

Comportement dynamique et acoustique des transmissions mécaniques électrifiées

AU PROGRAMME

- Phénomènes physiques à l'origine du bruit et des vibrations des moteurs électriques et transmissions par engrenage .
- Méthodes de calcul pour la conception silencieuse
- Optimisation robuste tenant compte des tolérances
- Cas issus de différentes industries
- Questions / réponses en direct



Pascal Bouvet
Directeur scientifique

Adrien Parpinel
Expert modélisation



France Innovation (by ASRC) fédère

- Les entreprises innovantes réalisant des prestations de recherche et de développement technologique ;
- Les entreprises proposant des produits, procédés ou services innovants ;
- Les entreprises de type sous traitance industrielle ;
- Les entreprises du conseil et de l'accompagnement de l'innovation, etc.

Dans le cadre de sa plateforme communautaire France Innovation, **investisseurs, collectivités/clusters, etc ou encore organismes de recherche** sont acceptés.

Représentation à double sens

Information Newsletters, Webinaires

Mises en lumière Annuaire, Magazine 360°R&D
et réseaux sociaux, Webinaires, etc.

Mises en relation Recherches de compétences,
Plateforme communautaire, France Innovation Meetings, etc.

+880 membres avec fiche active

+7 000 inscrits à nos webinaires/an

+28 000 contacts

+2 200 mises en relation

Liste non exhaustive	MEMBRE DISCOVERY	MEMBRE PRO	MEMBRE PREMIUM
Référencer la fiche profil de votre entreprise	✓	✓	✓
Utiliser le logo membre France Innovation	✓	✓	✓
Participer aux consultations pour forger les positions de l'Association	✓	✓	✓
Accepter ou refuser des rendez-vous de membres (plateforme communautaire)	✓	✓	✓
Solliciter des rendez-vous aux autres membres (plateforme communautaire)	✗	✓	✓
Diffuser des recherches de compétences	✓	✓	✓
Répondre à des recherches de compétences	✗	✓	✓
Participer à des webinaires	✓	✓	✓
Organiser un webinaire	✗	✗	✓
Diffuser du contenu	✗	✗	✓
Tarifs préférentiels sur des évènements partenaires	✗	✓	✓
Tarifs préférentiels (20 à 40% de remise) pour les évènements France Innovation Meetings	✗	✓	✓

Au service des entreprises innovantes.

France Innovation est une association professionnelle qui fédère **les prestataires privés de recherche et de développement technologique**, les entreprises proposant des **produits, procédés ou services innovants** et les acteurs du **conseil et de l'accompagnement en innovation**.

Vous recherchez une expertise R&D&I ?

Parcourez l'annuaire des membres
ou contactez-nous.

Trouver une expertise

CHIFFRES CLÉS

400 membres
+ de 600 mises en relation par an

UN RÉSEAU NATIONAL

- Porter **une vision commune** (prise de position sur le **Crédit Impôt Recherche**, le Transfert de technologies, le financement des projets nationaux et européens, etc.)

Vous souhaitez valoriser
votre savoir-faire ?

Rejoignez France Innovation

Comment adhérer ?

✓ Mots clés

✓ Structure

✓ Compétences & Expertises

Sélectionner

✓ Domaines d'application

✓ Localisation

num dpt, ville

ⓘ Triez par pertinence ou par ordre alphabétique

(779)

TRIER PAR

○ A - Z

○ Derniers inscrits



Typhoon HIL est un leader du marché de la technologie de simulation ultra-haute fidélité C...

<http://www.typhoon-hil.com>

[Voir la page profil](#)

 DEMANDER UN RDV

Start-up/PME de ≤ 5 salariés



Graines de Conseil
Ingénierie Financière

Depuis 2016, nous accompagnons les entrepreneurs (+200 entreprises différentes,...

<http://www.grainesdeconseil.fr>

[Voir la page profil](#)

 DEMANDER UN RDV

Start-up/PME de ≤ 5 salariés



Atlantic Bone Screen est une CRO préclinique spécialisée dans le domaine des maladies...

<http://www.atlantic-bone-screen.com>

[Voir la page profil](#)

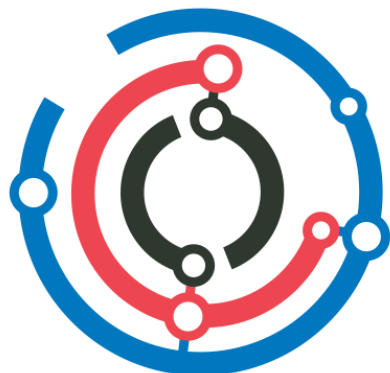
 DEMANDER UN RDV

PME



decade





France Innovation

MEETINGS

Les RDV d'affaires des entreprises innovantes

Les participants 2024 :

92% ont identifié de nouveaux partenaires sur nos événements

91% envisagent de participer à nouveau à un événement France Innovation Meetings

95% sont satisfaits de la qualité des échanges obtenus lors de leurs rendez-vous

97% sont satisfaits du suivi effectué par l'équipe organisatrice

FRANCE INNOVATION MEETINGS
**MANUFACTURING, MATERIALS &
ENERGY**

• 03 juillet 2025



FRANCE INNOVATION MEETINGS
SANTÉ & COSMÉTIQUE

• 30 septembre 2025



FRANCE INNOVATION MEETINGS
DEFENSE, SECURITY & AERO

• 11 décembre 2025



LES RENCONTRES

19 et 20 nov. 2025 - EN LIGNE



France
Innovation

Attention, de nouveaux webinaires peuvent venir s'intercaler entre les dates ci-dessous

<https://www.france-innovation.fr/webinaire/>

05 nov : La Médiation Nationale du Crédit : au service des Entreprises

07 nov : Les 10 idées reçues sur le contrôle fiscal

20 nov : Réussir le scale-up de vos procédés en agrolimentaire et cosmétique

4 dec : Horizon Europe : 1,5 milliards d'€ pour les projets en santé

12 dec : Hucency : votre solution de sensibilisation à la cybersécurité

16 dec : IP BOX : la fiscalité des revenus de propriété intellectuelle

17 déc : L'Agence de l'innovation de défense (AID) : Les opportunités pour les entreprises

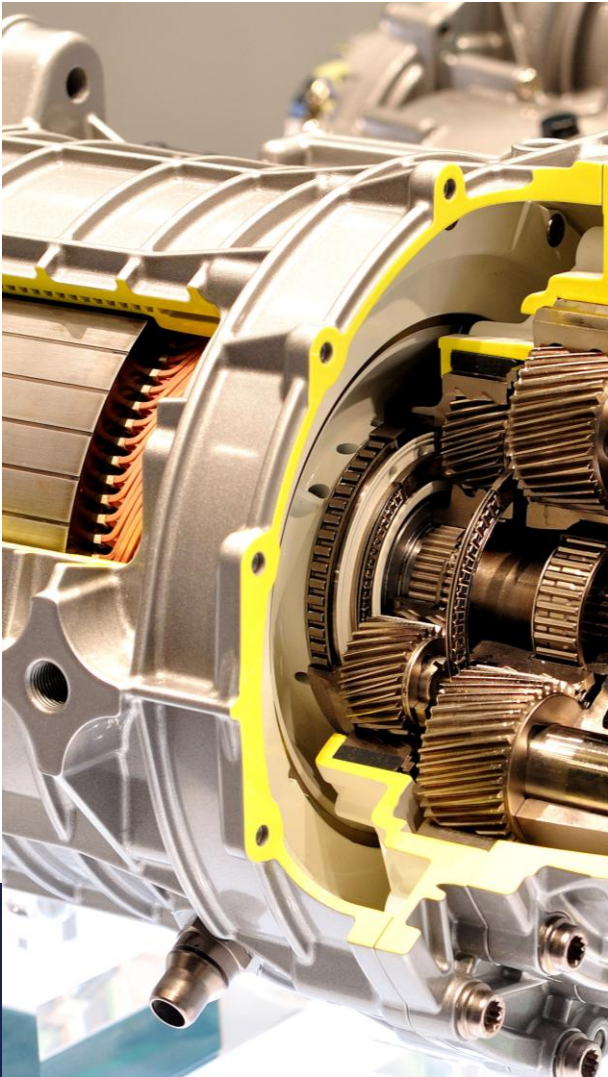
www.france-innovation.fr

contact@france-innovation.fr

Linked in

<https://fr.linkedin.com/company/france-innovation>





ELECTRIFIED DRIVELINES MODELLING AND TESTING TO MEET YOUR INDUSTRIAL CHALLENGES

Webinar France Innovation – October 15th, 2025
Pascal BOUVET, Adrien PARPINEL



VIBRATEC

■ everenn group

Speakers



Pascal BOUVET
Scientific Director
pascal.bouvet@vibratec.fr



Adrien PARPINEL
Design Engineer
adrien.parpinel@vibratec.fr



Webinar program

Duration: 1 hour

Electrified Drivelines

Modelling and Testing to Meet your Industrial Challenges

- Introduction
- Part 1: Vibration and Acoustic Comfort
- Part 2: Driveline Dynamic Behavior
- Part 3: Robustness and Series Production
- Training programs
- Questions



Introduction

GROUP & SUBSIDIARIES



4 Complementary Subsidiaries

01



As an engineering company, Vibrattec provides high-level consulting services through experts assigned to your projects.

02



Based in Kuala Lumpur since 2011, Vibrattec Asia Pacific offers the services of the entire Vibrattec group throughout Southeast Asia..

03



MicrodB develops software and hardware for identification, characterization and detection of noise sources.

04



Vibratteam is a consulting company made up of consultants immersed in customer teams.

Multi-sector expertise

Allow the entire industry to benefit from innovations in a single business sector

Railway

Industry
Energy – O&G

Auto
Aero
Defense
Space

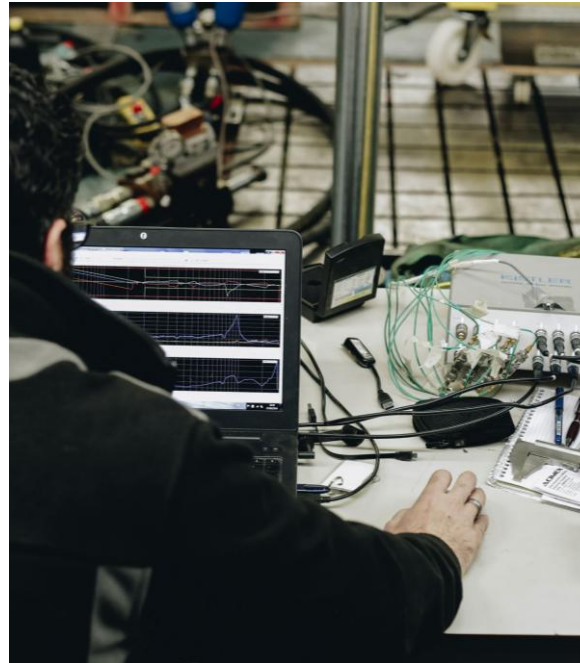


Expertise throughout the whole process

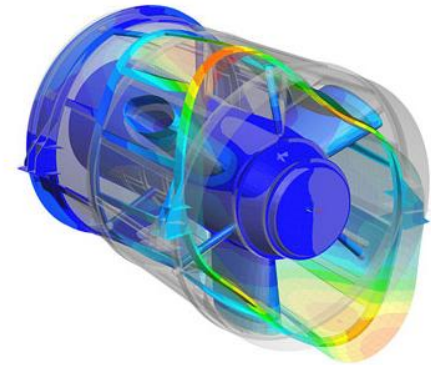
From physical phenomena understanding to industrial solutions



Instrumentation



Analysis



Simulation



Contract Research Organization

3 PhDs in progress - 15 scientific publications
per year



Academic relationships



Member and Participant in R&D clusters



20 %
turnover
invested in
R&D

Collaborative project culture

TURBOLAB : modelling of Electric Drive Unit

PINOT : fault detection in geared transmission

THOR : gear and bearing excitations

QuieterRail : noise and vibration impact of railway traffic



Special thanks to our clients for trusting us

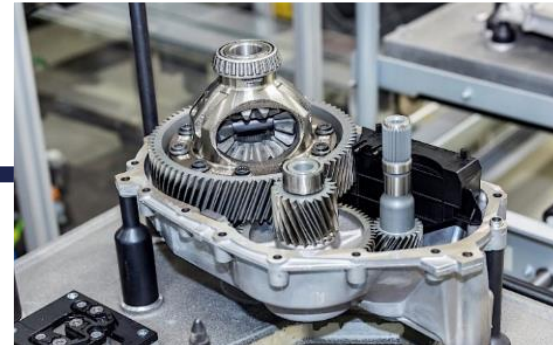
from start-up firms to large multinationals



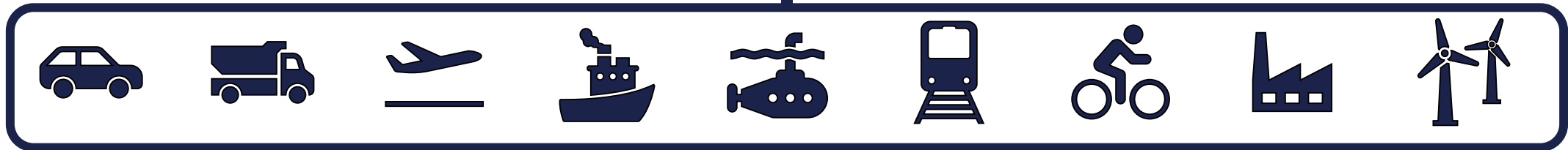
Electrified Drivelines



Electric Engine



Gearbox



Noise and Vibration Comfort

- NVH
- Brand image

Driveline Dynamic Behavior

- Torsion, Flexion
- Safety concerns

Robustness, Series Production

- Manufacturing tolerances
- End-of-line non-conformities



Electrified Drivelines

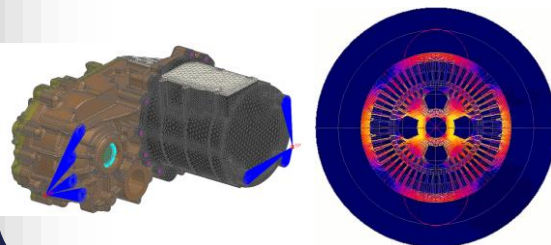
Fields of application
Examples

Over 15 years of
experience

- +200 industrial projects
- All sectors
- All types of machines
- 4 PhDs
- 7 R&D projects

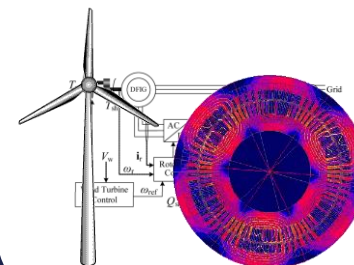
Automotive

- ePowertrain design
- High confort expectation



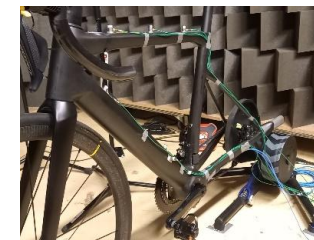
Energy

- NVH Optimization
- Efficiency



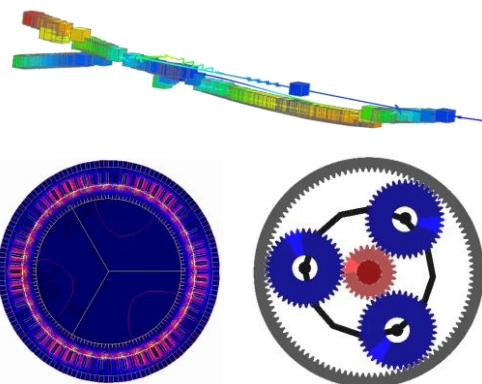
Light e-mobility

- Noise perception
- Gear + E-motor



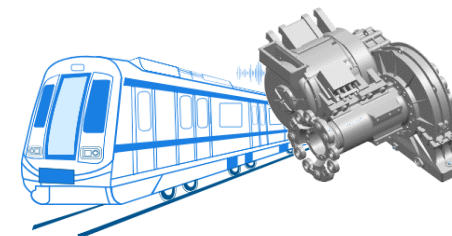
Aeronautics

- Hybrid propulsion
- Safety concerns to dynamics



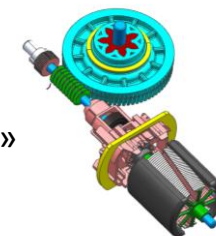
Railway

- Acoustic homologation
- Passenger comfort



Auxiliaries

- Pumps, actuators, etc.
- « no disturbing noise »



Part 1

VIBRATION AND ACOUSTIC COMFORT

Part 1: Vibration and Acoustic Comfort

“ Electric machines are supposed to be silent, right?”

 A well-lubricated gearbox shouldn't cause any trouble?”

SPOILER ALERT

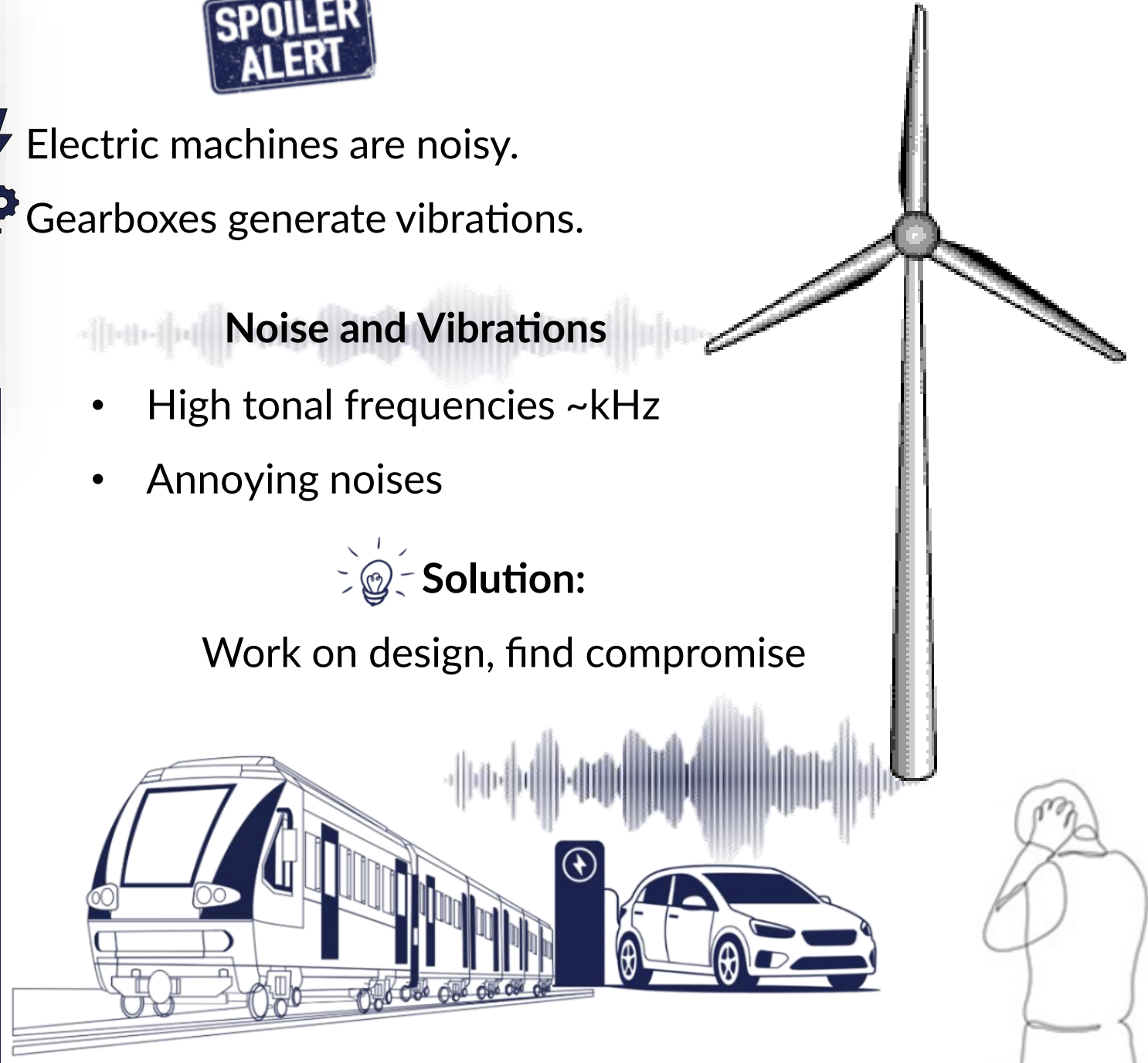
- ⚡ Electric machines are noisy.
- ⚙ Gearboxes generate vibrations.

Noise and Vibrations

- High tonal frequencies ~kHz
- Annoying noises

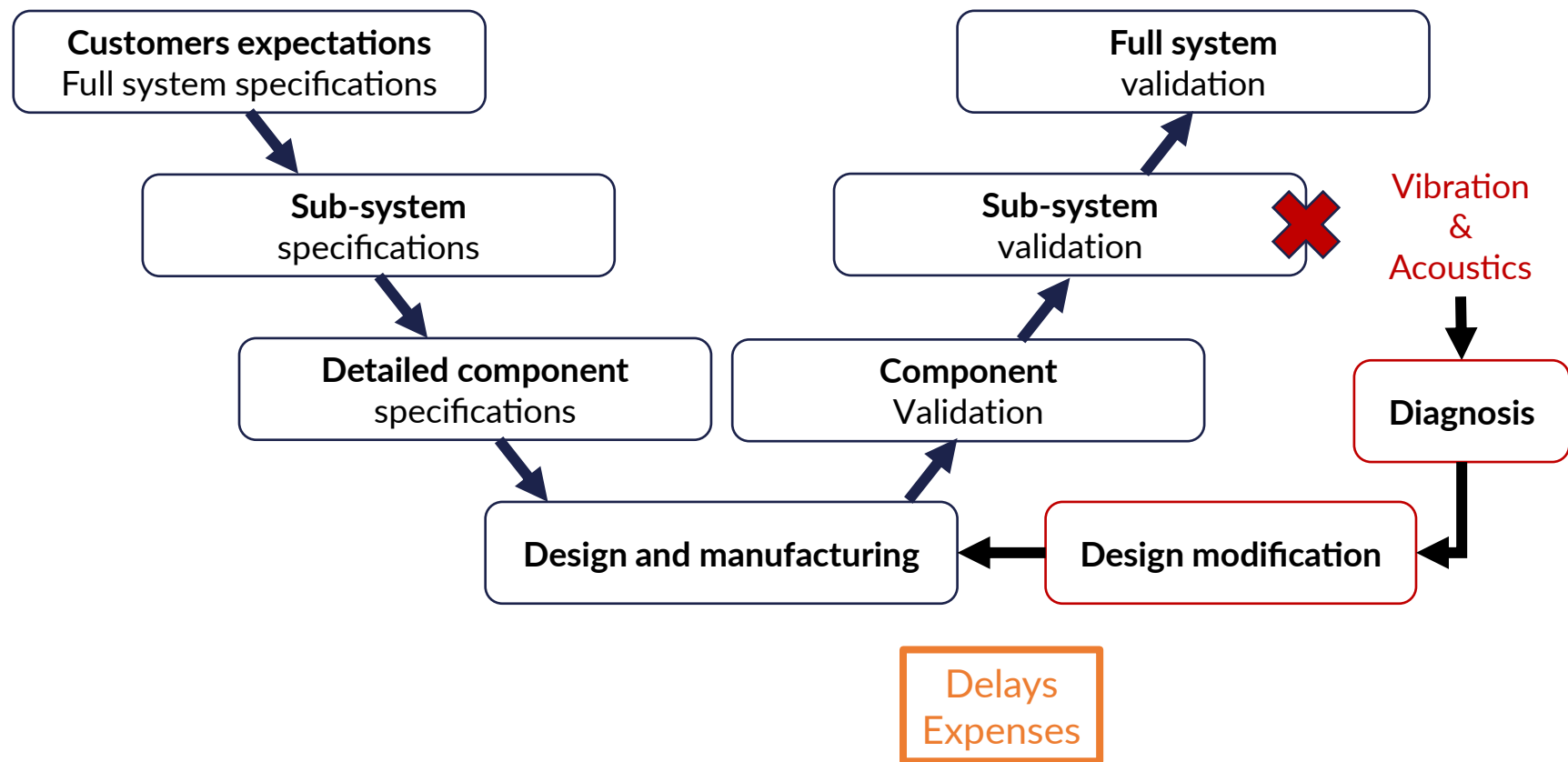
 **Solution:**

Work on design, find compromise



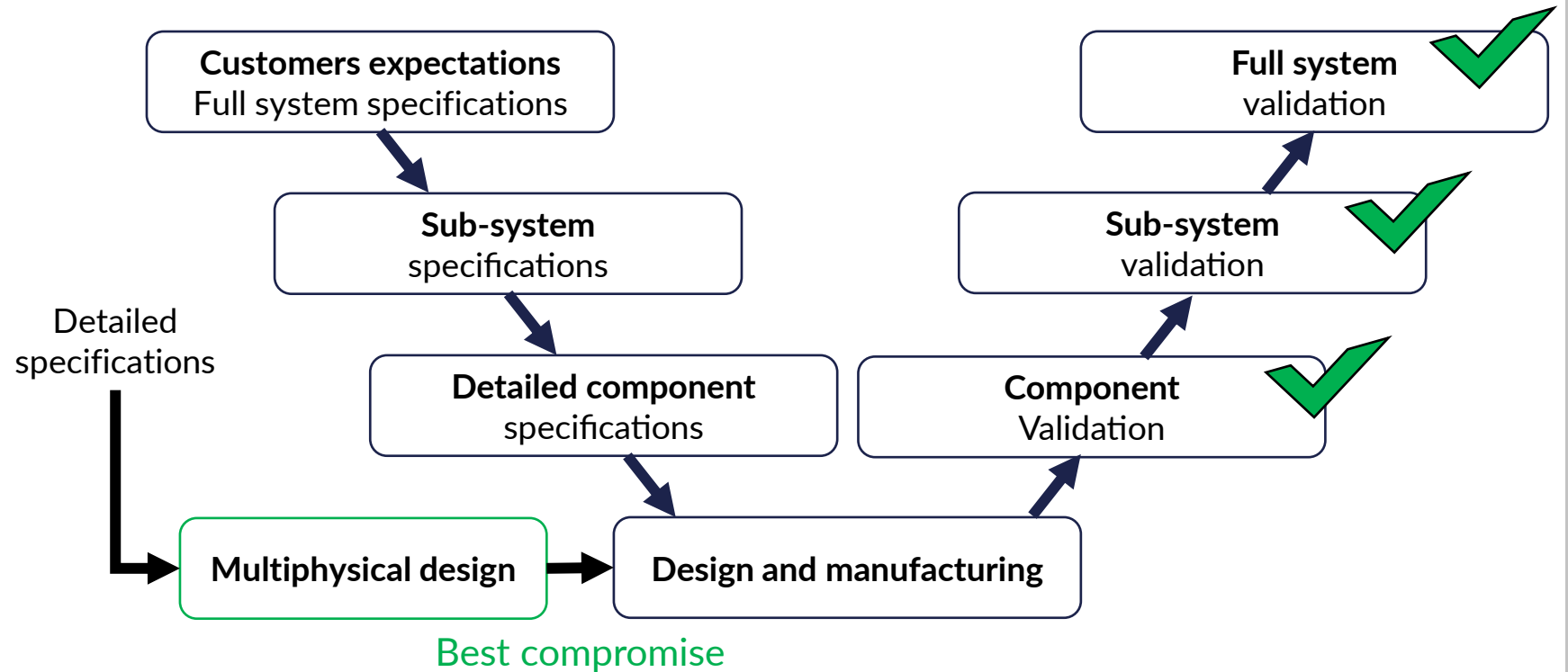
Vibration and Acoustic Comfort

Usual Product Development Cycle



Vibration and Acoustic Comfort

Product Development Cycle – Vibration&Acoustics

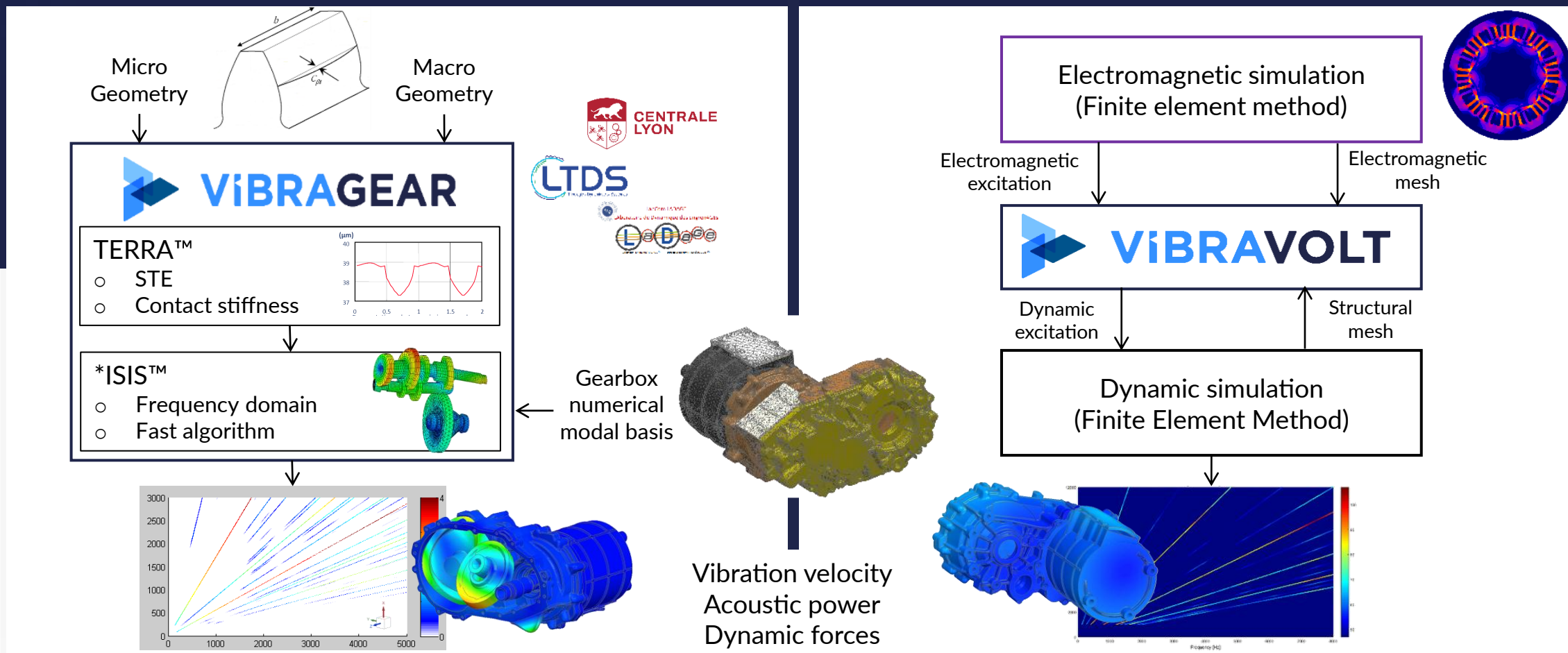


Key points:

- Production cycle reduced, **faster product development**
- Need for **quick tools** and efficient methodologies
- **Multiple actors** from different companies

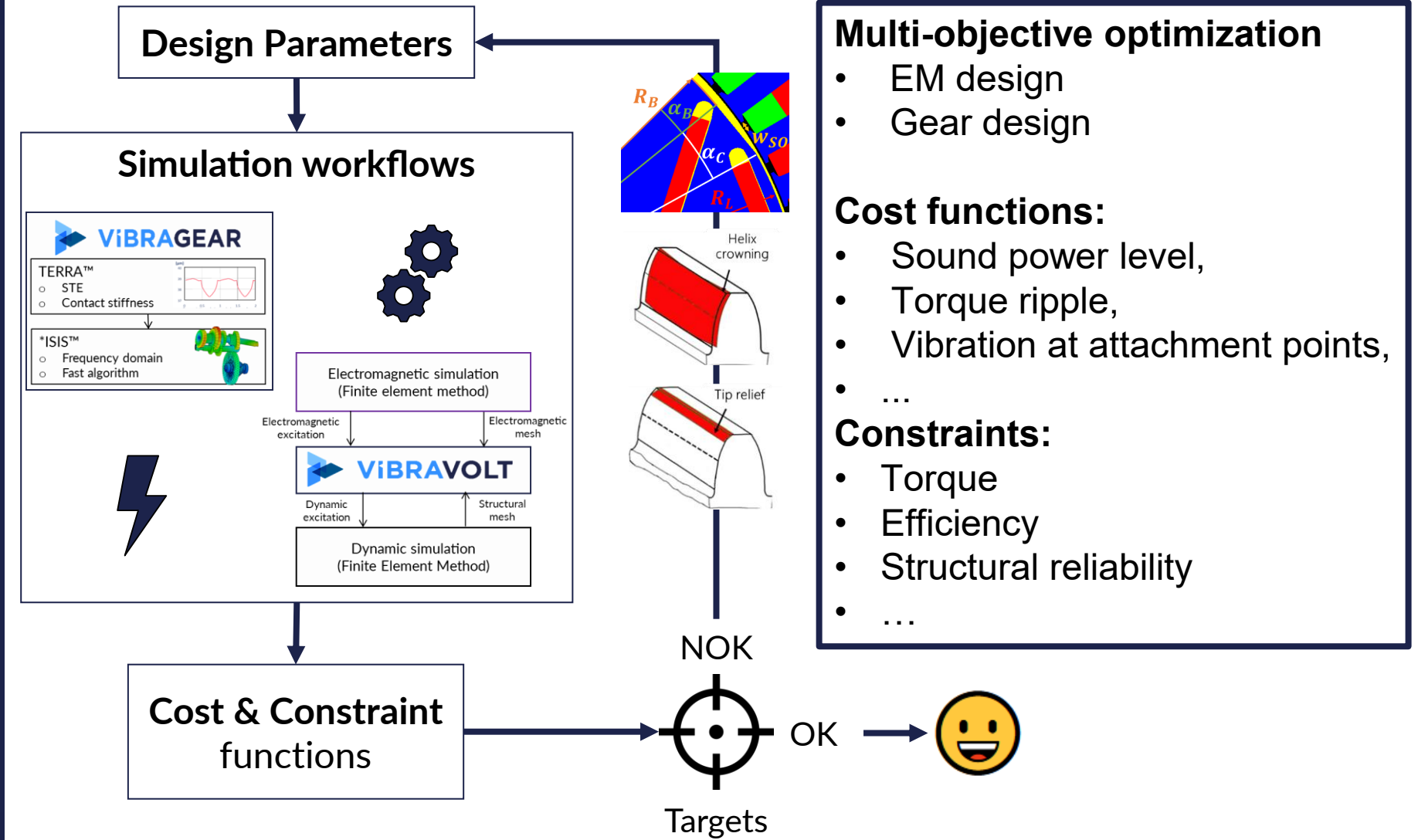


Vibration and Acoustic Comfort Multiphysical design



Vibration and Acoustic Comfort

Design Optimization



Case Study: Railway traction noise from Gearbox

Issue: Acoustic homologation non-conformity due to tonal noise level

Modeling:

- ~1 week

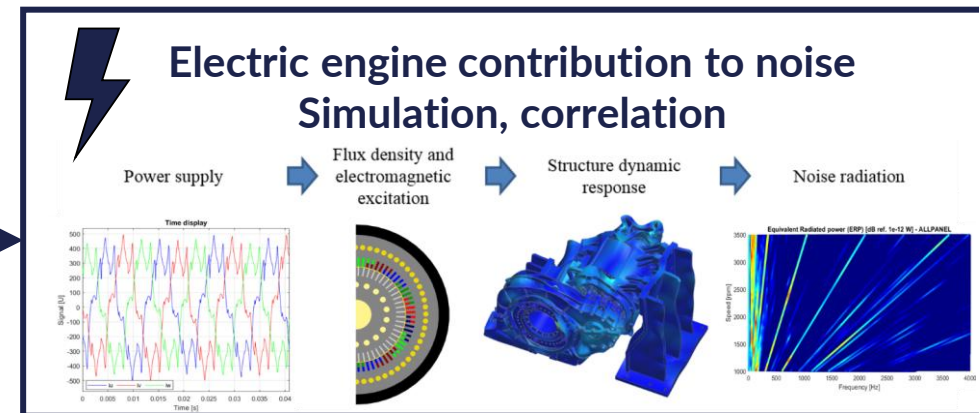
Diagnosis:

- CPU time: ~6hours

Gear design optimization:

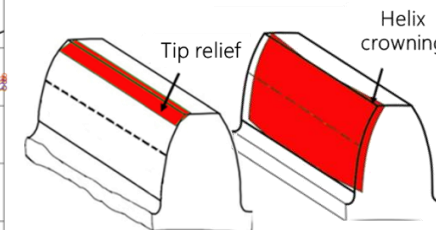
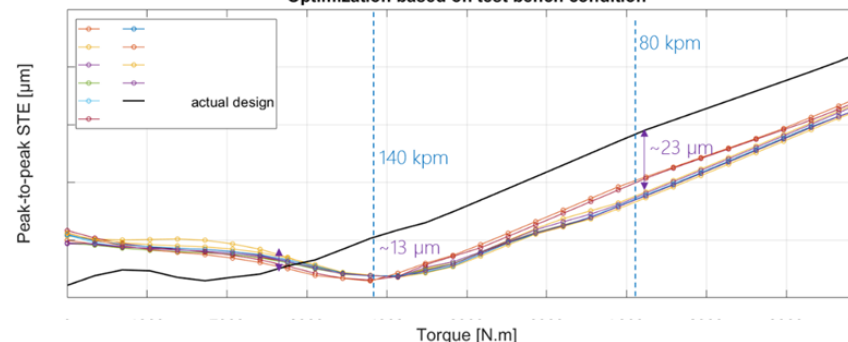
- 10 000 designs evaluated
- CPU time: ~48hours

Modelling - Diagnosis

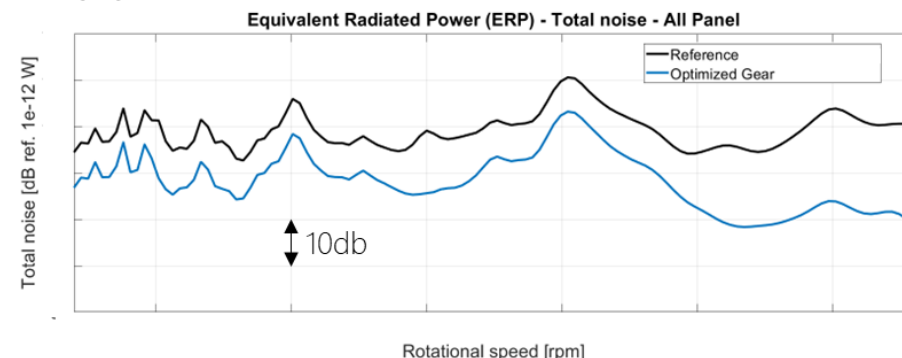


Gear design optimization

Optimization based on test bench condition

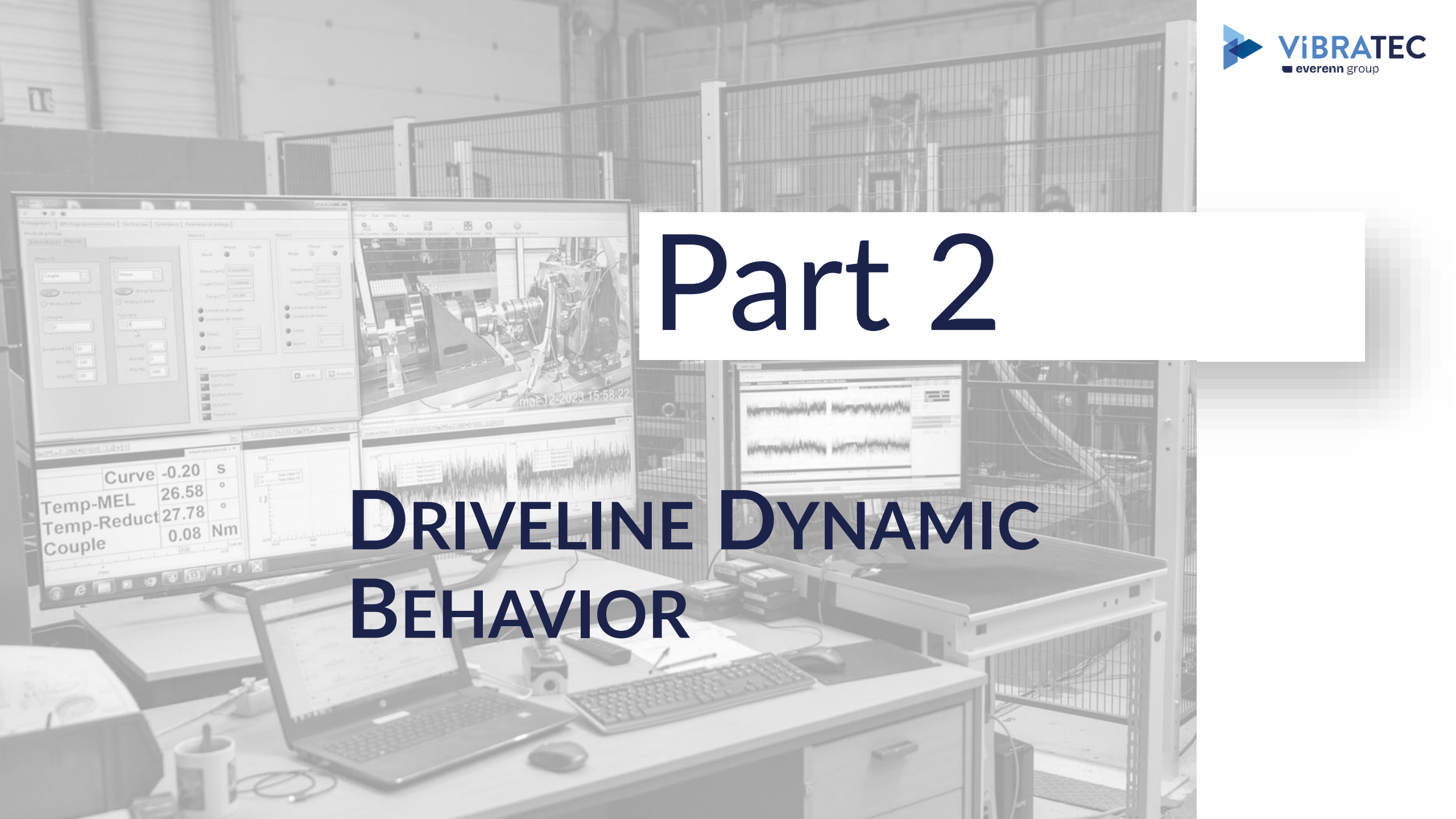


Noise reduction



Part 2

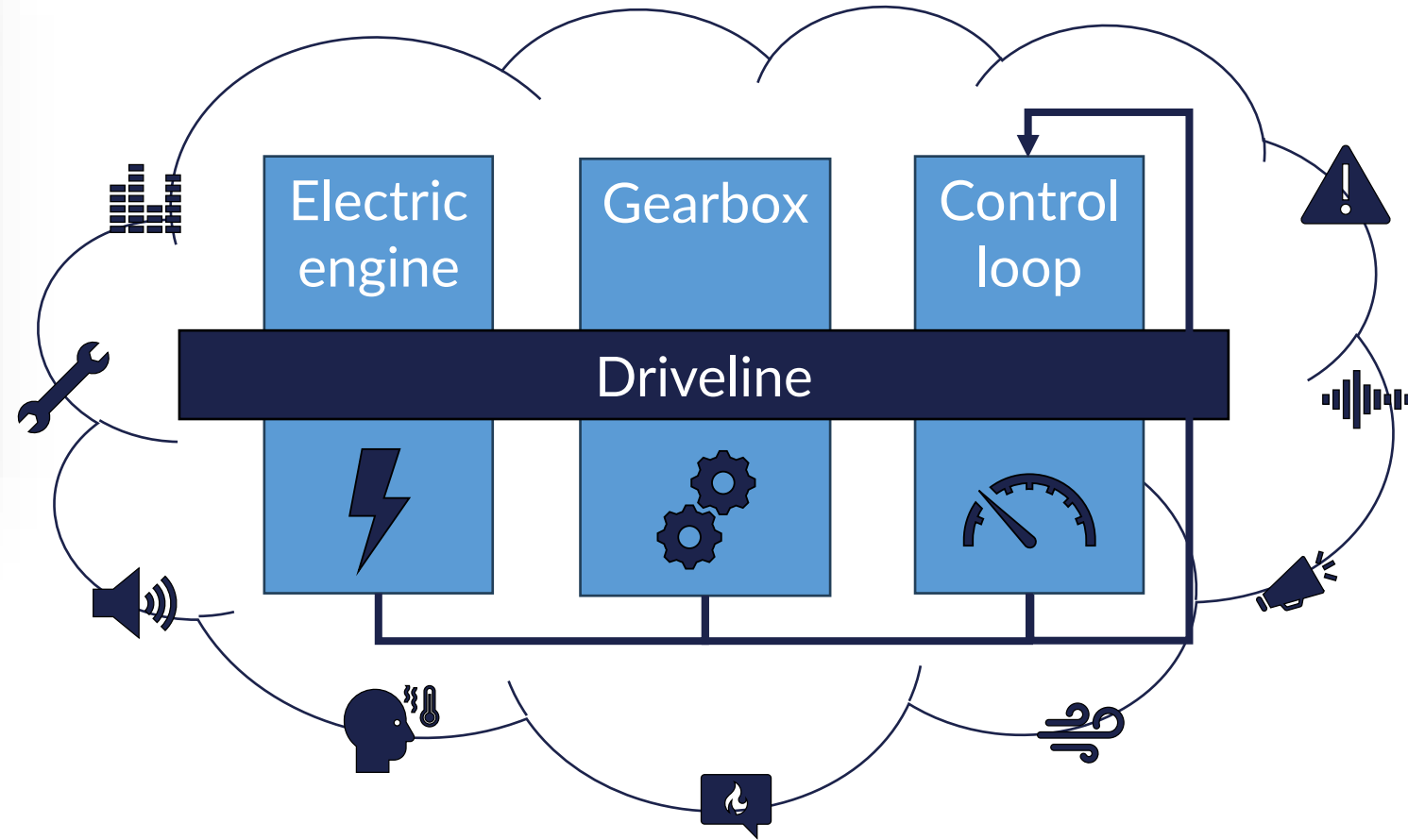
DRIVELINE DYNAMIC BEHAVIOR



Part 2: Driveline Dynamic Behavior

“ 😊 An electric motor, a gearbox... and everything runs like clockwork, right?

Well... until the clock starts vibrating, whining, twisting — or worse, breaking!”



- **Integration** = design challenge
- Consideration of **dynamic excitations**
- Consideration of **control system**
- **Driveline dynamic response** to be anticipated



R&T Project



2021-2024

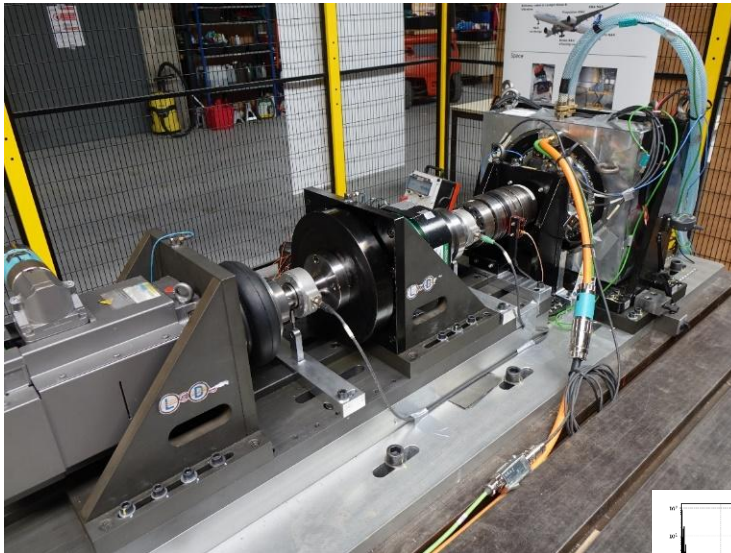


Financé par

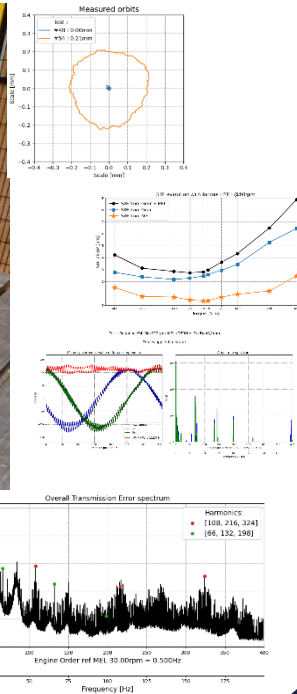


Demonstrators for innovative hybrid propulsion systems

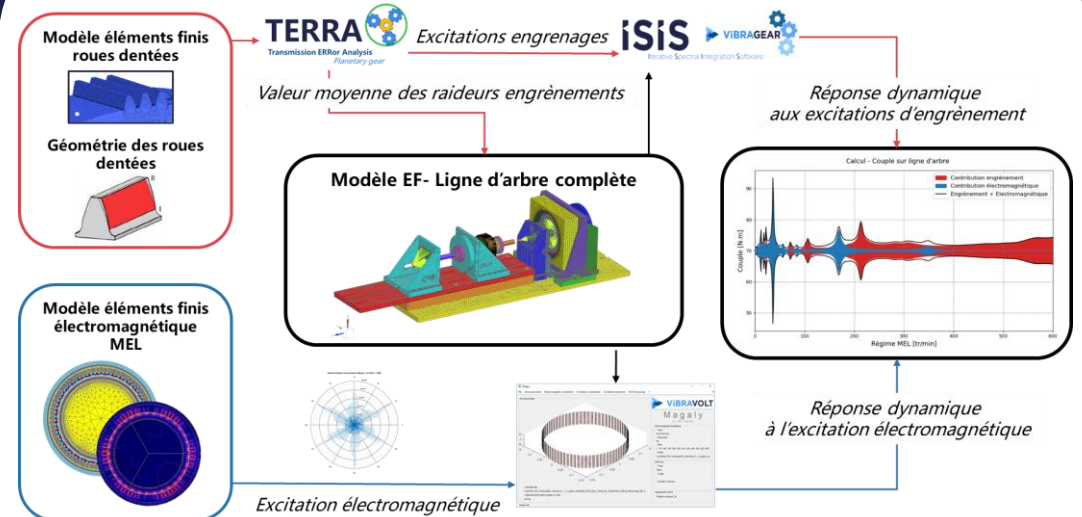
Test bench demonstrator



- Test bench design
- Test bench operation
- Experimental database



Numerical Demonstrator



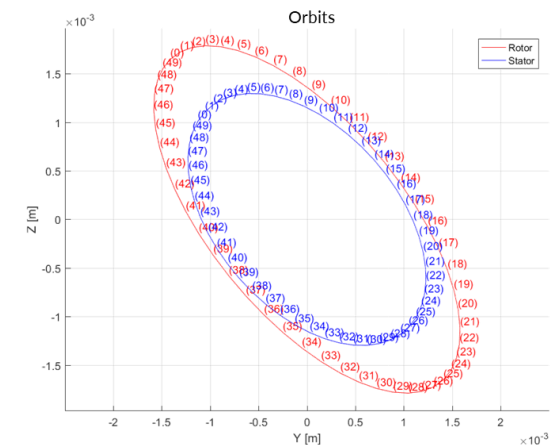
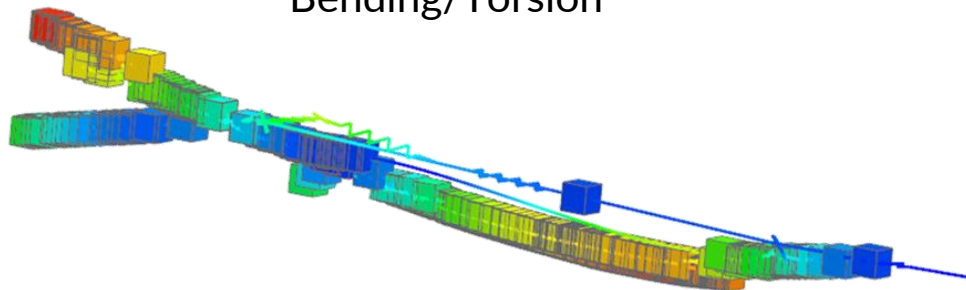
- Pooling historical know-how, multiphysical
- Test/Simulation correlation and validation
- Prediction of driveline dynamic behavior



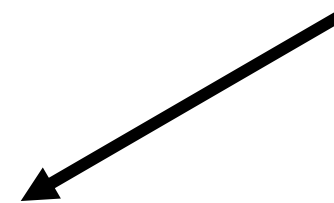
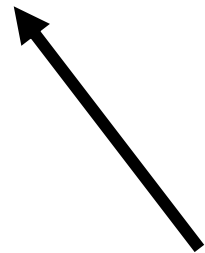
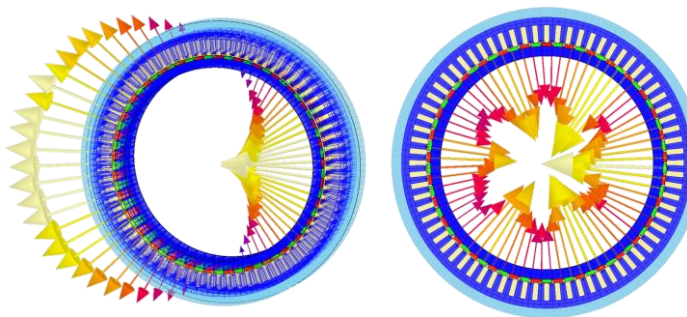
Example of Simulation study

Driveline design, unbalanced magnetic pull

Turboreactor driveline - dynamic response
Bending/Torsion



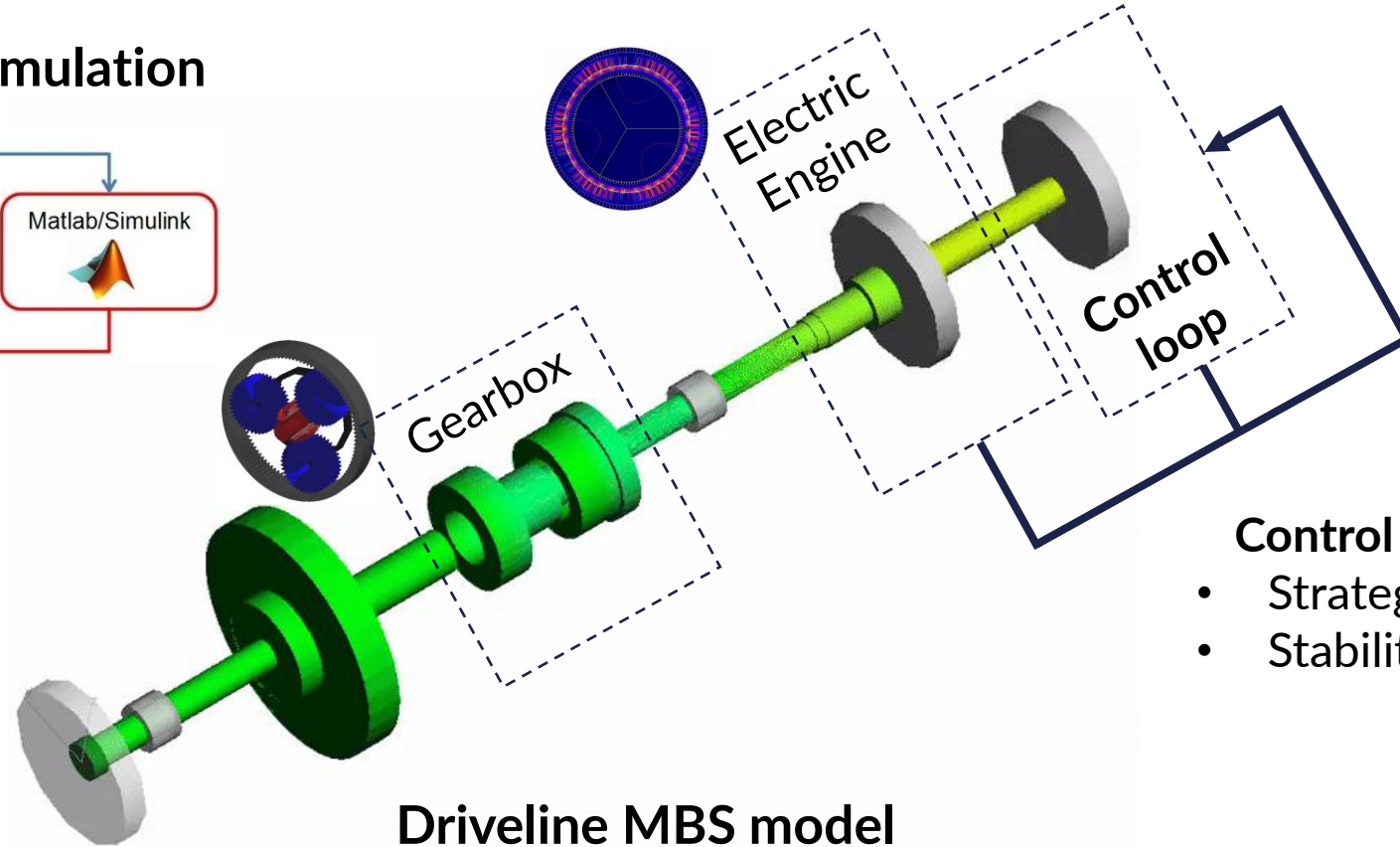
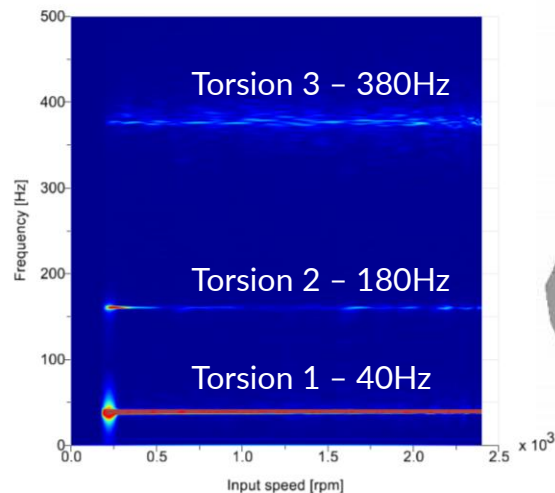
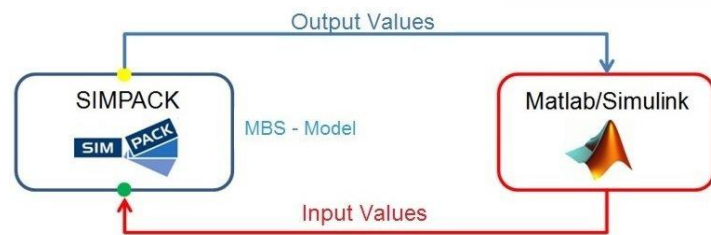
Unbalanced Magnetic Pull



Driveline Dynamic Behavior ⚡

System approach, Control loop modelling

Control Loop, Co-Simulation



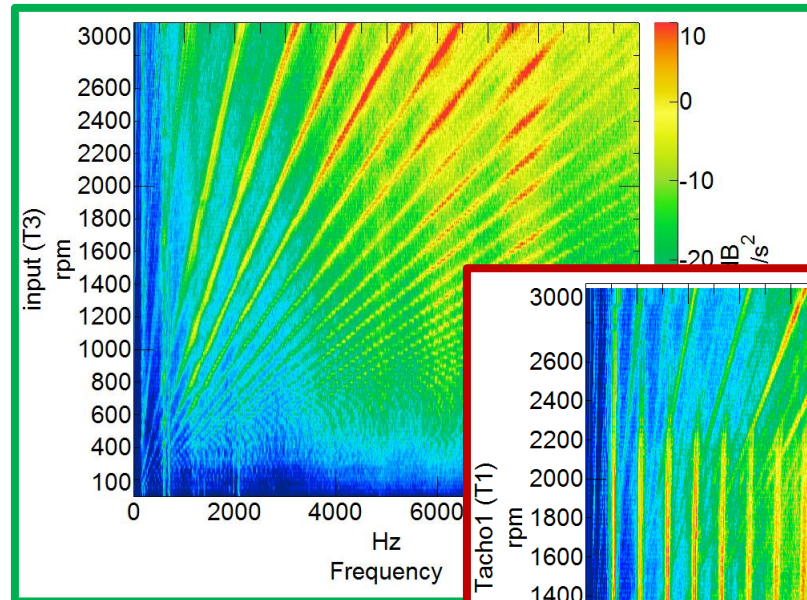
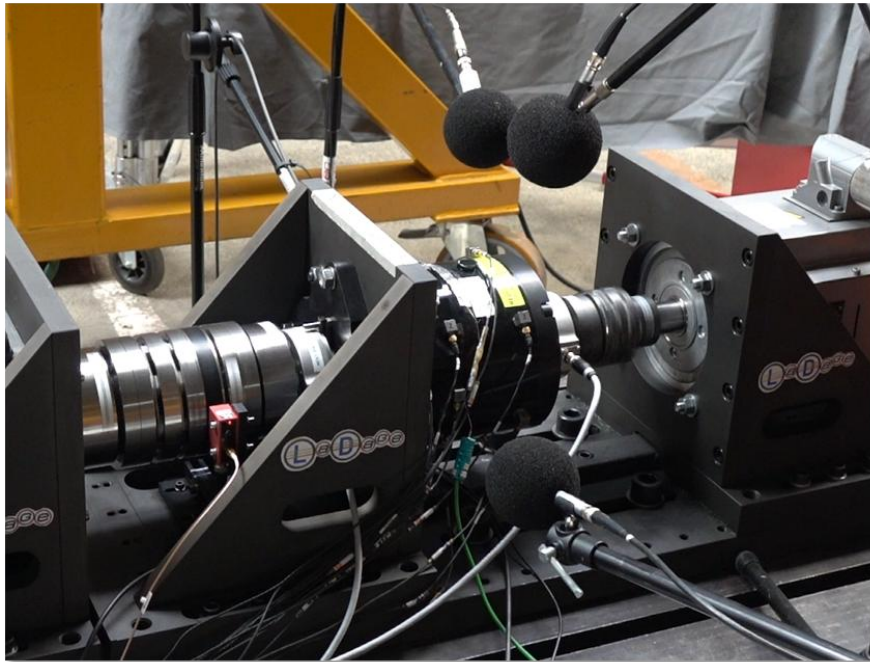
Control loop:

- Strategy?
- Stability?

Driveline Dynamic Behavior ⚡

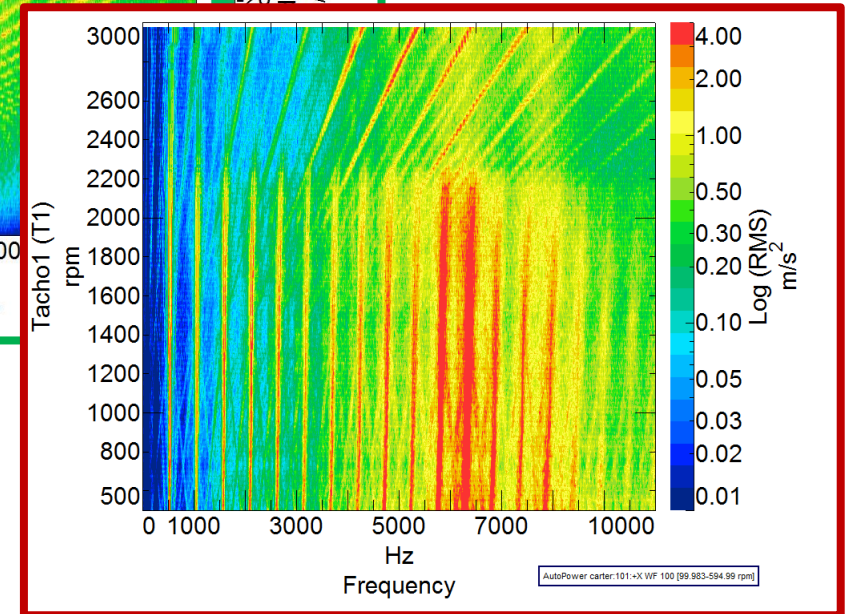
Example of Control Loop Effect on Test Bench

Same tested gearbox
Same test bench
Two separate tests



No issue.

Issue between
control loop and
driveline **torsion**
mode



Part 3

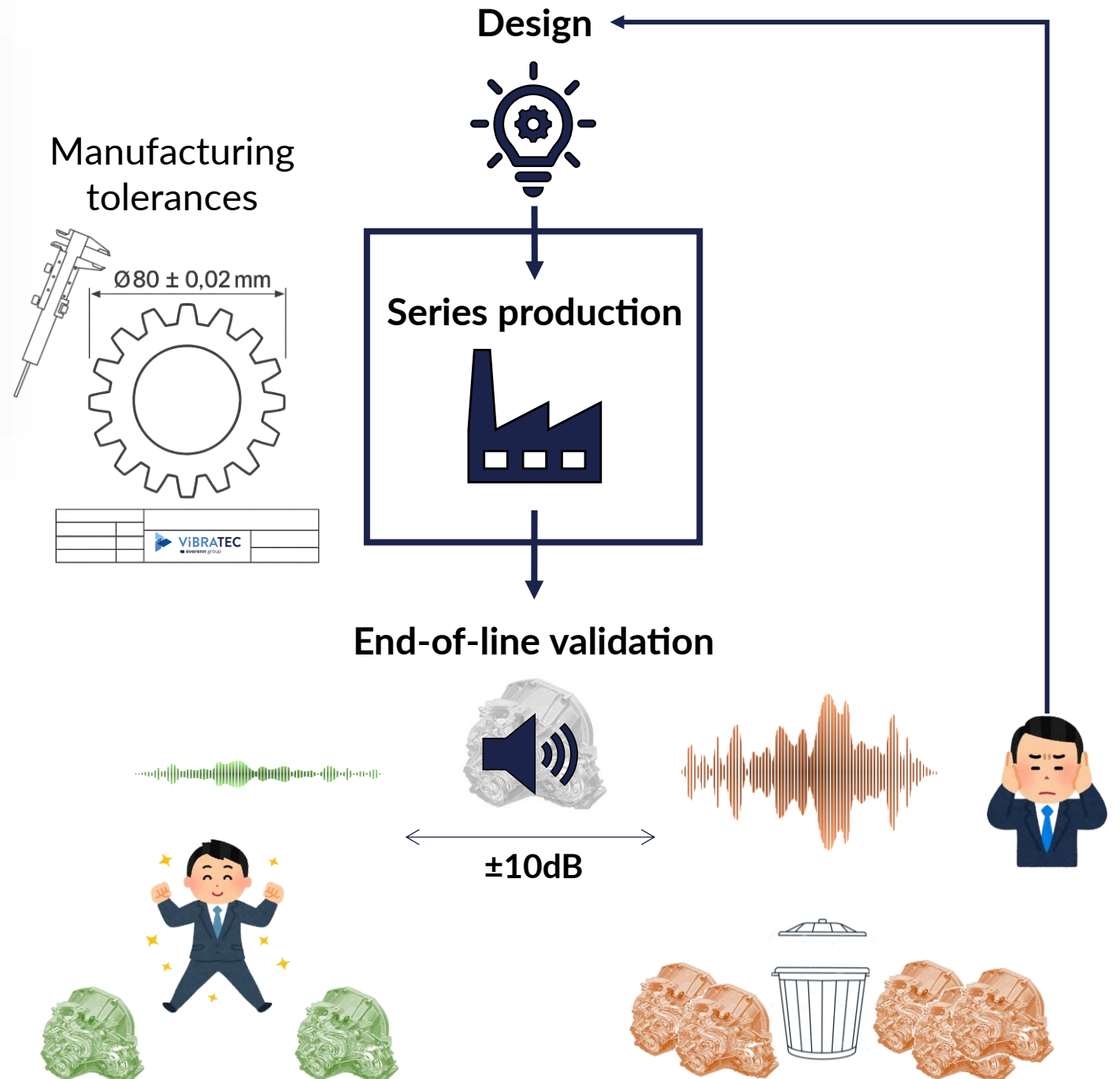
ROBUSTNESS AND SERIES PRODUCTION

Part 3: Robustness and Series production

“ If we stick to design specifications, everything should work just fine.

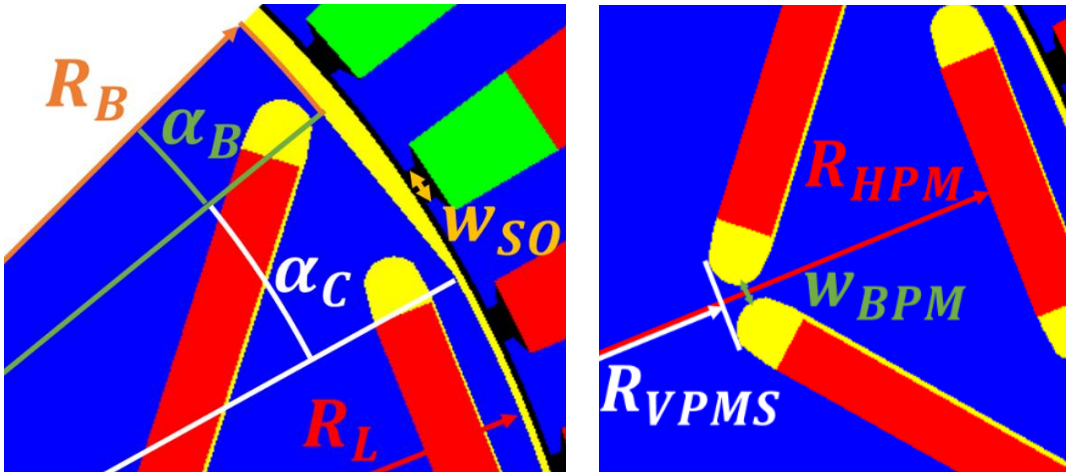
A few tenths of millimeter shouldn't cause trouble when manufacturing an electric motor  or a gearbox .

Well... in an ideal world, that could be true.”

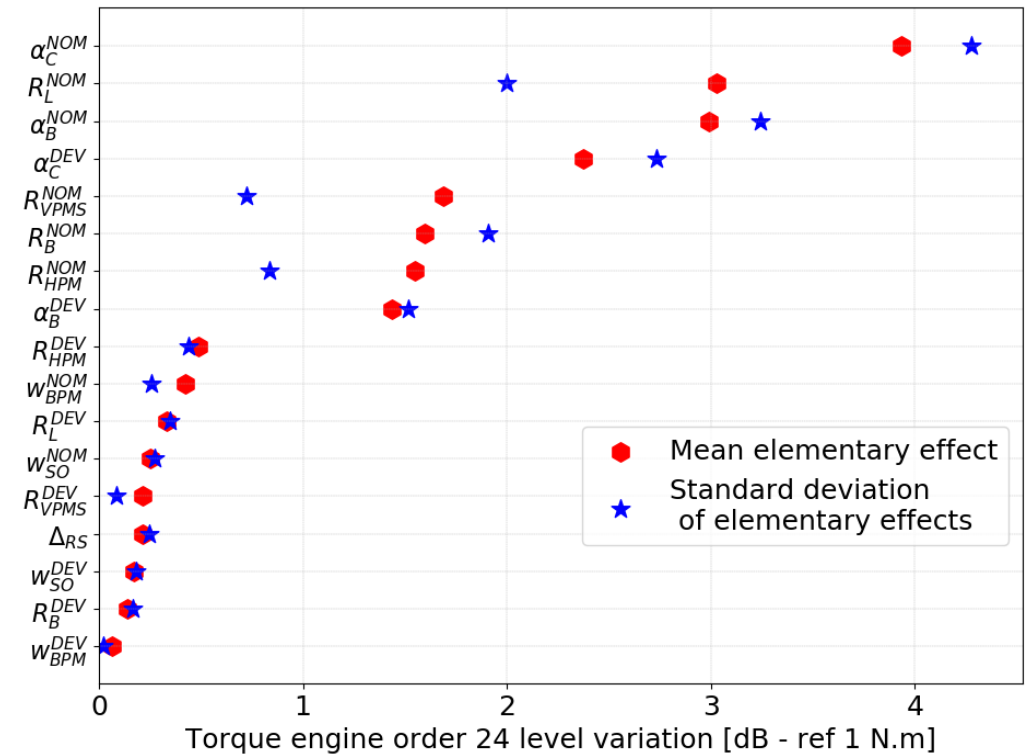


Sensitivity Analysis

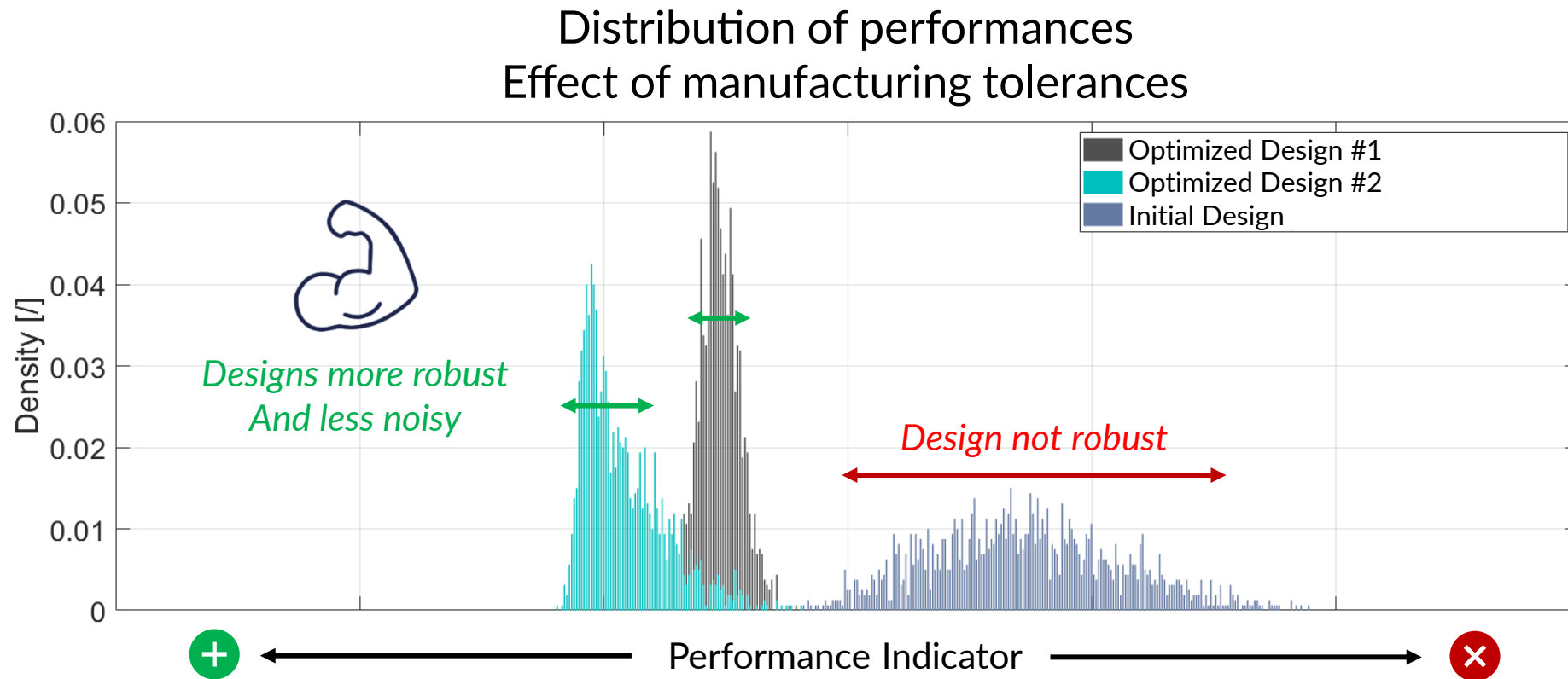
- Sensitivity analysis of design parameters
- Identification of most influent parameters
- Discrimination of **tolerance intervals**



Example of sensitivity analysis result



Tolerances, Uncertainties Dispersion of Performances

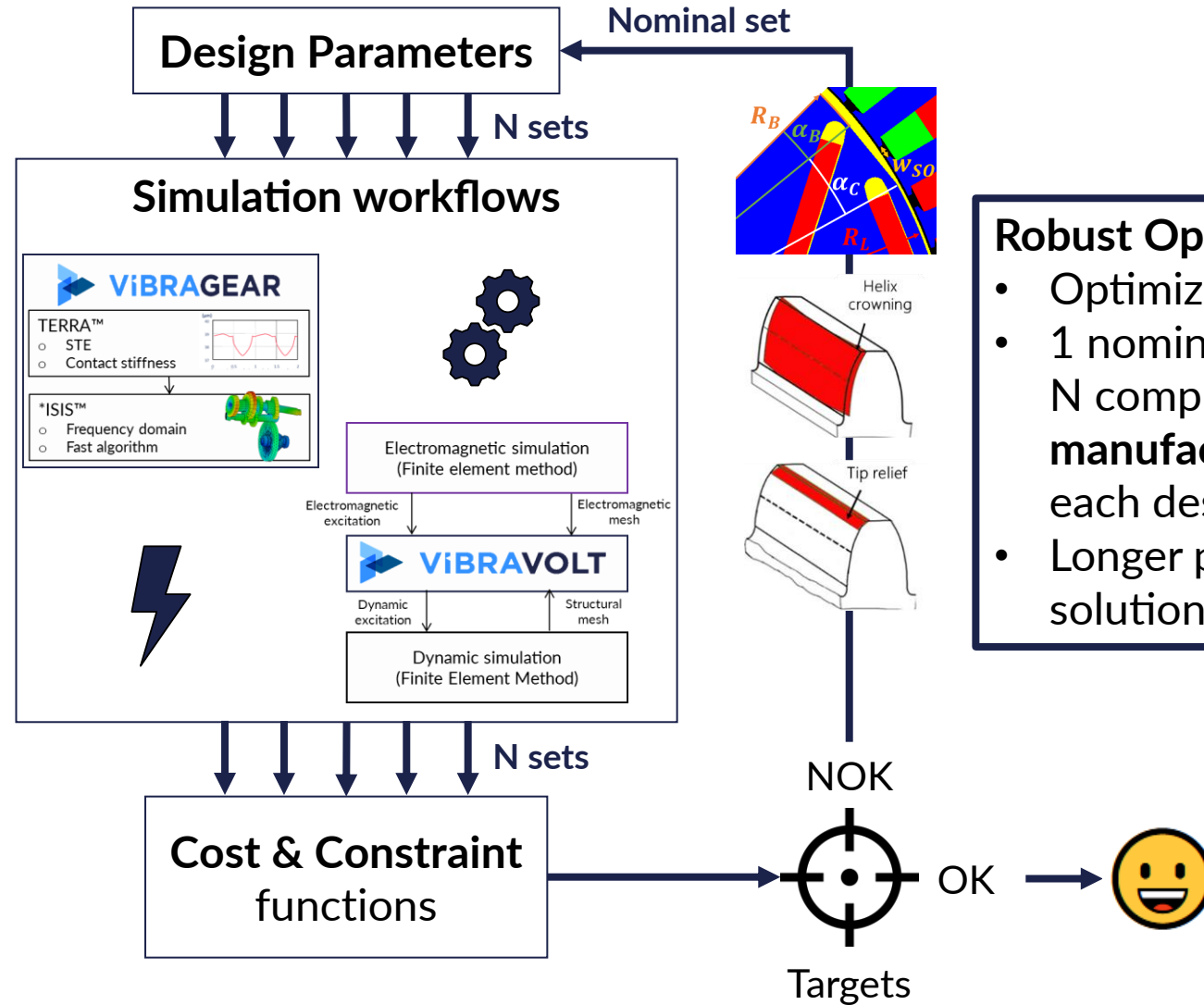


Note: Simulation result, 10 000 variations tested per design, considering tolerances intervals



Robustness and Series Production

Robust Optimization



Robust Optimization:

- Optimization process
- 1 nominal set of parameters = N computations, considering **manufacturing tolerances** for each design parameter.
- Longer process, but robust solution, if existing.

Training Programs

ON DEMAND

Training Programs

On demand



4,6
Average rating



160
Trainees per year



43
Client companies



45
*Sessions hosted at our
client's premises*

Qualiopi
processus certifié

 **RÉPUBLIQUE FRANÇAISE**
Catégorie Actions de formation

Among our training courses:

Experimental Modal Analysis

Signal Processing

Noise from E-motors

Gear Dynamics

E-Powertrain integration in vehicles

Transfer Path Analysis &
blocked forces measurements

AI for Acoustics and vibration

Training Programs

Catalog

<https://vibratec.fr/en/our-training-programs/>



Training Programs





Questions

Q&A

Contacts

Business Contacts

Speakers



Pascal BOUVET
Scientific Director
pascal.bouvet@vibratec.fr



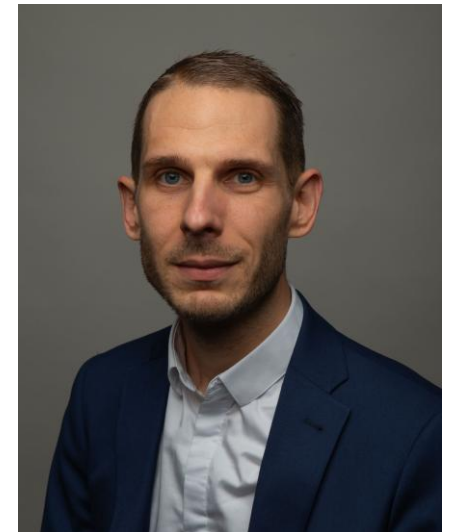
Adrien PARPINEL
Design Engineer
adrien.parpinel@vibratec.fr



Agnieszka RIVOLLET
Business Developer
Railway BU
agnieszka.rivollet@vibratec.fr



Fabien BOHN
Business Developer
Auto./Aero./
Defense/Space BU
fabien.bohn@vibratec.fr



William LECOMTE
Business Developer
Industry&Energy BU
william.lecomte@vibratec.fr





THANK YOU FOR YOUR ATTENTION

Contact us for more information

