AMA DataSet Limited

British Standards Institution

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Contents

British Standards Institution – BSI

Overview

Full online editorial system to manage BSI publications with the capability of having multiple users and real-time high-speed typesetting to PDF within out any limitations. The editor has features to manage Tables, Figures and Equations along with the facility to proof these individually whilst editing. Revisions are maintained via track changes control and auditing with options to lock files once signed-off.

The editorial system also has a full document management control with access privileges for articles, images and proofs.

Features

Commissioned	2017
Sector	Publishing
Location	London
Platform	AMA DataSet – Strata CMS

A general overview of the editorial is listed below:

- Multiple users with secure access and IP control
- Editorial user managed by the BSI
- File management of documents
- Object control
- Editing of content, tables, and equations in an easy-to-use editor
- Typeset the publication in real-time within out any limitations
- Track changes and auditing of documents
- Facility to upload image recourses, EPS or JPEG
- Facility to import and export publication as XML
- Create consolidated and loose-leaf publications
- Archiving publications, clean revisions, create new next version

Security

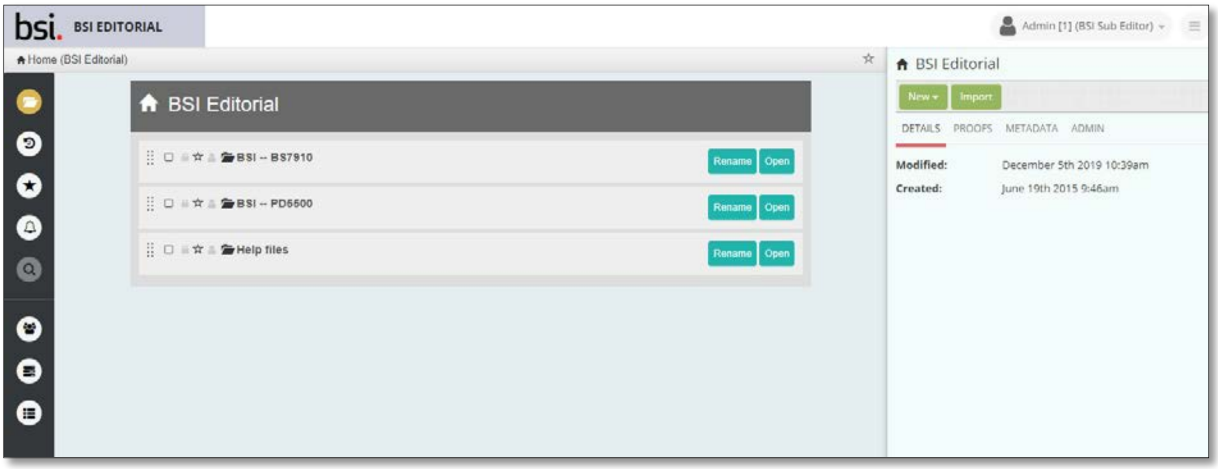
An integral part of AMA's CMS, Strata, is that all actions are audited throughout the editorial process, this can be sign-in, navigation, through to editing. User access is an import part of the CMS and user can be locked down by IP or double authentication.

File management of documents

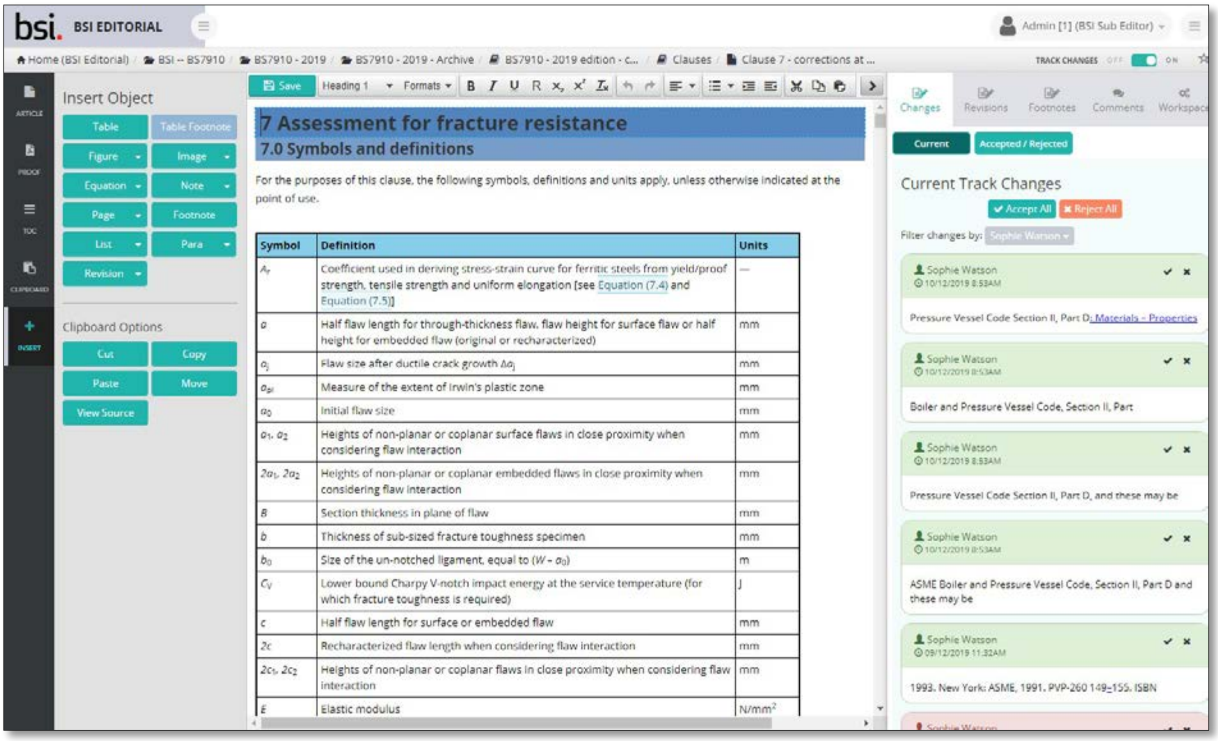
The system has a sophisticated management for asset control from editable documents through to resource files such as images and proofed PDFs. The user has the facility of locking documents, bookmark for quick access and adding metadata. Below is a quick overview of features.

- Share or Lock of resources (files and folders)
- Access level control of resources
- Add resources to favourite list
- Copy, duplicate and rename of resources
- Reorder and move
- Security control

- Metadata
- Import of XHTML, XML, images
- Import documentation
- Proof template control
- Proof script control



Folder view, showing file management of documents

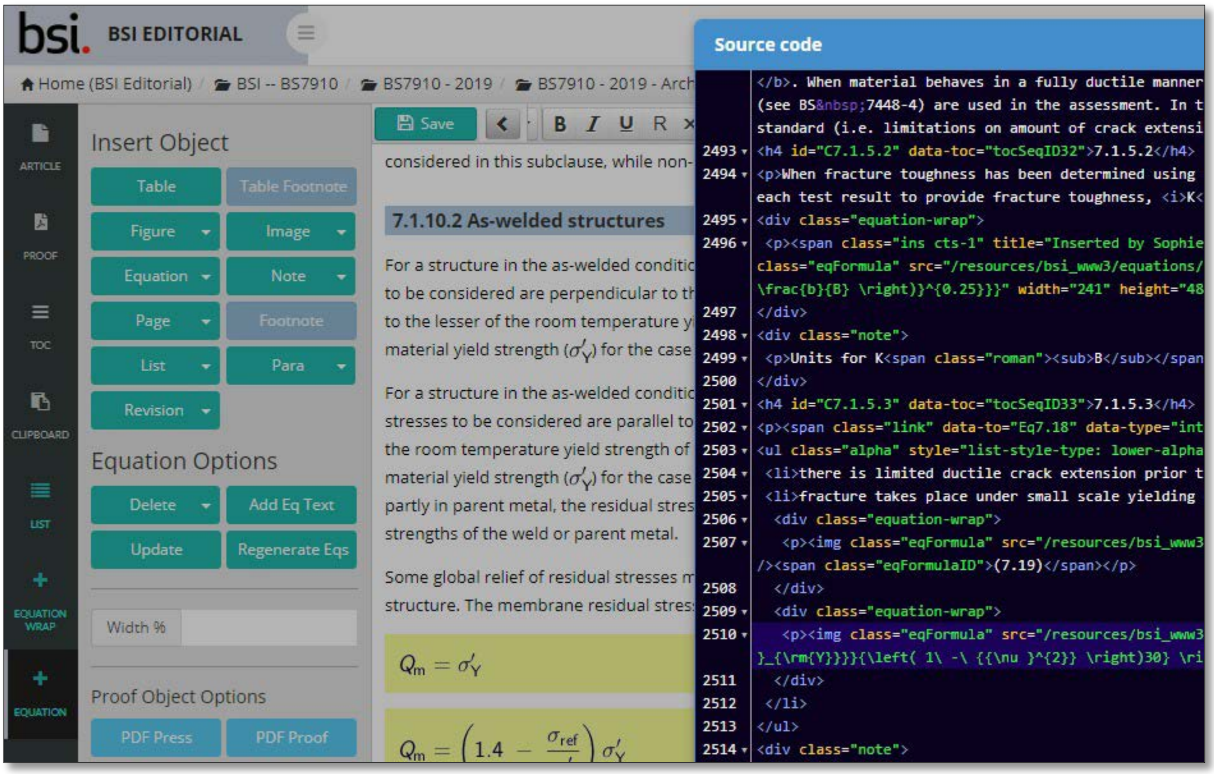


Editing of document, showing panels 'Insert Object' and 'Track Change'

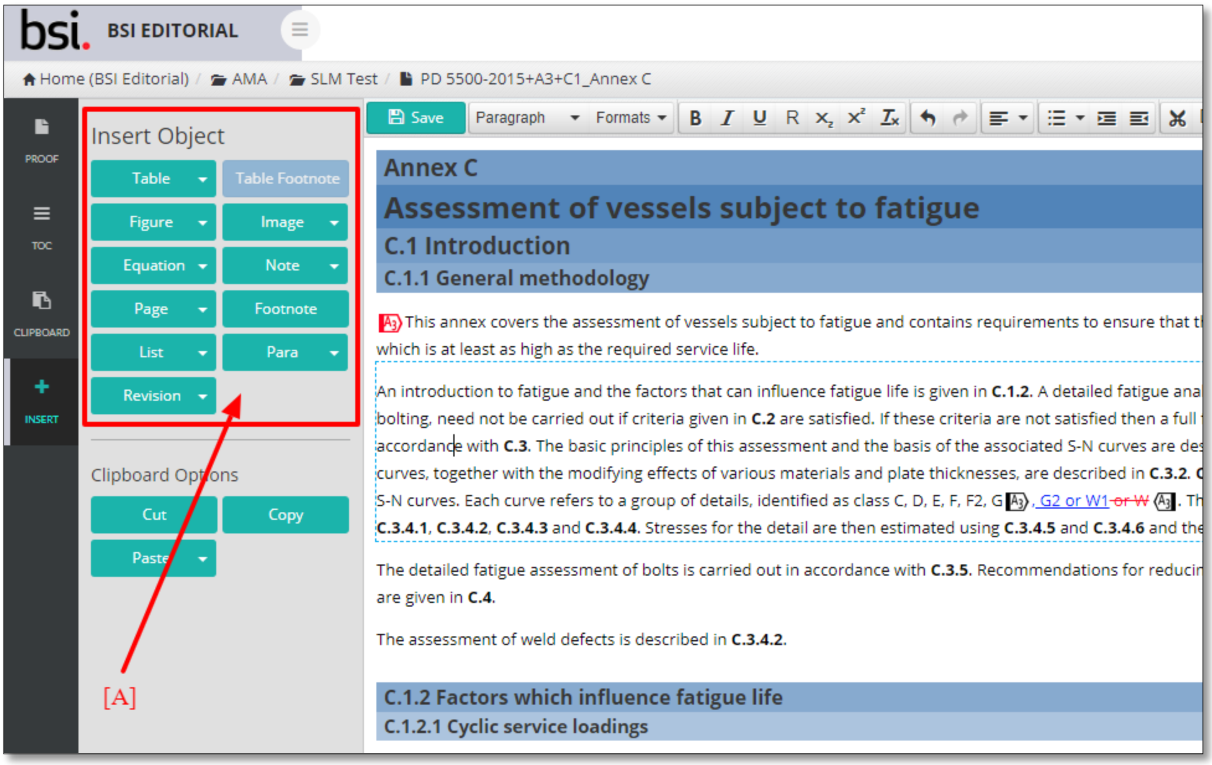
Object control

The document editor uses eXtensible HyperText Markup Language (XHTML) as its core base and it is this provides the user with a graphical view when editing documents to ensure that complex items such as tables or equations are laid out correctly. This provides the user an easy way to manage document coding, be it editing, importing, exporting or direct editing of the XHTML within the editorial system.

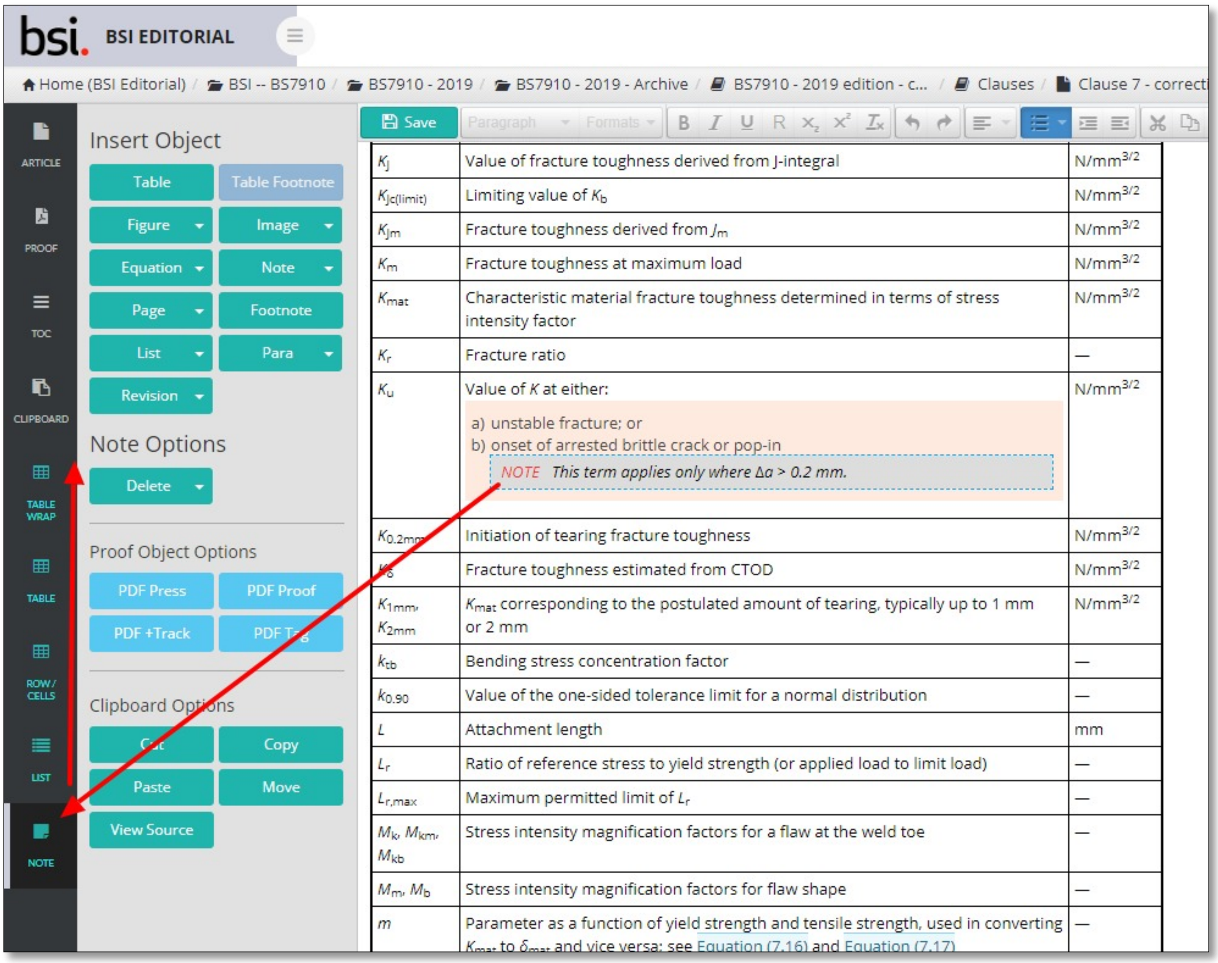
The editor uses blocks of XHTML data to control complex items such as a Figure and Tables, these are referred to as ‘Objects’. The user has the facility of inserted objects within the editor to build the page. Using this method, complex setting such as figures and equations within a table are simply objects within objects and each individual object is designed to typeset to the assigned template.



Coding of the documents using XHTML



Insert Object panel, showing various predefined control for Tables, Figure and Equations



Showing side panel with multiple Objects within Objects. In this case there is a Note within a List within a Table

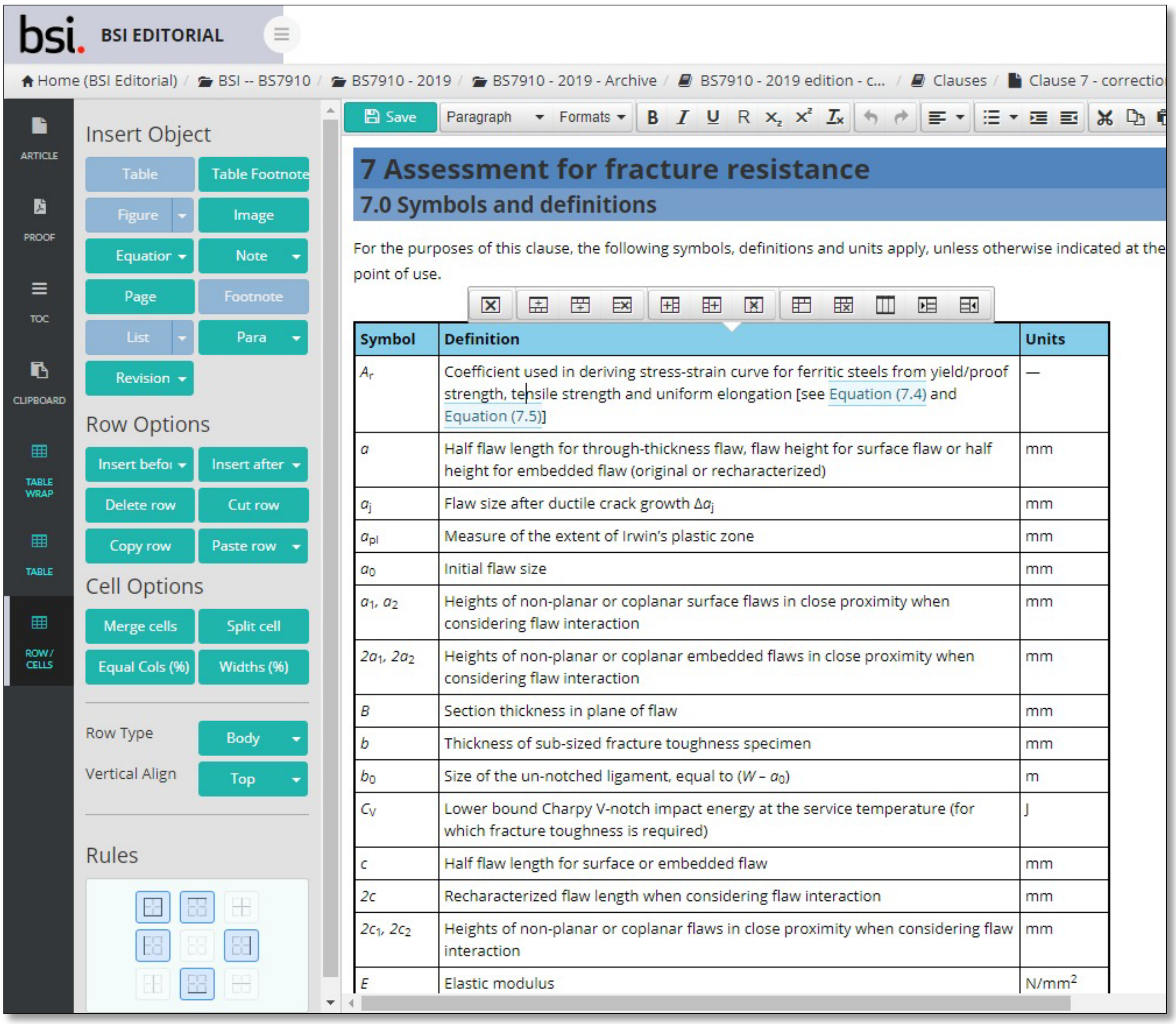
List of objects

- Table: straddle columns and rows; footnote
- Figures: multiple images
- Images
- Equation: inline and numbered
- Notes
- Break: page; section
- Footnotes
- List
- Paragraph
- Revision marks
- Object within Objects

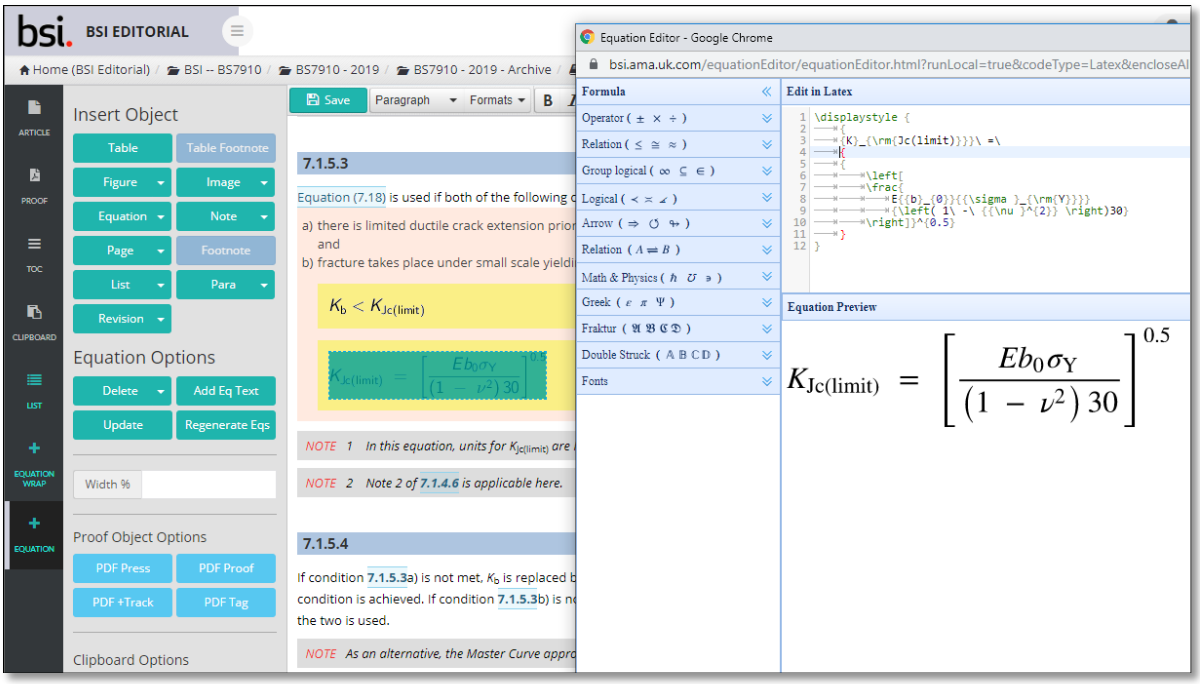
Editing of content via the editor

With any editor it is essential to maintain consistency and ease of use. To achieve this, the editor has two side panels and a top bar to aid the user.

The left panel has article control, listing of typeset proofs, document navigation and object inserts. When a user places their cursor into the edited text, the object panel will change to reflex the nested position and any available options for that object, such as insert row when in a Table object.



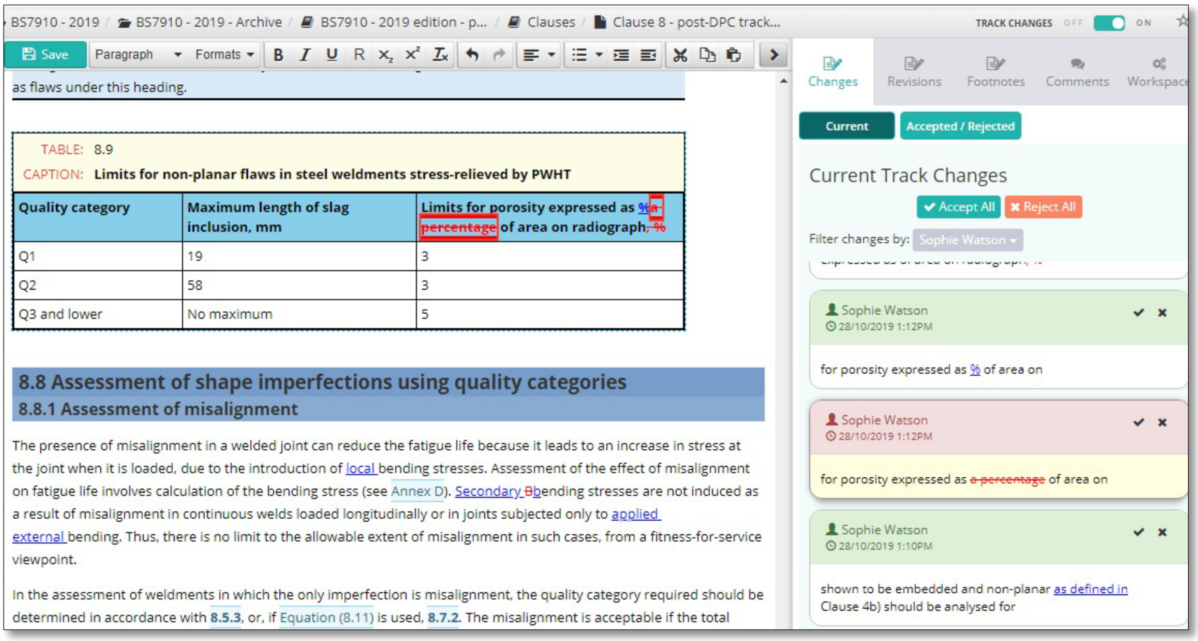
Left panel showing the options of Table Object



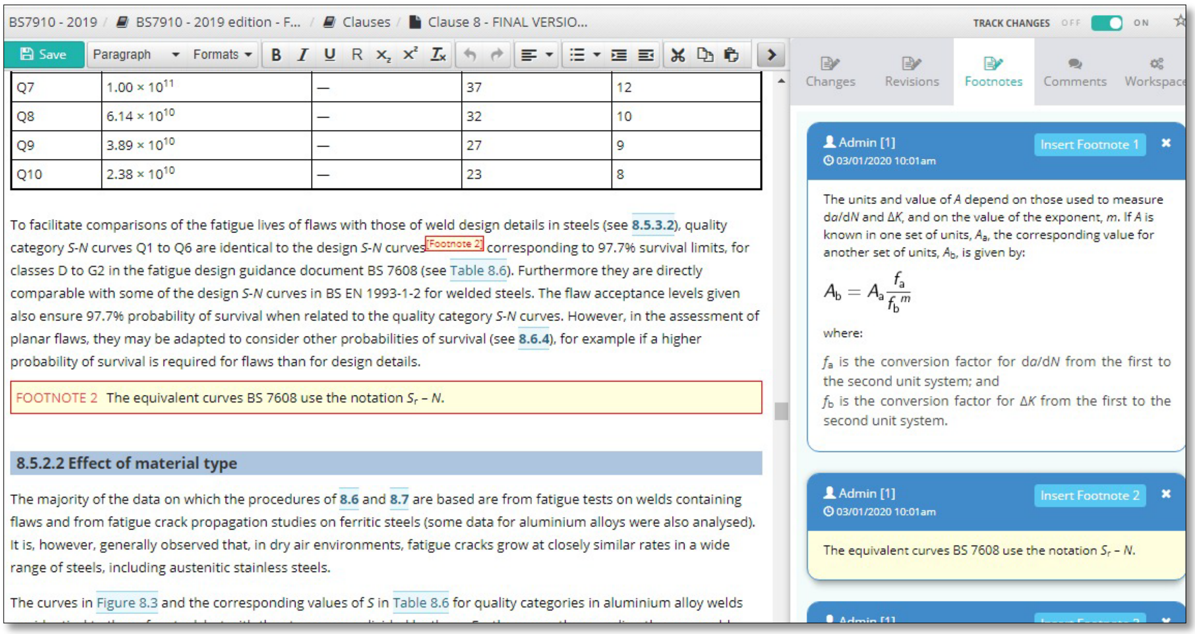
Equation editor using LaTex

The right panel has additional options for the user:

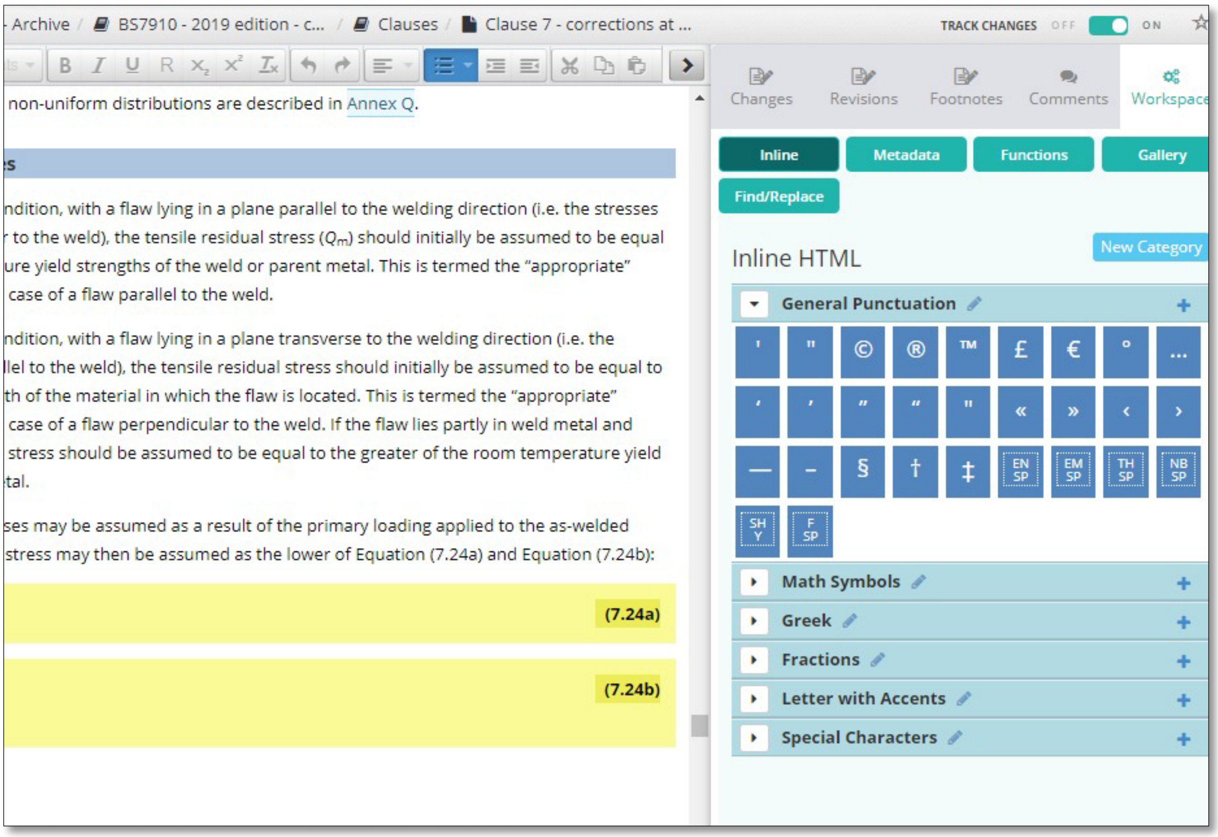
- Track changes
- Revisions
- Footnotes
- Comments
- Workspace
    - Inline characters
    - Metadata
    - Functions: renumbering
    - Gallery
    - Search and Replace



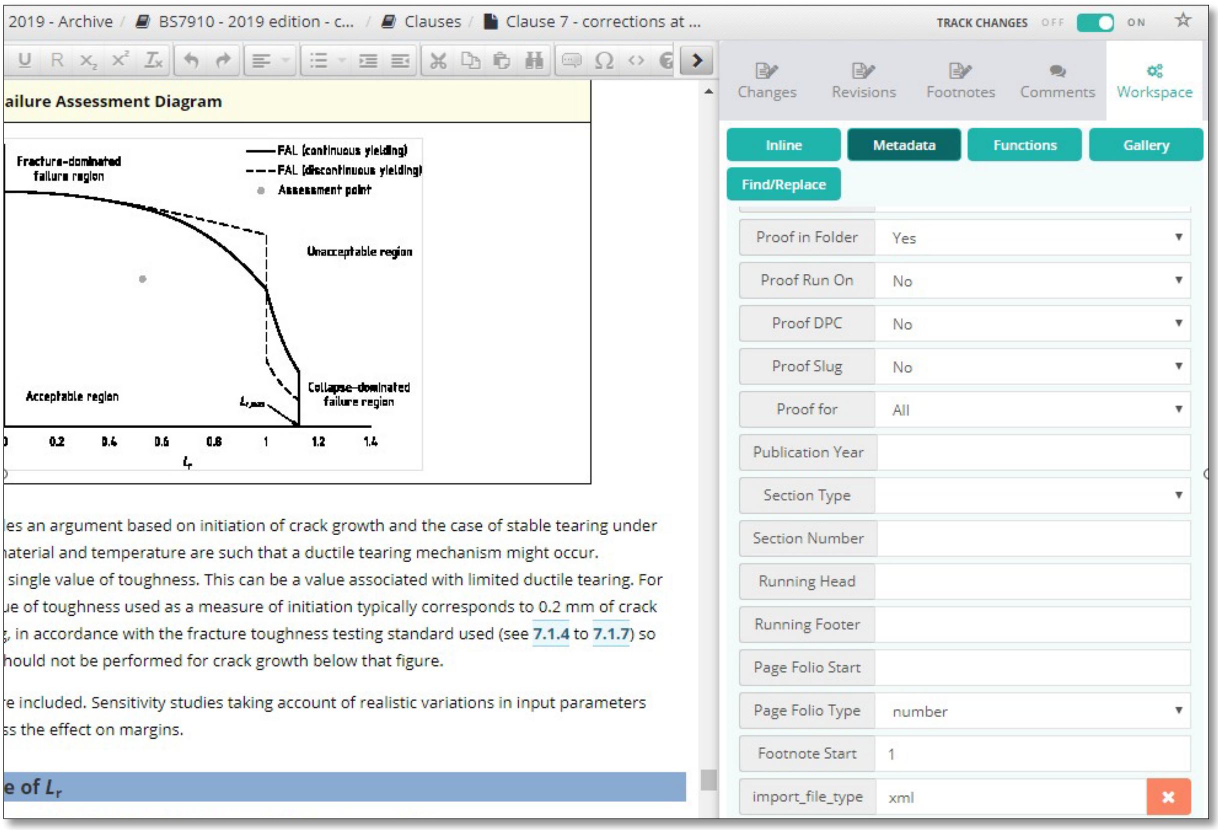
Right-hand panel showing track changes



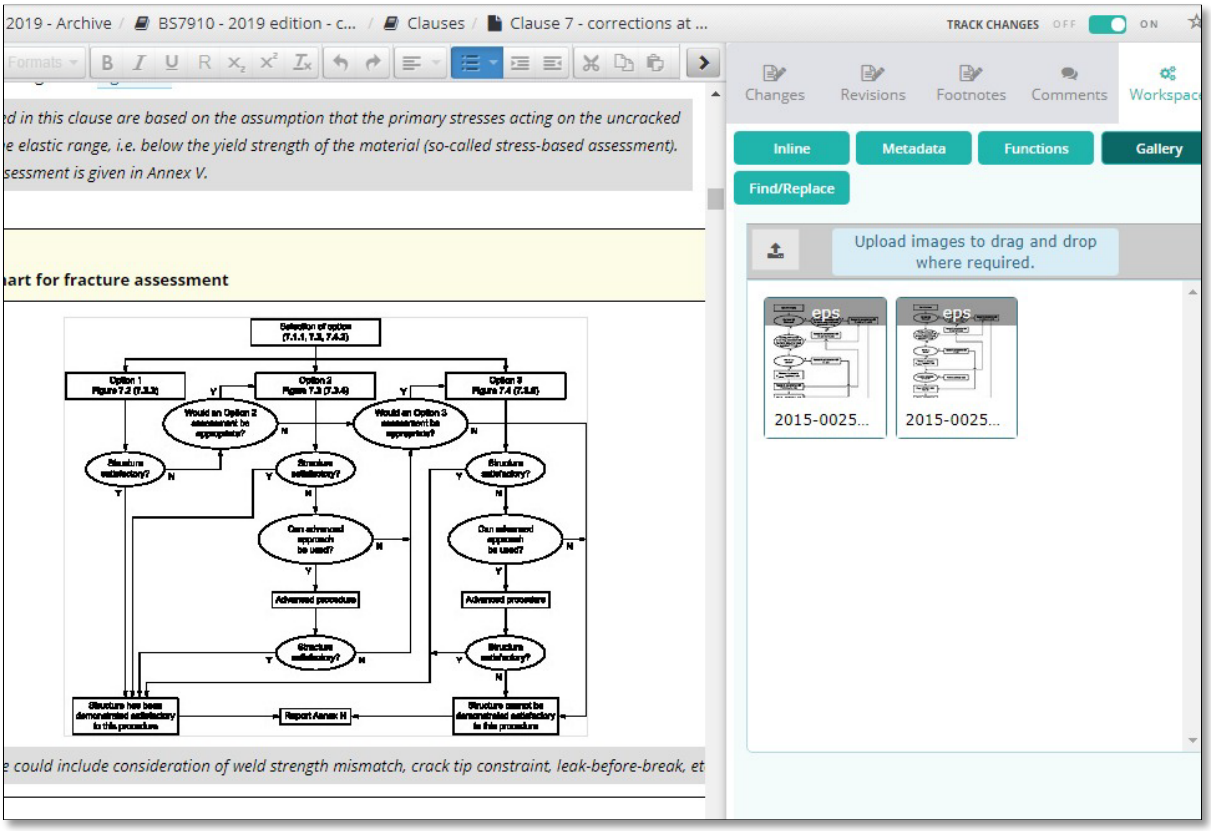
Right-hand panel showing footnotes



Right-hand panel showing inline characters within workspace tab



Right-hand panel showing metadata of the document within workspace tab



Right-hand panel showing image gallery within workspace tab

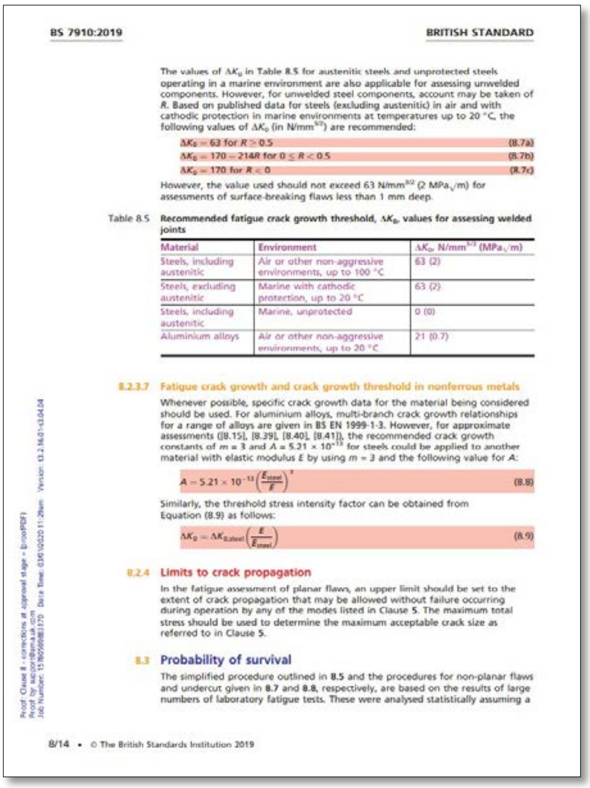
Proofing

The user can typeset either a single object such as an equation, typeset a whole document or typeset a folder many documents. The template is designed for a given publication with the XHML compiling to XML and set with the assigned template set in the metadata. This process is extremely quick and can set up to 500 pages per minute. All proofing is performed in the background allowing the user to continue with editing.

Landscape and continuation of objects such as Tables and Figures are automatically set without the need of user intervention. Each proof is saved and can be retrieved at any time. Previous typeset documents can be compared with newer version to create loose-leaf documents.

Pagination is controlled automatically and set via the metadata of the document or folder.

The user can proof for press PDF, colour coded for ease of checking, proof with track changes.



BS 7910:2019 BRITISH STANDARD

The values of ΔK_0 in Table 8.5 for austenitic steels and unprotected steels operating in a marine environment are also applicable for assessing unwelded components. However, for unwelded steel components, account may be taken of R. Based on published data for steels (excluding austenitic) in air and with cathodic protection in marine environments at temperatures up to 20 °C, the following values of ΔK_0 (in N/mm$^{3/2}$) are recommended:

$$\Delta K_0 = 63 \text{ for } R > 0.5 \quad (8.7a)$$

$$\Delta K_0 = 170 - 214R \text{ for } 0 \leq R < 0.5 \quad (8.7b)$$

$$\Delta K_0 = 170 \text{ for } R < 0 \quad (8.7c)$$

However, the value used should not exceed 63 N/mm$^{3/2}$ (2 MPa$\sqrt{m}$) for assessments of surface-breaking flaws less than 1 mm deep.

Table 8.5 **Recommended fatigue crack growth threshold, ΔK_0, values for assessing welded joints**

Material	Environment	ΔK_0, N/mm$^{3/2}$ (MPa$\sqrt{m}$)
Steels, including austenitic	Air or other non-aggressive environments, up to 100 °C	63 (2)
Steels, excluding austenitic	Marine with cathodic protection, up to 20 °C	63 (2)
Steels, including austenitic	Marine, unprotected	0 (0)
Aluminium alloys	Air or other non-aggressive environments, up to 20 °C	21 (0.7)

8.2.3.7 Fatigue crack growth and crack growth threshold in nonferrous metals

Whenever possible, specific crack growth data for the material being considered should be used. For aluminium alloys, multi-branch crack growth relationships for a range of alloys are given in BS EN 1999-1-3. However, for approximate assessments ([8.15], [8.39], [8.40], [8.41]), the recommended crack growth constants of $m = 3$ and $A = 5.21 \times 10^{-13}$ for steels could be applied to another material with elastic modulus E by using $m = 3$ and the following value for A:

$$A = 5.21 \times 10^{-13}\left(\frac{E_{steel}}{E}\right)^{3} \quad (8.8)$$

Similarly, the threshold stress intensity factor can be obtained from Equation (8.9) as follows:

$$\Delta K_0 = \Delta K_{0,steel}\left(\frac{E}{E_{steel}}\right) \quad (8.9)$$

8.2.4 Limits to crack propagation

In the fatigue assessment of planar flaws, an upper limit should be set to the extent of crack propagation that may be allowed without failure occurring during operation by any of the modes listed in Clause 5. The maximum total stress should be used to determine the maximum acceptable crack size as referred to in Clause 5.

8.3 Probability of survival

The simplified procedure outlined in **8.5** and the procedures for non-planar flaws and undercut given in **8.7** and **8.8**, respectively, are based on the results of large numbers of laboratory fatigue tests. These were analysed statistically assuming a

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Proofing with colour-coded objects to ensure mark-up is valid

Sample PDF pages from BSI editorial system

Table 7.4 **Guidance for determining whether yielding is continuous or discontinuous** *(continued)*

Yield strength range, MPa	Process route	Composition aspects	Heat treatment aspects	Assume yield plateau (discontinuous yielding) [A]
$R_{eH} > 350$	Controlled rolled	BS EN 10025-3 and BS EN 10025-4 compositions	Light TMCR schedules ($R_{eH} < 400$)	Yes
			Heavy TMCR schedules ($R_{eH} > 400$)	(Yes)
$R_{eH} \leq 500$	Quenched and tempered	Mo or B present with microalloy additions Cr, V, Nb or Ti	Heavy tempering favours plateau	Yes
			Light tempering favours no plateau	(Yes)
		Mo or B not present but microalloy additions Cr, V, Nb or Ti are (V has a particularly strong effect)	Heavy tempering	(Yes)
			Light tempering	(No)
$R_{p0.2}$ or $R_{eH} > 500$	Quenched and tempered	Mo or B present with microalloy additions Cr, V, Nb or Ti	Tempering to $R_{p0.2} < \sim 690$	(No)
			Tempering to $R_{p0.2} > \sim 690$	No
		Mo or B not present but microalloy additions Cr, V, Nb or Ti are	Tempering to $R_{p0.2} < \sim 690$	Yes
			Tempering to $R_{p0.2} \geq \sim 690$	(No)
$R_{p0.2} \leq 1\,000$	As-quenched	All compositions	NA	No

[A] Text in brackets indicates that there is uncertainty and a sensitivity analysis should be conducted to establish the effect the presence or absence of a yield plateau has on the assessment.

[B] Yield strength in Table 7.4 is defined as the upper yield, R_{eH}, to harmonize with the relevant standards.

The extent of the Lüders strain, $\Delta\varepsilon$, is estimated from:

$$\Delta\varepsilon = 0.037\,5(1 - 0.001\sigma_Y) \text{ for } \sigma_Y \leq 1\,000 \text{ MPa} \tag{7.8}$$

where:

σ_Y is the yield strength.

Equation (7.8) may be used in conjunction with Equation (7.4) to estimate the stress-strain curve for material which Table 7.4 indicates has a Lüders plateau. This is achieved by employing Equation (7.4) to obtain strain up to the yield strength and then adding the $\Delta\varepsilon$ increment from Equation (7.8) to the calculated strains; then Equation (7.4) is re-applied for stress equal to and exceeding the yield strength up to the tensile strength.

7.1.3.7 Tensile properties from hardness

When tensile data are not available from C-Mn steels, yield/proof strength and tensile strengths (in MPa) at room temperature can be estimated from measured Vickers hardness (HV_{10}) as follows (see BS EN ISO 15653):

Parent metal:

Where any uncertainty exists concerning the relevance of available data for the particular assessment being performed, specific data should be obtained using the methods given in BS ISO 12108 (see also **10.3.3.3**).

8.2.3.3 Recommended fatigue crack growth laws for steels in air

Values of the constants A and m in Equation (8.1), given in Table 8.3, should be used for:

- steels (ferritic, austenitic or duplex ferritic-austenitic) with yield or 0.2% proof strengths ≤700 N/mm^2;
- operation in air or other non-aggressive environments at temperatures up to 100 °C.

Unless justification for using different values is provided, the upper bound (mean + 2SD) values for $R \geq 0.5$ should be used for all assessments of flaws in welded joints. These laws are shown in Figure 8.2 a).

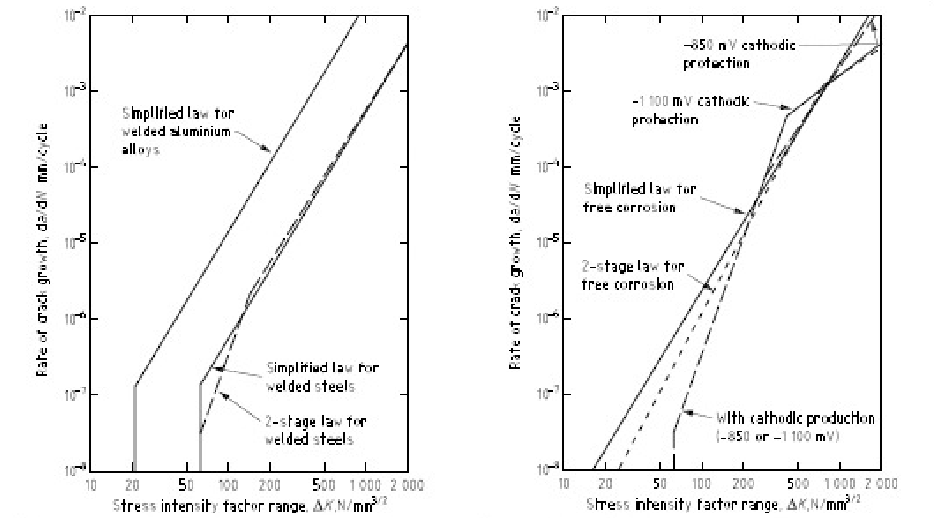
Table 8.3 **Recommended fatigue crack growth laws for steels in air** [A)]

R	Stage A				Stage B				Stage A/Stage B transition point ΔK, N/mm$^{3/2}$	
	Mean curve		Mean + 2SD		Mean curve		Mean + 2SD			
	A [B)]	m	A [B)]	m	A [B)]	m	A [B)]	m	Mean curve	Mean + 2SD
<0.5	1.21×10^{-26}	8.16	4.37×10^{-26}	8.16	3.98×10^{-13}	2.88	6.77×10^{-13}	2.88	363	315
≥0.5	4.80×10^{-18}	5.10	2.10×10^{-17}	5.10	5.86×10^{-13}	2.88	1.29×10^{-12}	2.88	196	144

A) Mean + 2SD for $R \geq 0.5$ values recommended for assessing welded joints.

B) For da/dN in mm/cycle and ΔK in N/mm$^{3/2}$.

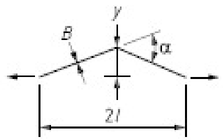
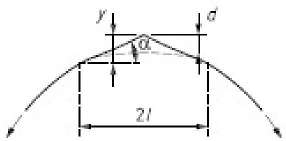
Figure 8.2 **Recommended fatigue crack growth laws**



a) Operation in air and other non-aggressive environments

b) Welded steels (including austenitics in marine environments)

Table D.1 **Formulae for calculating the bending stress due to misalignment in butt joints** *(continued)*

Type	Detail	Bending stress σ_s	Remarks
e) Angular misalignment between flat plates	 α in radians	Assuming boundary conditions equivalent to fixed ends: $\frac{\sigma_s}{P_m} = \frac{3y}{B}\left[\frac{\tanh(\beta/2)}{\beta/2}\right]$ $= \frac{3a}{4}\frac{2l}{B}\left[\frac{\tanh(\beta/2)}{\beta/2}\right]$ pinned ends: $\frac{\sigma_s}{P_m} = \frac{6y}{B}\left[\frac{\tanh(\beta)}{\beta}\right]$ $= \frac{3a}{2}\frac{2l}{B}\left[\frac{\tanh(\beta)}{\beta}\right]$ where, in each case: $\beta = \frac{2l}{B}\left(\frac{3\sigma_{max,m}}{E}\right)^{0.5}$	The tanh correction (in square brackets) allows for reduction in angular misalignment due to straightening of joint under tensile loading. It is always ≤1 and therefore it is usually conservative to ignore it. The exception is if, when combined with axial misalignment, the angular component has the effect of reducing the overall stress. Its effect is negligible for $2l/B < 10$ and it is independent of the assumed end fixing condition for $2l/B > 100$. Note, for compressive loading, without any lateral restraint, the "tanh" term becomes a "tan" term and it is no longer conservative to ignore it.
f) Angular misalignment at longitudinal or circumferential seams in tubes or vessels		Assuming boundary conditions equivalent to fixed ends: $\frac{\sigma_s}{P_m} = \frac{3d}{B(1-v^2)}\left[\frac{\tanh(\beta/2)}{\beta/2}\right]$ pinned ends: $\frac{\sigma_s}{P_m} = \frac{6d}{B(1-v^2)}\left[\frac{\tanh(\beta)}{\beta}\right]$ where, in each case: $\beta = \frac{2l}{B}\left[\frac{3(1-v^2)\sigma_{max,m}}{E}\right]^{0.5}$	Assuming an idealized geometry: $d = \frac{y}{2}$ or $\frac{\alpha l}{2}$

where:

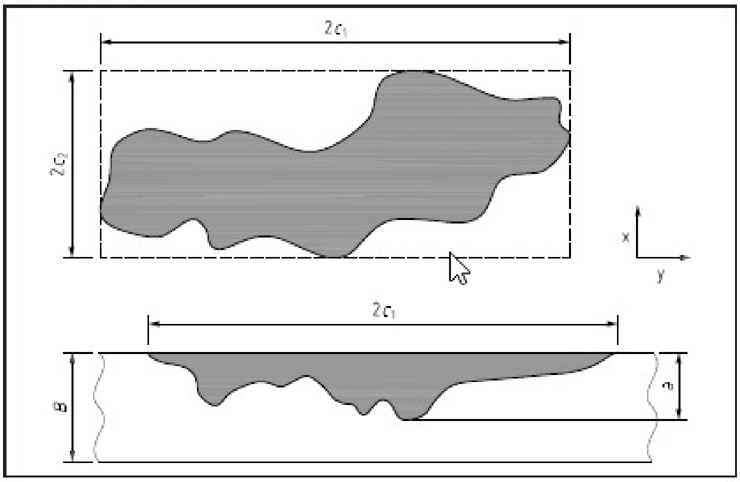
σ_{ref} is obtained from an appropriate reference stress solution (**G.4** to **G.6**);

f_c is a factor of safety (see **G.2.5**).

The reference stress solutions given in **G.4** to **G.6** are applicable only to the assessment of LTAs.

The methods for assessing LTAs are based on the assumption of a rectangular profile, i.e. the dimensions of the LTA are defined by its maximum depth and maximum lengths in the axial and circumferential directions (see Figure G.2). Methods based on a river-bottom profile of an LTA are given in ASME B31G and DNVGL-RP-F101 [G.2].

Figure G.2 **Dimensions of an LTA**



G.4 LTAs in a cylinder

G.4.1 Hoop stress

The reference stress is calculated from the following equation:

$$\sigma_{ref2} = \left[\frac{1 - \left(\frac{a}{B}\right)\frac{1}{Q}}{1 - \left(\frac{a}{B}\right)}\right]\sigma_2 \quad (G.3)$$

where:

$$Q = \sqrt{1 + 0.62\left(\frac{c_1^2}{r_o B}\right)} \quad (G.4)$$

G.4.2 Axial stress

The reference stress is calculated from the following equation:

$$\sigma_{ref1} = \left[\frac{\pi\left(1 - \frac{a}{B}\right) + 2\frac{a}{B}\sin\left(\frac{c_2}{r_o}\right)}{\left(1 - \frac{a}{B}\right)\left[\pi - \left(\frac{c_2}{r_o}\right)\left(\frac{a}{B}\right)\right]}\right]\sigma_1 \quad (G.5)$$

Typeset PDF pages from BSI editorial system

Summary

Software as a Service (SaaS)	From back-ups to user access, we fully support your solution.
Hosting and Support	Our dedicated servers provide high availability access to your solution.
Bespoke Enhancements	As the software manufacturer we are able to make quick and efficient enhancements to the solution.
Implementation and Configuration	We fully support your software project from setup through to training and launch.
Typesetting and production service	Fully trained in-house typesetter and production control to help with the day-to-day running of the system.
High speed pagination	Documents can be typeset concurrently up to 500 pages per minute in the background.
Consultancy Services	We use our experience gained from hundreds of projects to ensure the right solution for your business.