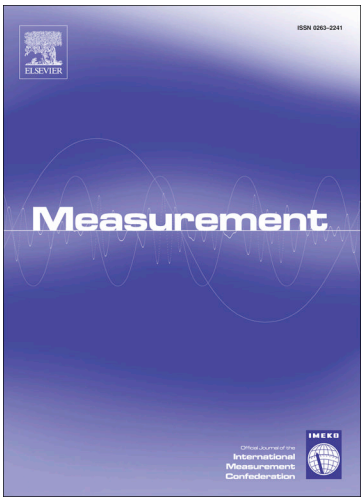

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PII: S0263-2241(17)30652-8
DOI: https://doi.org/10.1016/j.measurement.2017.10.027
Reference: MEASUR 5029

To appear in: *Measurement*

Received Date: 24 June 2017
Revised Date: 9 October 2017
Accepted Date: 11 October 2017

Please cite this article as: D. Auger, Q. Wang, J. Trevelyan, S. Huang, W. Zhao, Investigating the Quality Inspection Process of Offshore Wind Turbine Blades Using B-Spline Surfaces, *Measurement* (2017), doi: https://doi.org/10.1016/j.measurement.2017.10.027

Investigating the Quality Inspection Process of Offshore Wind Turbine Blades Using B-Spline Surfaces

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***Abstract*—** Wind turbines can only extract their rated amount of power if their blades conform closely to the Computer Aided Geometric Design (CAGD). This is quantified by reconstructing B-spline surfaces from measurement data taken from the blade. For reliable comparisons between the surface and CAGD, the generated surface must be an accurate representation of the part. To do this, the input parameters to the fitting process need to be optimized. Previously this has proved to be time consuming and computer intensive. This paper has focused on presenting a protocol for control point locations that increases the initial surface fitness; therefore, decreasing the time taken for an optimiser to converge on the ideal locations. The presented protocol was found to increase the fitness of a surface by up to 150%. For low tolerance products it has been observed that the protocol could remove the need for an optimiser all together.

Index Terms— B-Spline, surface fitting, quality control, control points, optimiser.

1. INTRODUCTION

With limited non-renewable resources and a change in public perception, the UK government has announced that by 2020, 15% of energy will be provided by renewable sources [1]. As the UK is surrounded by ideal locations for offshore wind farms, a target of 18 GW of installed capacity has been set for 2020[2].

To meet these targets it is imperative that wind turbine (WT) blades not only conform closely to their Computer Aided Design (CAD), but are also fit to operate at any given time. This means reducing the turbine's annual downtime. As manufacturing defects are the most common