebody else should do…).

This might start with an introductory paragraph providing a high-level description of your overall approach, then some specific subsections on your data sources, the methods to obtain your primary research data, sections on the instrumentation (including their accuracy and precision) or simulation software used, followed by a section how you used those tools, and complemented by an introduction to any more advanced analysis method you might have applied for the secondary analysis.

Especially in the description of your experiments or other activities, tables can be useful to summarise the key information, such as Table **??**. Make sure it is complete but not too complex. Consider putting large tables in an appendix, but keep in mind the role of appendices mentioned in Section~2.2.

4. Results

Describe the results and the results of their analysis

4.1. Results and primary analysis

Present the primary results in sufficient detail that the reader can get a good insight into what you obtained from your experiments or field work (or whatever you did), but avoid showing many similar graphs. Only show key samples, for example a typical case and a few unusual cases. Here, you will need to make good use of figures, such as that in Fig.~1

4.2. Secondary analysis

Try to build up your many results into a systematic analysis which distills the main results and presents them in a clear way in well-designed figures.

4.3. Uncertainty analysis

Remember: any result is only credible if the reader knows how accurate your results are likely to be. This needs an error analysis or uncertainty analysis of your results.

5. Discussion

Here you need to draw together your various results, discuss what they mean and how reliable they are, using your uncertainty analysis and any other aspects which might limit your results such as explicit or implicit assumptions in your methodology. Then discuss how your results contribute to addressing your aims and objectives, and what your contribution to the wider field is.

There are three typical ways how the Discussion can be presented in a paper. The most extensive is to have the Discussion in its own section. From an intellectual point, this would be the recommended approach, at least to start with: it forces you to separate mentally your critical evaluation of your results from the evidence (your results) on which you base the discussion).

Another option is to merge the results and discussion into a single 'Results and Discussion' section, but then you run the danger of mixing up evidence and interpretation and your lose strength in your argument.

A third option is to merge the discussion with the conclusions. Here, you run the risk of your main conclusions becoming buried in the discussion, and the reader has to guess a bit as to what your main contribution was.

6. Conclusions

A fairly concise section which summarises your main findings from your results and discussion sections, identifies your contribution to the field, and suggests some further work.

references

Appendix A. Essential appendices

Essential appendices; ie, detail without which the main paper is difficult to understand should be included here.

Appendix B. List of further material in the Work Progress Report

All working material and non-essential appendices must be submitted separately as the 'Work Progress Report'. There is no need to refer to that material. However, if you feel that certain sections or files in that report would be useful to the reader, you can list here that material and how to find it in the Work Progress Report submission.