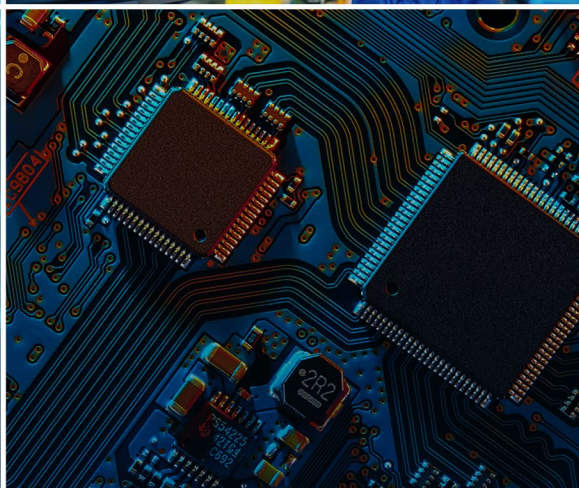
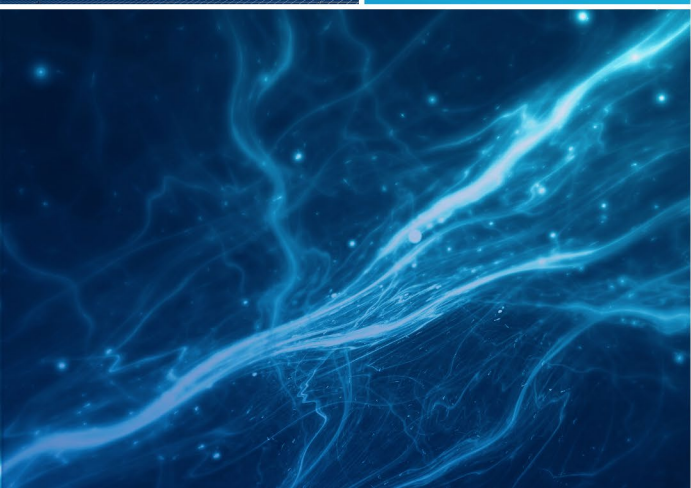


WEG EX QUALITY MANAGEMENT SYSTEM FOR ELECTRICAL MOTORS



2024 Annual Meetings
of the IECEX System

Driving efficiency and sustainability



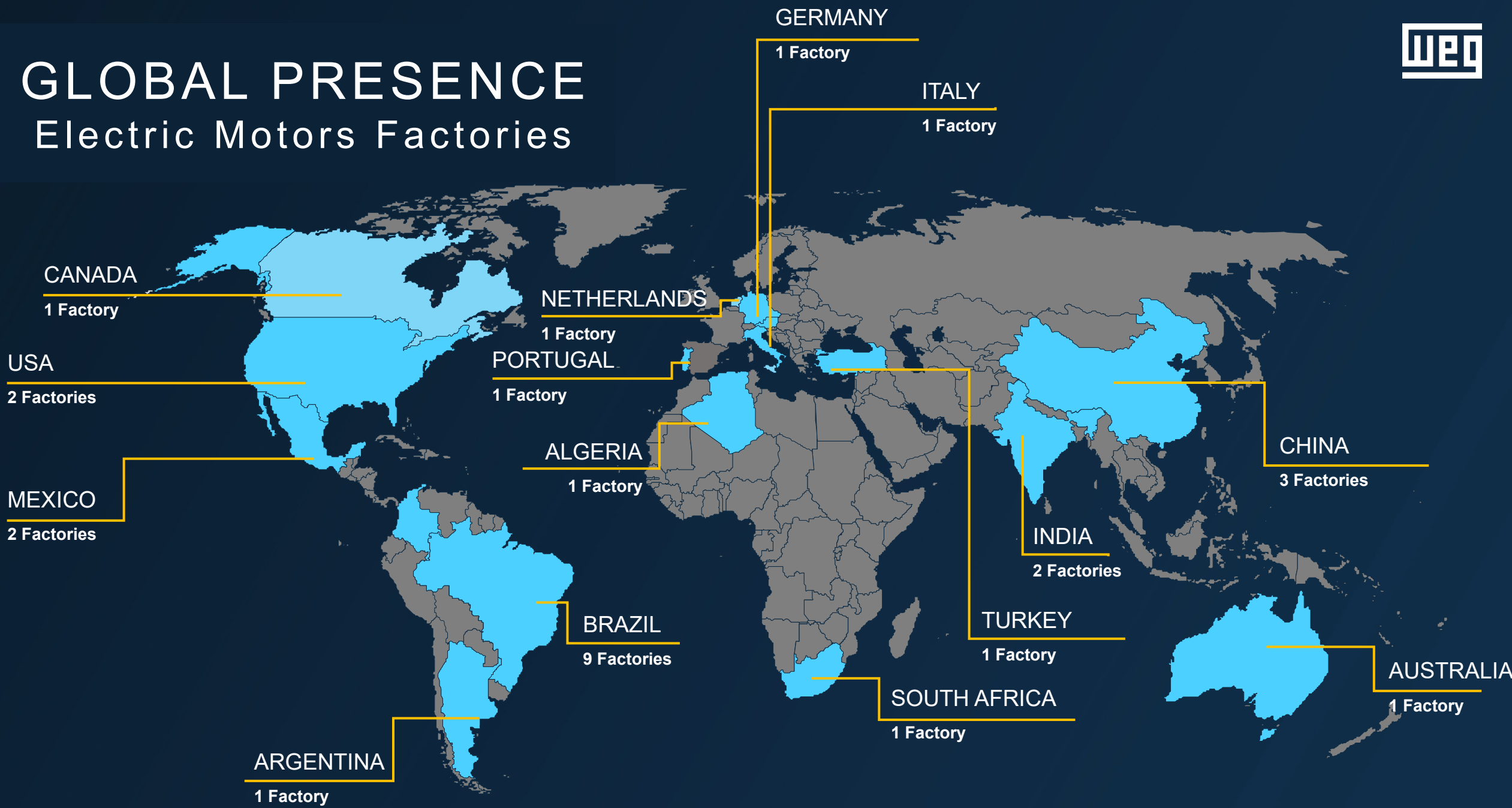
Christian Pinto Duarte

Head of Product Certification Systems Area
Quality Systems and Certification Dept
WEG Equipamentos Elétricos S.A. – Motors



GLOBAL PRESENCE

Electric Motors Factories



EX FACTORIES



WEG NUMBERS

OVER

40.000

employees
worldwide

OVER

4.700

engineers

OVER

60 mil

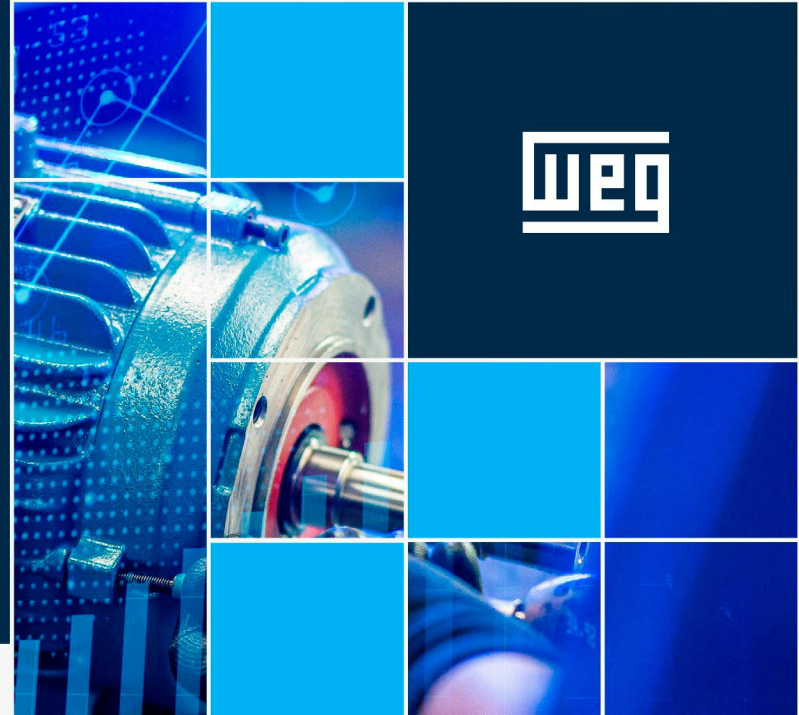
motors produced
per day

OVER

1 million m²

largest industrial plant for
electric motors in the world

(in Jaraguá do Sul / SC / Brazil)



10

in

7

in

4

Ex manufacturing
sites

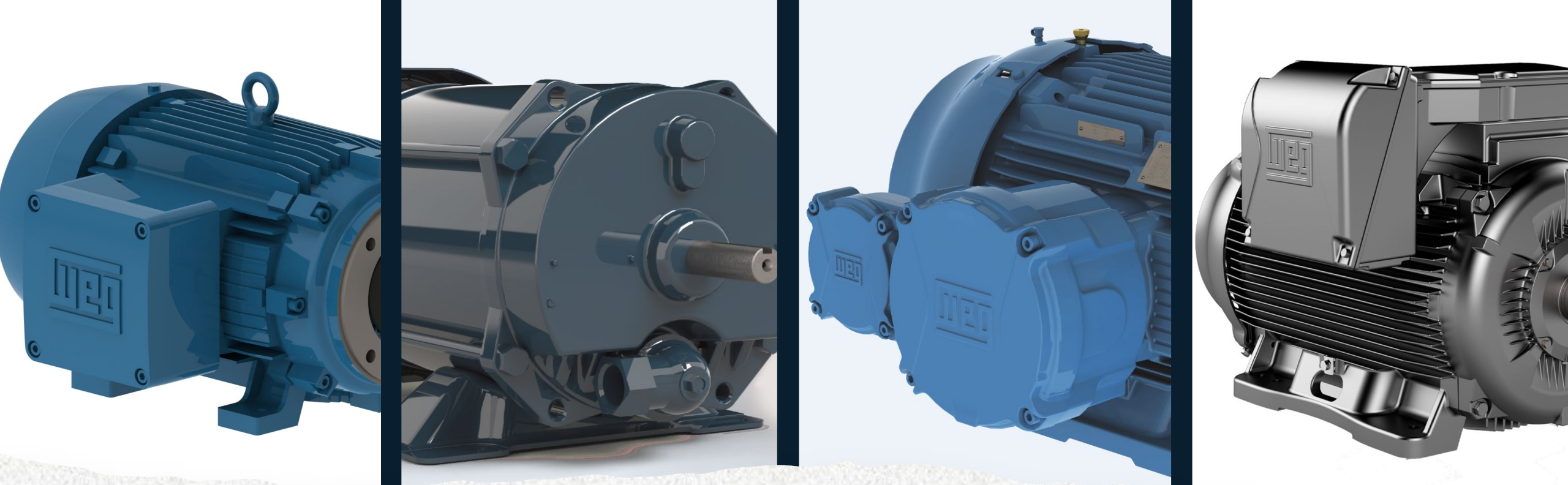
countries

continents

87.300 Ex motors produced in 2023

About 2000 employees
involved with Ex products





CERTIFICATION FOR EXPLOSIVE ATMOSPHERES

Important moment to WEG.
ExTR accepted in several certification programs speeding up the certifications



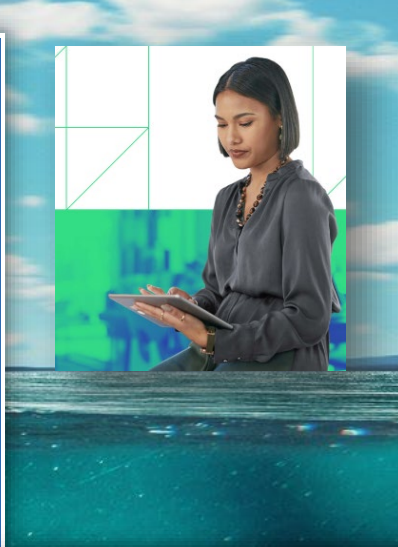
The importance of IECEx to WEG Business



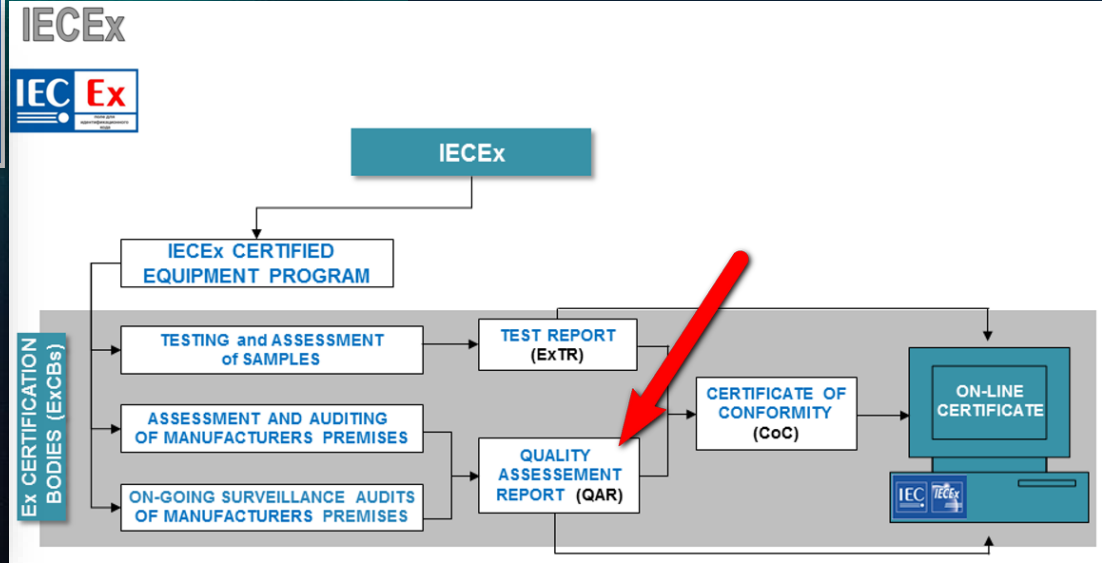
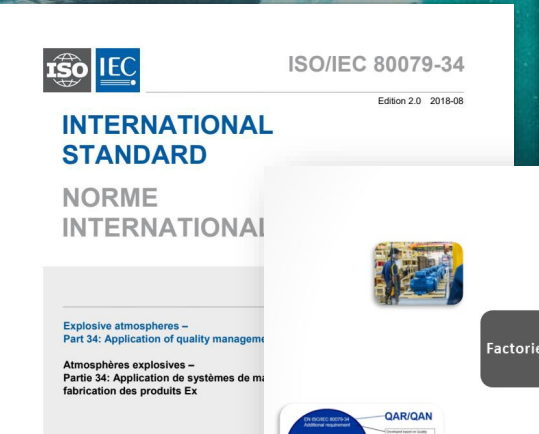
□ IECEx Certified lines, examples:



Ex Quality Management System



Customers can easily access the certificates...



...but society and customers can't see the giant effort spent by a manufacturer to obtain the certificates!

Ex Quality Management System



Six Sigma
Product and process improvements programs and statistic tools.



Planning Quality
Improvement Systems, Risks Mitigations and KPI Management



Quality Management System
Audit ISO system management, ISO systems implementation consulting and corporate documentation management



Product Compliance
Product compliance system for regulations, laws, guidelines and standards and product certification requirements



Measurement System Development
Solutions for measuring and inspecting products and processes



Product Certification
3rd part product certification management system for attending customers and market requirements



Electrical Testing
Performance testing laboratories and product development support



Metrology
Calibration and maintenance for measuring equipment.



WEG PRODUCTS ACCORDING TO REQUIREMENTS VOICE OF CUSTOMER

COMPLIANCE REQUIREMENTS CUSTOMER REQUEST

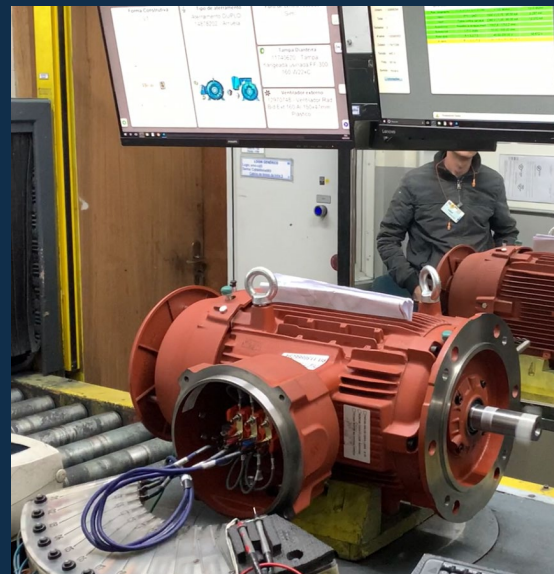
Ex Quality Management System



- ✓ Metrology – calibration equipment
- ✓ Traceability – integration with ERP SAP
- ✓ Inspection and records during process
- ✓ Audit: Internal, External and customer
- ✓ Certification / Compliance Area
- ✓ Qualification of Suppliers
- ✓ Procedure of process and product changes
- ✓ Professional qualification involved with Ex Products
- ✓ Six Sigma qualification – Yellow, Green and Black Belt
- ✓ Authorized Repair Shop Network management

Ex Quality Management System

- TRACEABILITY – integration with ERP SAP
Online inspections and records during the process
- INSPECTION
Dedicated area to inspect Ex Components
Certified Product Inspection Plan - Exclusive Standards
Mandatory activity in the SAP ERP, Product is blocked if the activity is not carried out



Ex Quality Management System



✓ Metrology – equipment calibration

MAIN SERVICES

- ✓ Calibration.
- ✓ Electrical and mechanical equipment repair.
- ✓ Gauge design.
- ✓ Instrument purchase specification .
- ✓ Geometric test on machine tools.
- ✓ Special measurements.

METROLOGY NUMBERS

- ✓ Accreditation according to ISO/IEC 17025.
- ✓ Over 25.000 equipment managed.
- ✓ U\$ 29 million in asset under management.
- ✓ 97% calibrations performed internally.
- ✓ U\$ 1.2 million in calibration standards.
- ✓ 200 service orders per day.

METROLOGY



EX QUALITY MANAGEMENT SYSTEM



1

AUDIT

- Internal
- External
- Customer



2

CERTIFICATION AREA COMPLIANCE AREA

- Checking if the product complies with applicable standards and regulations
- Support the whole certification process
- Maintain updated product certificates
- Ensure products continue to meet certificates



3

QUALIFICATION OF SUPPLIERS

- Evaluate suppliers based on the product quality and standards
- Conduct audits at supplier facilities
- Collaborate with suppliers to improve their processes and products



EX QUALITY MANAGEMENT SYSTEM



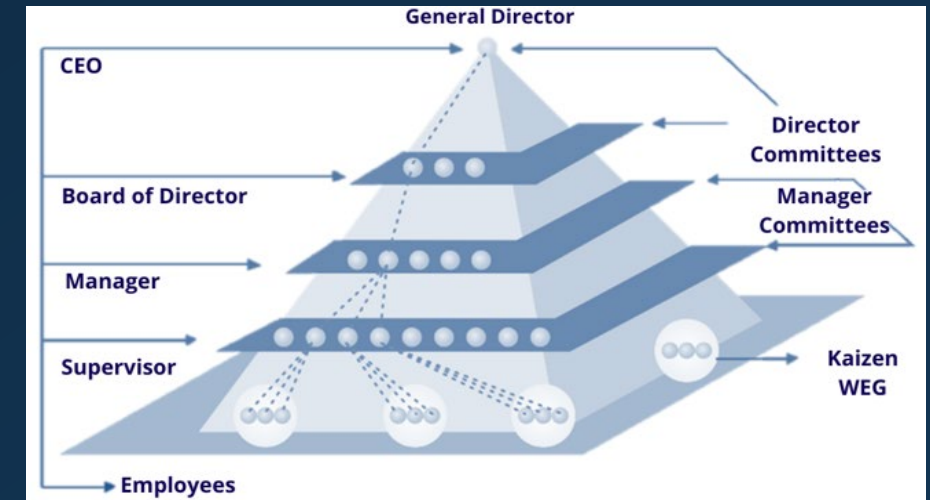
MANAGEMENT OF PRODUCT AND PROCESS CHANGES

MANAGEMENT PRODUCT AND PROCESS CHANGES

- Participative management
- PRODUCT or PROCESS changes must have the internal approval of the pertinent COMMITTEE:

COMMITTEE: multidisciplinary group composed by managers who evaluate and deliberate changes.

- For each type proposed change there a specific committee to evaluated it.
- For Ex products, WEG use the following Committee;
 - Product Development Committee;
 - Industrial Committee;
 - Quality Committee.



EX QUALITY MANAGEMENT SYSTEM



LINE DEVELOPMENT USING 6SIGMA METHODOLOGY

- Dedicated engineers with 6sigma formation to develop the product line;
- Internal training for employees in 6sigma methodology;
- Internal portal developed to assist in statistical evaluations.



AUTHORIZED REPAIR SHOP NETWORK MANAGEMENT

Strategic Differential for our customers

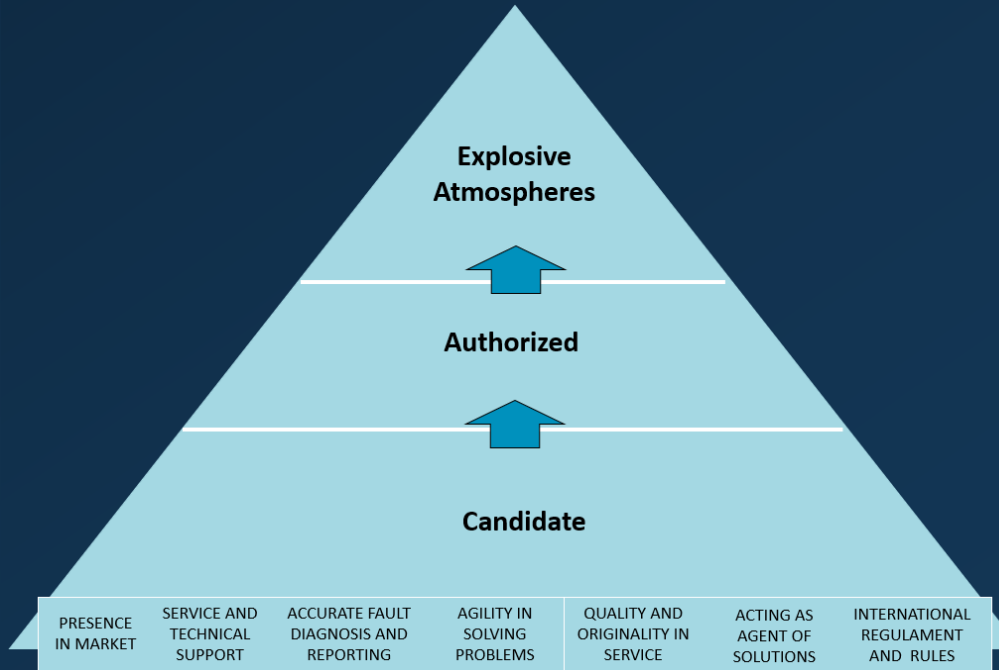
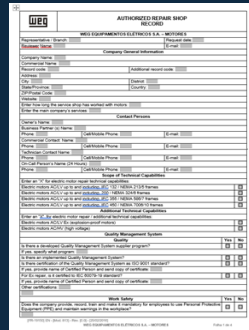
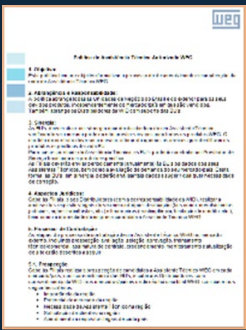
Policy

Standards and Forms

Manual

Training Program

Accreditation Process



KPI management



734 Repair Shops in the world

186 Repair Shops in the world

Ex Quality Management System



Professional qualification involved with Ex Products

Timeline of the HR development



1. On the job training

Activities related to the job
Ex Components or Products



3. Improvement Courses

Qualification for Engineers
Six Sigma Training
Qualification about IA
Internal Courses



5. Leadership Development

-WEG Leadership Academy (e-learning)
-Supervisors Training
-Open courses for managers and executives



2. Professional Qualification

Learning Paths
QPOP –training for operators
– **Ex Components or Products.**



4. Scholarship Program

Languages
Undergraduate and technical
Postgraduate

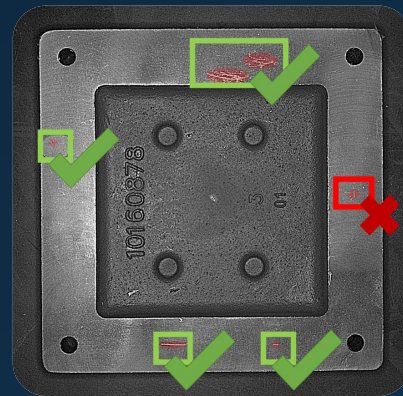
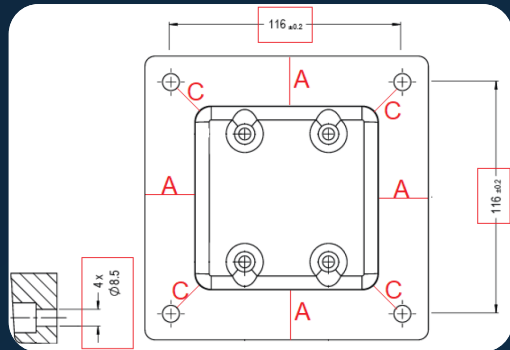


Technology to Quality Assurance of Ex products

Problem: The subjectivity of manual inspections can prove to be a risk for Quality Control;

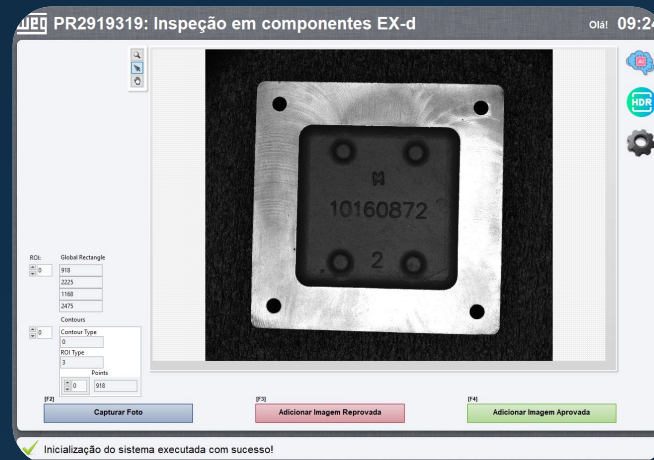
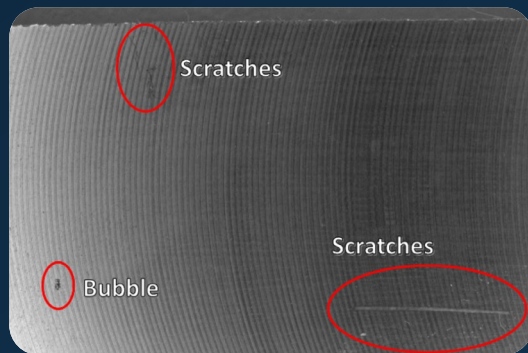
Inspection by sampling, there is a risk of passing parts with problems

Scratches, bubbles and dimensional variations can compromise the safety of explosion-proof motors.



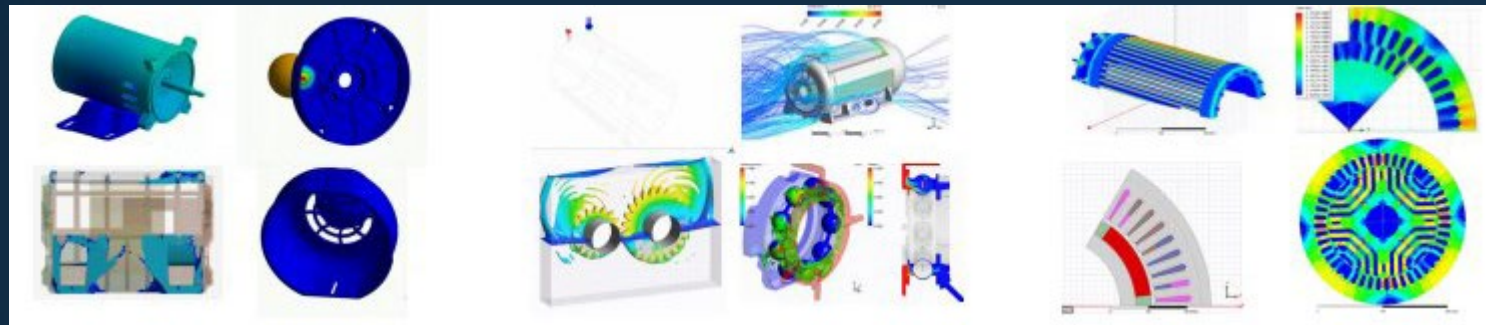
SOLUTION: Machine Vision Applied to Ex d parts inspection

Under development:

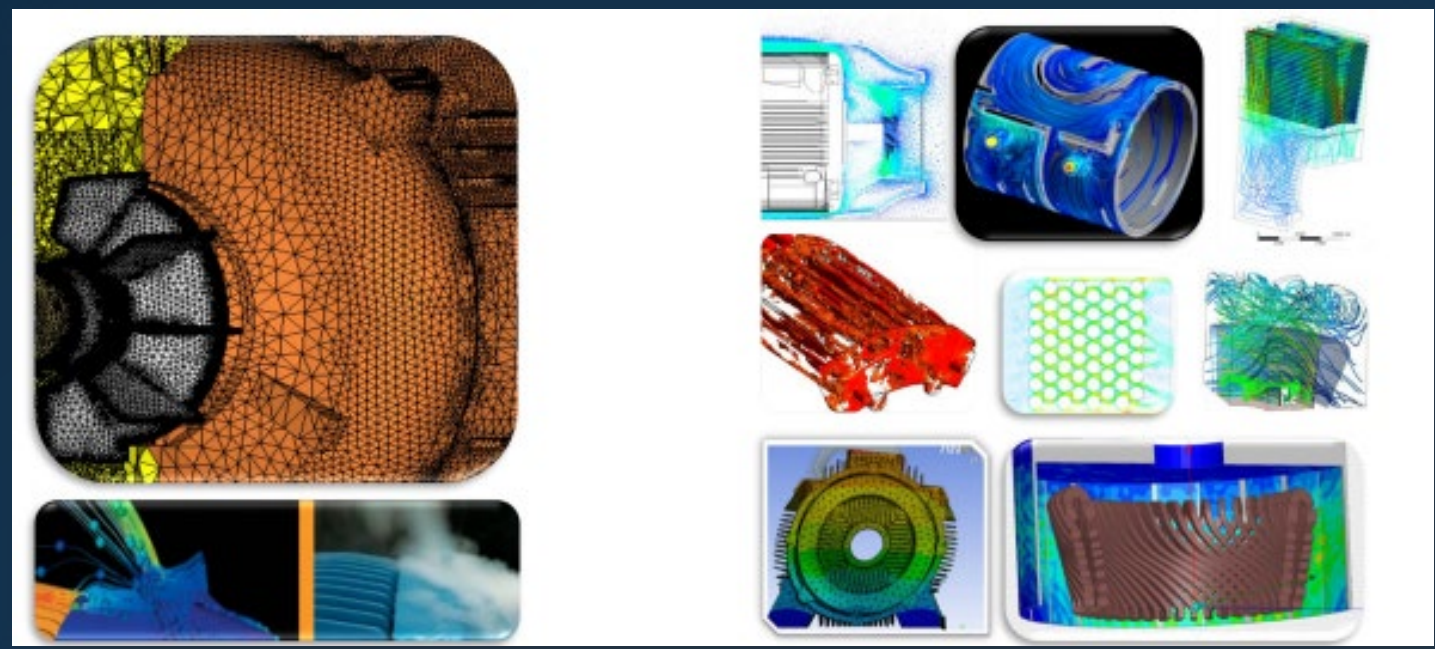


Virtual prototypes - Simulation

In 2005 it was 4/month



In 2012 was 8.000/month

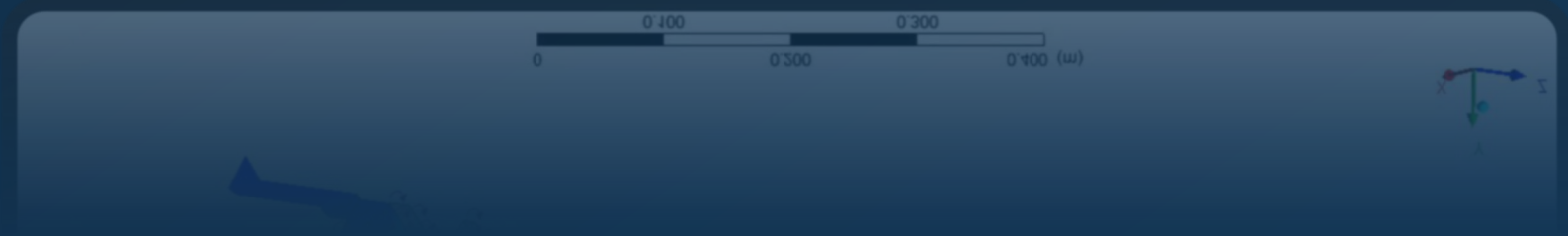
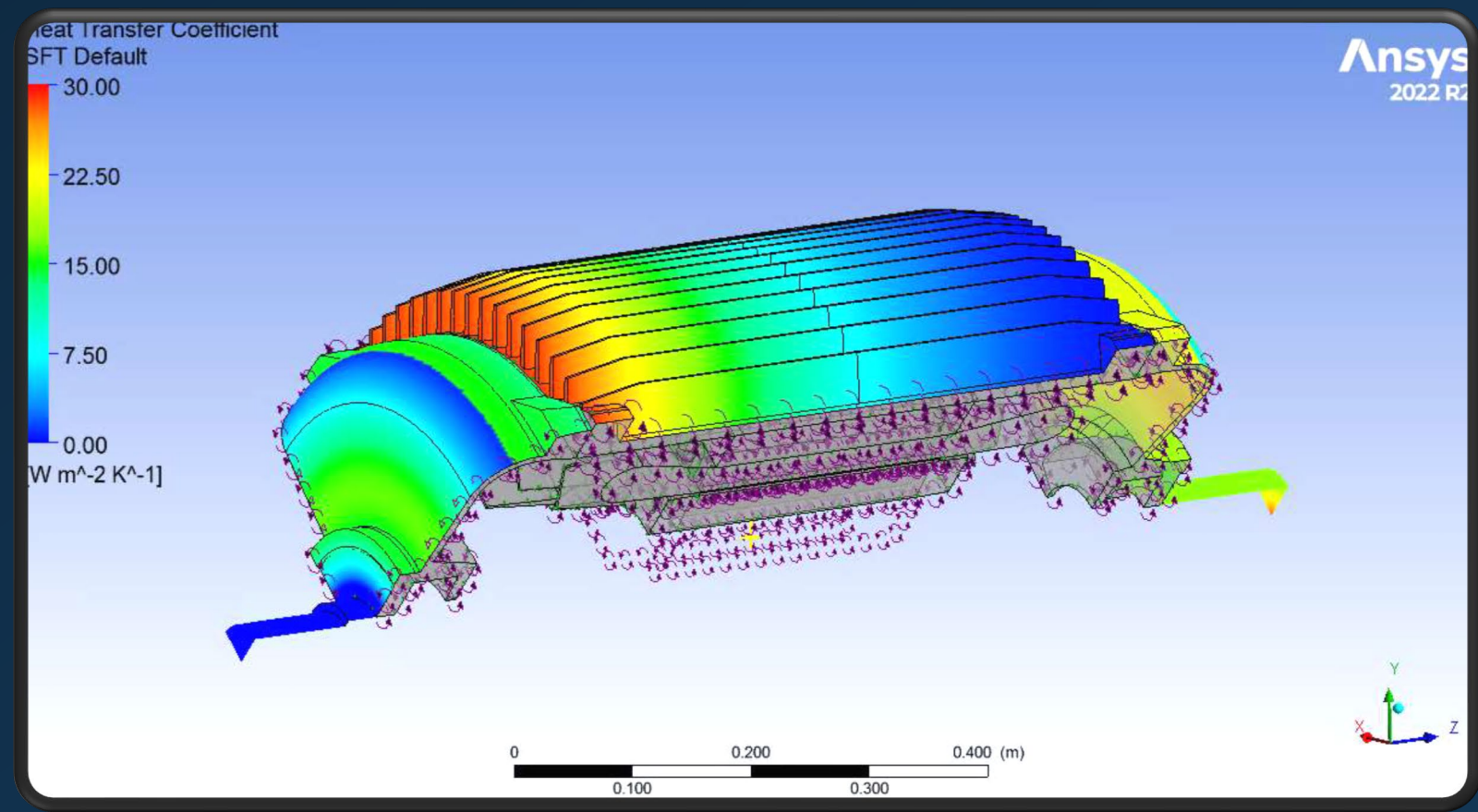


2023... 30.000/month

Numeric Simulation to Complement Laboratory Tests

The virtual simulation of experiments will bring significant gains, such as:

- identifying problems not possible through tests and experiments;
- increasing product reliability and safety;
- reducing the time to marketing; and
- incentive technological evolution.



Certification Process Timeframe



Products of the 4.0 industry



2024 IECEX System Meeting



WEG Participants



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Certifications
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supplied by WEG



THANK YOU!

Driving efficiency and sustainability

