



EFCA
YOUNG PROFESSIONAL OF THE YEAR
2019

Personal details / Entry Form

Full name: Henrik Bredahl Kock

Nationality: Danish

Birthday: 24/02/1987

Age as of 31/03/2019: 32

Company: COWI

Location: Gurgaon, India

Member Association: FRI (The Danish Association of Consulting Engineers)

Contact details

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Section A. EMPLOYER'S RECOMMENDATION

Henrik Bredahl Kock has proven to be a role model within our modern consultancy business. In a world where technical expertise needs to be coupled with an innovative mindset, a willingness to work globally and daring to take on leadership responsibility at an early age, Henrik has already shown a promising talent.

Starting April 2012, the first four years of Henrik's career in COWI were based in Denmark, working on structural dynamics and the finite element method on projects on several continents, e.g. The Puente Nigale Fixed Link Project in Venezuela and the Ibra Sur Wadi Bridges in Oman.

On the home turf, Henrik, together with a multidisciplinary team including risk analysts, rail/runability engineers and structural engineers, amongst other tasks, worked on defining the performance criteria for ship impact for the tender documents of the New Storstrøm Bridge in Denmark.

In these works, Henrik demonstrated not only in-depth technical expertise within his own "narrow" field, but also the capability to think and work multi-disciplinary and thereby contributing to defining a new state of the art within complex numerical finite element modelling.

The advanced modelling allowed the combined effects of dynamic ship impact and train-runability on the bridge to be analyzed for the first time – not only in COWI but likely for the first time in the World thus allowing an accurate description of the bridge's performance criteria taking into account train overturning and derailment. Not only did Henrik play a key role behind the scene getting the model developed, but he was also instrumental in getting the new methodology accepted and approved by the client, The Danish Road Directorate, and by the validator of Banedanmark, thereby demonstrating sound communication and stakeholder management skills.

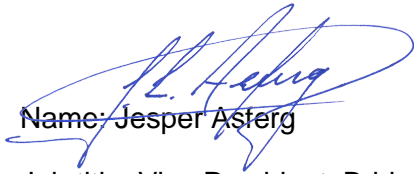
Finally, the studies were published and positively received at the IABSE conference in Vancouver 2017.

Since August 2016, Henrik has been based in our bridge office in India, where he initially continued working with the finite element method and implementing the COWI tools in COWI's Delhi office. In this role, Henrik demonstrated strong multicultural understanding, but also solid leadership skills in relation to strengthening and further building our Indian team to work as a well-integrated part of COWI's global bridge division.

This has lead Henrik to his current role as Head of Bridges for the now more than 45 staff bridge team in India, consisting of staff from India, Poland, Portugal and Denmark. Henrik has been instrumental to build the work culture, recruitment processes and technical development of the team. This has manifested itself by the team growing from approximately 5 staff in mid 2016 to close to 50 staff as of March 2019.

In summary – Henrik's well founded technical skills, his capabilities of working with complex multi-disciplinary challenges coupled with management and leadership skills allowing him to get the team to stand united behind him makes him a great asset for COWI and the engineering society. I have high expectations for his continued growth within the business and I'm confident that with even

more experience, Henrik will only become an even greater representative on the engineering society contributing to continued development of the greater society as well as COWI.



Name: Jesper Asferg

Job title: Vice President. Bridges, International

Managerial relationship to candidate: Line Manager in a matrix organization.



Section B. THE PROJECT

B.1 Project description:

Upon completion in 2022, The New Storstøm Bridge will be Denmark's third longest bridge. As such, it marks a significant milestone in the strong tradition in Denmark for beautiful, innovative and functional bridges. Moreover, with completion of the Femern link, the bridge will form part of the key transport corridor between Germany, Denmark and the rest of Scandinavia, thus elevating the impact of the bridge from a national level to the regional level.

COWI's role in the project consisted of engineering consultancy services to project owner, the Danish Road Directorate, during the tender stage of the project. These services comprised, amongst others:

- Preparation of the tender design incl. road, rail, bridge, mechanical & electrical, etc.
- Preparation of the design basis for the bidders, hereunder risk analyses including ship impact.
- Cost estimation.
- Technical contribution to environmental impact assessment (EIA).

COWI's services in the tender stage of the project were provided from 2013 to 2017 and the tender stage has been successfully concluded through the award of the engineering, procurement and construction to the Italian joint venture consisting of Itinera and Grandi Lavori Fincosit.

September 2018, construction started in the presence of high level representatives of the Danish government. The expected completion date is 2022 for road traffic and 2023 for rail traffic with a total construction cost for the new bridge of 2.1 billion DKK.

From a technical standpoint, the project scheme consists of a 6.5 km combined rail and road corridor crossing the strait of Storstrømmen, Denmark.

The project comprises a double track railway line with line speed of 200 km/h for passenger trains alongside a dual lane subsidiary road with design speed of 80 km/h and a bi-directional bicycle track.

A part of the scheme is the 4 km New Storstrøm Bridge. The tender documents render viaduct spans of 80 m at either side of the main bridge crossing the navigation spans.

At the two navigation spans of 160 m each, a cable stayed bridge with a single pylon and single cable plane features a structurally and aesthetically desirable solution. The superstructure is jointly carrying rail tracks, road and bicycle lanes via a 24 m wide single cell box girder in prestressed concrete. Over the navigation spans, a vertical clearance of 27 m shall be ensured.

Figure 1 and Figure 2 show renderings of the project.



Figure 1 - Rendering of The New Storstrøm Bridge as suggested in the tender documents.



*Figure 2 - Cross section of the bridge superstructure.
(Note that the rail tracks post this rendering were changed to a slab-track solution, as opposed to the shown ballasted solution.)*

B.2 Innovative characteristics of the project:

The New Storstrøm Bridge, will be a significant engineering feat to complete.

Starting with the navigation spans, they are formed by means of a 100 m tall single-pylon cable-stayed bridge in a modified-fan configuration. This will be Denmark's first large-scale cable-stayed bridge featuring this cable configuration. See Figure 3 below.

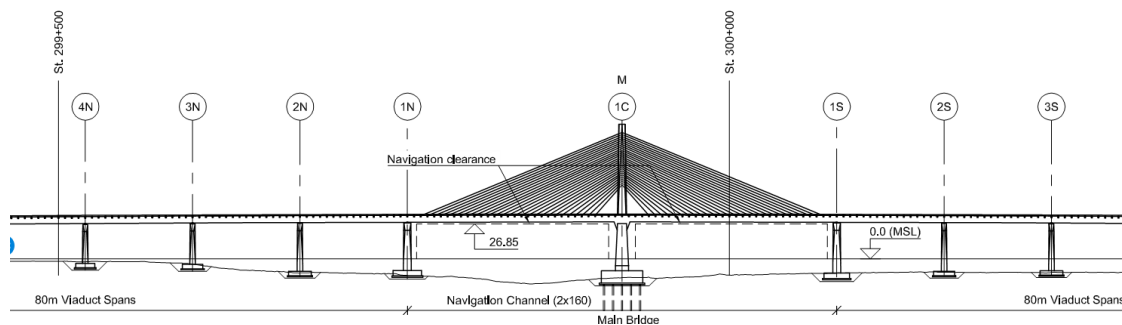


Figure 3 - General arrangement of navigation spans and viaduct spans. Cables in a modified-fan configuration.

Adding further to the complexity is the fact that the horizontal curvature of the bridge, as shown in Figure 1 and Figure 2, will create a curved cable plane, as opposed to the far more commonly used straight cable planes - e.g. on the Øresund Bridge.

Further, the viaduct spans, rendered of 80 m span length in the tender documents, feature single-cell ribbed box girders that are transversely and longitudinally pre-stressed. Given the desire to create a harmonious user experience for passengers of all modes of transport, rail, road and bicycle, the box girder features a highly complex geometry, in particular in the top slab - See Figure 2.

Through the preparation of the tender documents, in particular the design basis, the project found potential for enhancements of the existing norms, that did not to a satisfactory degree reflect the conclusions of the engineering analyses conducted.

Consequently, to facilitate that the New Storstrøm Bridge carries the appropriate balance between safety, aesthetics and function, profound efforts were put into challenging the status quo of the norms, which ultimately, through constructive dialogue with relevant authorities led to norm dispensations on several topics, including ice loading, clear distances, temperature loads and ship impact.

As such, the New Storstrøm Bridge has paved the way for norm reviews on a range of areas that not only will benefit the New Storstrøm Bridge, but also forthcoming bridges in Denmark and, potentially, internationally.

B.3 The YP's role in, and specific contribution to, the project:

Henrik Bredahl Kock was instrumental in the development of the ship impact requirements for the design basis for the New Storstrøm Bridge.

This work, conducted over the course of approximately 1 year, included close collaboration with an array of disciplines, including risk analysts, geotechnical engineers, structural engineers and train runability experts. As such, the challenge of the task was not only the complexity of each individual discipline, but equally cutting through the complexity in the interplay of all involved disciplines. Moreover, as an added dimension, the ship impact team was multi-cultural with members from India, Pakistan, Denmark and South Africa.

In this process, Henrik consistently delivered high quality input not only through his own work, but even more importantly was able to identify the best course of action around the table of experts from each discipline.

Focusing on the direct output from Henrik, the ship impact requirements for the design basis were centered around a numerical model that involved non-linear finite element modelling of the ship, foundations and bridge bearings. Henrik developed this model, which with its high fidelity created an in COWI unprecedented insight into bridge response during ship impact.

Moreover, the non-linear behavior of the bridge was for the first time in COWI coupled with train runability analyses through Henrik's development of an interface module. Again, a COWI, and likely World, first.

In short, the analyses models produced created the foundation for highly informed, and cost-efficient, Design Basis requirements to the bidders to the benefit of the Danish Road Directorate and ultimately society.

As a direct outcome of the above analyses, Banedanmark's BN1-59-4 norm, which prescribes bridge response criteria during ship impact, was challenged and a dispensation to its stricter requirements granted, thus paving the way for new procedures for bridge designers in Denmark, and internationally.

B.4 Communication with the client/end user:

The outcomes of the comprehensive ship impact analyses were most importantly conveyed to the Danish Road Directorate (DRD) in writing in the produced design basis, which later was floated to the bidders.

In the preparation process of the design basis, Henrik conveyed COWI's efforts on the matter verbally in a clear and concise way at meetings with the DRD and Banedanmark's validator, thus allowing the necessary trust to be built.

Further, Henrik's unpretentious attitude helped keep the discussions constructive, pleasant and fruitful.

B.5 Describe the project end results and the benefits to the client/end user:

The New Storstrøm Bridge will be a prominent physical manifestation of the ambition to strengthen the ties between the Scandinavian region and the rest of Europe.

As such, the bridge forms part of greater scheme that, amongst others, includes a fixed link between Fehmarn (Germany) and Rødby (Denmark), the New Storstrøm Bridge itself and rail and road upgradation throughout the region. Once these components are completed, the travel time of people, goods and services between the Scandinavian region and Germany will be significantly reduced, thus strengthening the economic ties in the region and the European Union's (EU) inner market as a whole. Refer to Figure 4 below for a regional overview.

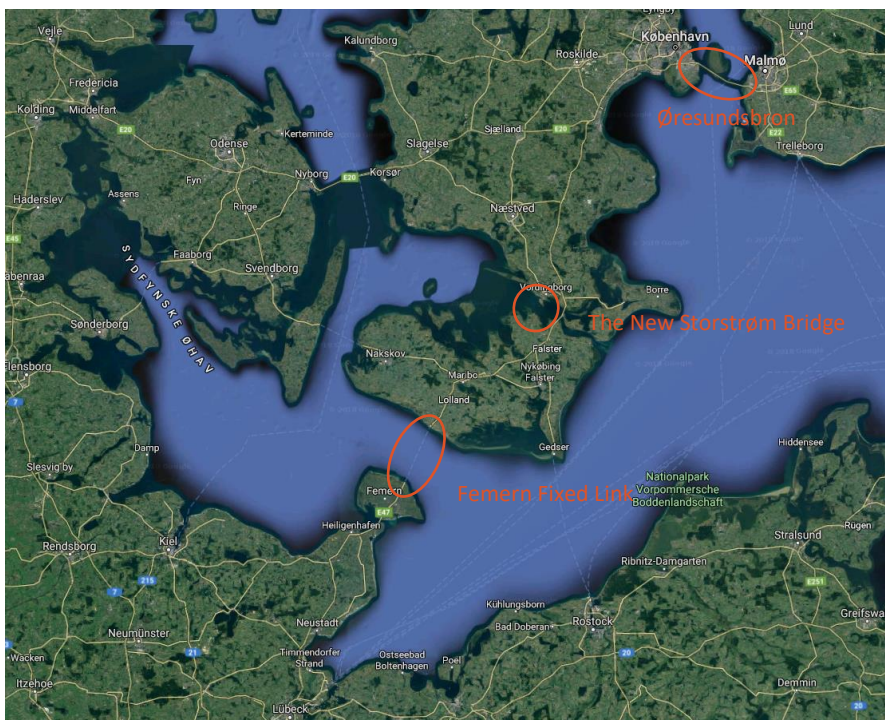


Figure 4 - Regional overview and key infrastructure projects forming part of the strengthening ties between Scandinavia and the rest of the EU.

In addition to the profound international impacts, the bridge will also strengthen coherence and balance in Denmark, by easing the daily commute between Copenhagen and Nykøbing-Falster, thus allowing people to live in the Nykøbing-Falster region and working in Copenhagen.

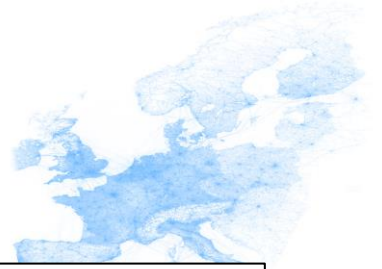
The bridge construction alone is expected to create 200-300 jobs locally, thus contributing significantly to the local economy and enabling up-skill of the workforce, thereby readying it for forthcoming major infrastructure projects, including Femern.

In short, the New Storstrøm Bridge is a milestone that already has, and will, within key areas, push engineering boundaries to new levels.

Upon completion, it will be a reference point in Danish bridge design history, emanating socio-economic ripples on a local, national and international scale.



Section C. CLIENT'S APPRECIATION OF THE CANDIDATE



As part of the COWI design team, preparing tender documents (Design Basis) for the Danish Road Directorate (DRD) for the New Storstrøm Bridge, Henrik Bredahl Kock was responsible for prescribing appropriate levels of ship impact and definition of criteria for global failure in conjunction with ship collision scenarios for the bridge.

This work was clearly conveyed in writing as part of the detailed requirements in the Design Basis, and in person, through face-to-face meetings to both us at the DRD and Banedanmarks Validator (independent checker). As such, the work carried out by Henrik demonstrated not only a very high level of technical competence, but also the ability to convey very complex technical issues in depth, in a clear and concise manner.

In terms of the added value to the project, the concise written requirements in relation to ship impact, provided not only clarity to the bidders, but also challenged status-quo for such requirements in terms of the extent of design required by the Design and Build Contractors. Further, the more holistic requirements ultimately allowed large potential savings to the bidders, and thus the DRD.

The ability to comprehend and convey such complex technical issues is rare. Henrik is a very exceptional engineer, with a very unpretentious personality.

In essence, Henrik's contribution formed a critical part of the project, demonstrated great technical skill - and innovation - and as such I wish him the best of luck in the competition.

Name and signature: Barbara Boesen MacAulay, CEng MICE

20/03/2019

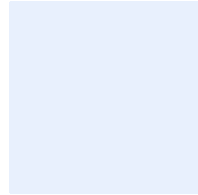
Job title: Technical Manager, Bridges

Company: The Danish Road Directorate

Section D. CV OF THE CANDIDATE



Curriculum Vitae



Personal information

First name(s) / Family name(s)

Henrik Bredahl Kock

Business Address

COWI India, Plot No 121, Cowi India, Phase I, Udyog Vihar, Sector 20, Gurugram, Haryana, India

Phone number(s)

+45 5640 4672

Cell: +91 9971 70 9005

E-mail address

hbkk@cowi.com

Nationality

Danish

Date of birth

24-02-1987

Work experience

Dates

April 2018 – present

Occupation or position held

Head of Bridges, India

Main activities and responsibilities

Line manager for 45+ headcount bridge design team based in New Delhi, India. The team consists staff from India, Poland, Portugal and Denmark with year's of experience ranging from 0 years to 22+ years of experience. Since April 2018, the team has worked on, amongst others, the World's longest suspension bridge (Canakkale 1915 Bridge), the longest bridge over water in India (Mumbai Trans Harbour Link) and the most powerful linear proton accelerator in the World (European Spallation Source). Main activities include:

- Motivate the team by being visible, accessible and proactive
- Communicate goals and expectations
- Set, communicate and live standards in terms of culture, methods and work ethics
- Support and promote the company strategy
- Technical sparring
- Recruitment, salary increments and dismissals
- Development and empowerment of team members
- Recognise and celebrate successes
- Deal with low performance
- Give credit, take blame
- Build trust

Name and address of employer

COWI India Private Ltd, Plot No 121, Phase I, Udyog Vihar, Sector 20, Gurugram, Haryana 122016, India

Type of business or sector

Engineering consultancy within the civil engineering sector.

Dates	August 2016 - March 2018
Occupation or position held	Engineer
Main activities and responsibilities	<p>Engineer and technical liaison from the Delhi office to other COWI offices.</p> <p>Main activities include:</p> <ul style="list-style-type: none"> • Reinforced concrete bridge design • Pre-stressed concrete bridge design • Production of conceptual, preliminary and detailed design • Independent checks of external's and internal's designs • Tender designs • Drawing production with team members • Implement in-house finite element software in the Delhi office. • Assist the line manager in recruitment • Face domestic and international clients on Indian projects • Live and emanate company values • Build trust and understanding
Name and address of employer	COWI India Private Ltd., Plot No 121, Phase I, Udyog Vihar, Sector 20, Gurugram, Haryana 122016, India
Type of business or sector	Engineering consultancy within the civil engineering sector.
Dates	April 2012 - July 2016
Occupation or position held	Engineer, Consultant, Coordinator
Main activities and responsibilities	<p>Engineer in the department 'Bridges, International', working on pre-stressed concrete bridges across a wide range of geographies.</p> <p>Main activities include:</p> <ul style="list-style-type: none"> • Reinforced concrete bridge design • Pre-stressed concrete bridge design • Production of conceptual, preliminary and detailed design • Drawing production with team members • Structural dynamics including field measurements on existing infrastructure • Ship impact assessment
Name and address of employer	COWI A/S, Parallelvej 2, 2800 Kongens Lyngby, Denmark
Type of business or sector	Engineering consultancy within the civil engineering sector.
Dates	September 2009 to December 2009
Occupation or position held	Teaching Assistant on two courses; 'Plates and Shell Structures' and 'Mechanics and Analysis of Structures II'. Main activities included:
Main activities and responsibilities	<ul style="list-style-type: none"> • Tutoring students • Sparking interest in the subject in students • Grading students' reports • Lectures (Auditorium format)
Name and address of employer	Technical University of Denmark, Anker Engelunds Vej 1, 2800 Kgs. Lyngby, Denmark
Type of business or sector	Education





Education and training

Dates	2009 to 2012
Title of qualification awarded	Master of Science (M.Sc.)
Principal subjects/occupational skills covered	Civil engineering, including: <ul style="list-style-type: none">• Structural analysis• Finite Element Method• Non-linear numerical methods• Structural dynamics• Geotechnical engineering• Composite materials• Wind turbine dynamics• Steel structures• Bridge design• Seismic design
Name and type of organisation providing education and training	Technical University of Denmark
Level in national or international classification	M.Sc. - level 7 as per ISCED 2011 classification
Dates	2010
Title of qualification awarded	N/A – As part of the Master's degree perusal, exchange student at the 'Bridge and Structures Laboratory' in Tokyo, Japan.
Principal subjects/occupational skills covered	<ul style="list-style-type: none">• Structural dynamics• Structural analysis• Finite Element Method• Seismic design• Statistical methods
Name and type of organisation providing education and training	University of Tokyo, Japan
Level in national or international classification	M.Sc. - level 7 as per ISCED 2011 classification
Dates	2006 to 2009
Title of qualification awarded	Bachelor of Science (B.Sc.)
Principal subjects/occupational skills covered	Civil engineering, including: <ul style="list-style-type: none">• Mathematics and physics• Structural analysis• Finite Element Method• Reinforced concrete• Steel structures• Material science
Name and type of organisation providing education and training	Technical University of Denmark
Level in national or international classification	B.Sc. - level 6 as per ISCED 2011 classification



Personal skills and competences

Mother tongue(s)

Danish

Other language(s)

English, German

Self-assessment

European level (*)

Language

Understanding					Speaking				Writing	
Listening			Reading		Spoken interaction		Spoken production			
English	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user
German	B2	Independent user	B2	Independent user	B1	Independent user	B1	Independent user	B1	Independent user

Social skills and competences

- Friendly
- Unpretentious
- Approachable – I attempt to never judge, but instead to understand the question asked and, equally importantly, understand why it is asked.
- Open-minded – there's *always* more to learn and 'normal' is relative.
- Curious – in people and technical subjects.
- Situational awareness – helps manage tense situations.
- Empathetic
- Patient – let's not mention the Delhi traffic.
- Trustworthy – building trust and acting with high integrity is key in enjoying meaningful, long-lasting, relationships.
- Agreeable, but assertive, when needed.
- Cultural awareness – having lived in Germany, Denmark, Japan and now India, I find understanding cultural context is key in reaching common ground.

Organisational skills and competences

- Structured thinker to cut through complexity.
- Trust and belief in people to enable delegation of work and responsibility and allow team members to grow personally and professionally.
- Trust and belief in myself to enable me to take decisions, move forward, and take responsibility for those decisions.
- Structured planner of work as to be able to deliver high quality, on time.
- Efficient communicator of strategy, goals and expectations.
- Fact-based and able to admit own mistakes.
- Able to navigate and build trust at all levels of the organisation.
- Able to prioritise need to have and nice to have to ensure progress.
- Able to stay calm under pressure.

Technical skills and competences

- Bridge design, including cast-in situ and precast elements, at tender, preliminary and detailed design stage
- Finite element analysis
- Ship impact assessment
- Structural dynamics – both numerical and field measurements
- Strong interdisciplinary skills
- Recruitment techniques – from interview skills to organising academy-format recruitment programmes
- Team management

Computer skills and competences

- Microsoft Office Package
- IBDAS (Finite element analysis tool)
- MATLAB
- Windows, MacOS

Other skills and competences

Driver's license, single-digit-handicap golfer

Hobbies and activities

Golf, travelling, cooking

Papers published

Jacob Egede Andersen, Edita Talic, Henrik Bredahl Kock, Muhammad Rizwan Iqbal. 2017:
Dynamic Analyses of Ship Impact to the New Bridge over Storstrømmen. IABSE, Vancouver, Canada

Public speaking experience

- Lectures at the Technical University of Denmark
- Presentations to the COWI top management
- Presentations to the COWI Bridge design management team
- Public interview at the annual conference for consulting engineers in Denmark
- Regular presentations to the design team in India

Membership of professional organisations

The Danish Society of Engineers (IDA)

