

INGEROP – BIM & CIM



Field of activities of INGEROP.

Town planning



Infrastructures

CIM has been developed over the last 25 years for complex structures.



Water & Environment



Buildings

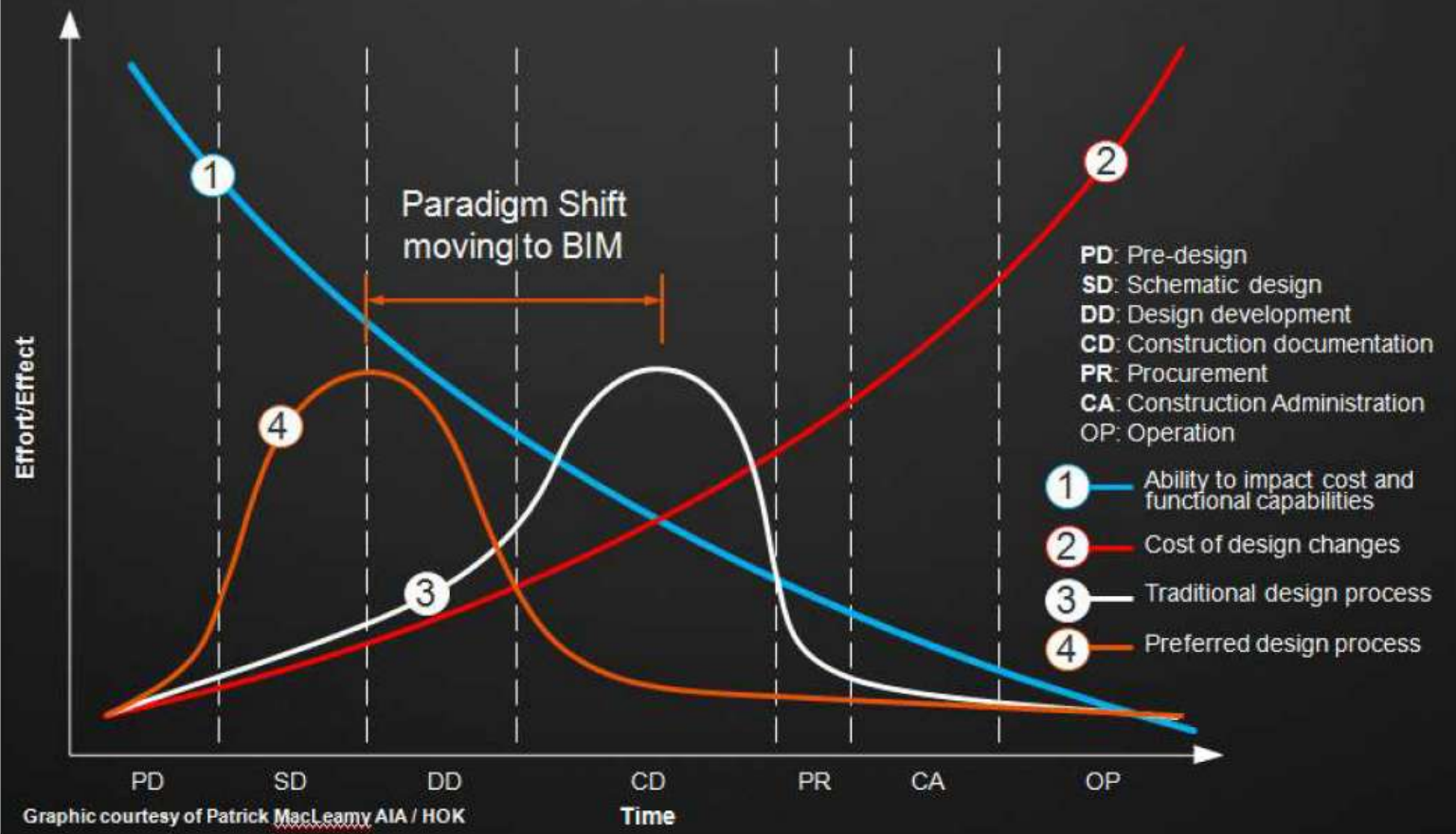


Energy & Industry

BIM is mainly used for buildings (Museum, hospitals...) and industrial facilities.

BIM / CIM Interest.

Evolution toward a new design process



The earliest a default is detected, the most efficient the correction is.

3D numerical models allow early detection of defaults.

Building Information Modelling is especially utilised in 2 of the INGEROP Departments:
 Building Department and Industry & Energy Department.

These complex projects need an optimised **control** and an efficient **share** of the information.

The tools to be implemented in order to reach these targets will in addition allow a proper risk control while improving productivity (thus competitiveness).

INGEROP is involved in a French National Project named MINnD (Interoperable Information Model for Sustainable Infrastructures). The goal is to define standardised informatics norms and tools in order to reach the above mentioned targets.





工業建造物

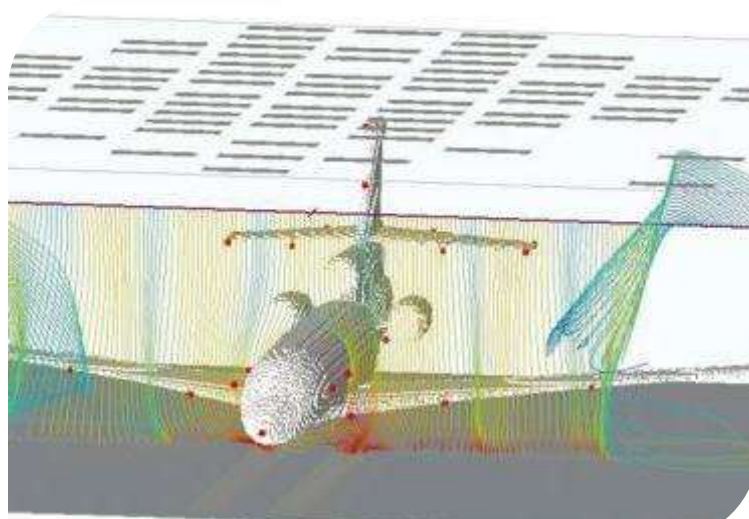
- 原子力
- 航空機
- 電話会社とデータセンター
- 農業関連産業
- 化学
- 薬学
- 自動車産業
- 防衛
- 建造物と工業プロセス



データセンター-Data center Almerys (63)(フランス)



廃棄物再処理場 - Villejuste (91)(フランス)



Dassault Aviation -のキャビン塗装シュミレーション- Mérignac (33)(フランス)



CEA - Installation DIADEM - Marcoule(フランス)



民間と公共事業:

- 病院
- 教育・研究機関
- スポーツ・文化施設
- 商業・居住・工業施設
- ショッピングモール



La Canopée – Paris(フランス)



Cité sanitaire – Saint-Nazaire(フランス)



マルセイユ港のテラス (フランス)



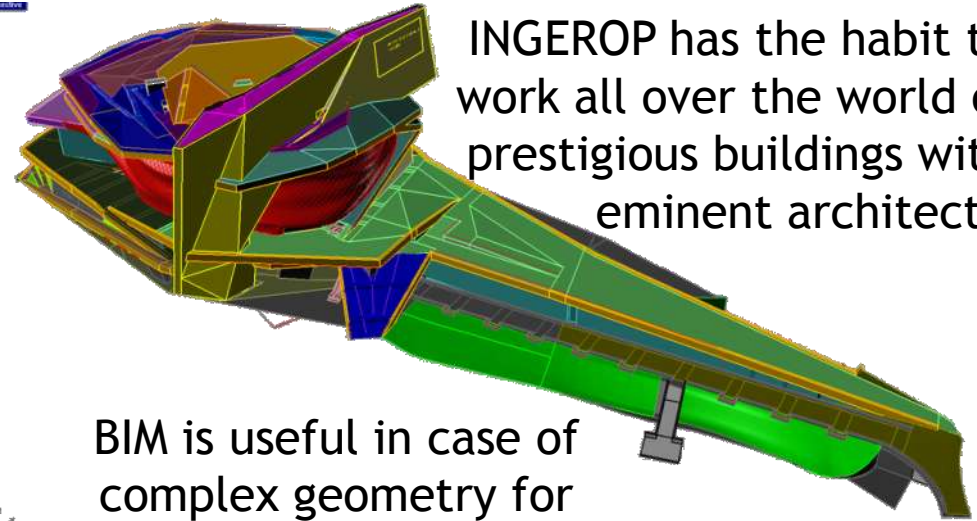
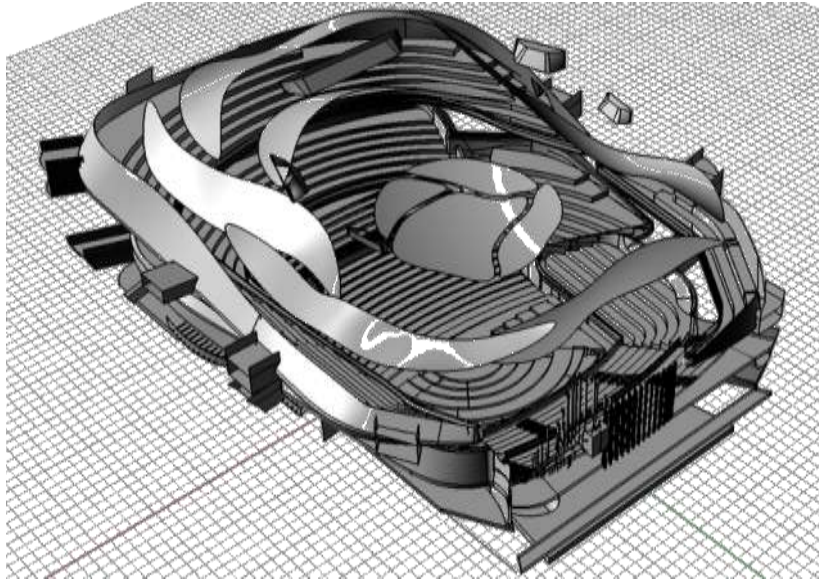
トゥーロンのスポーツ複合施設 Léo Lagrange (フランス)



**約60カ国
で活動**

BIM

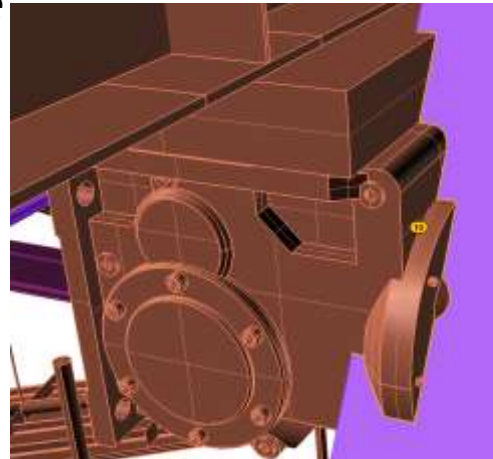
Paris Philharmonic



INGEROP has the habit to work all over the world on prestigious buildings with eminent architects.

BIM is useful in case of complex geometry for providing a successful interface with the architect.

Technological details are mandatory for the geometrical dimensions check as well as for the structural design.

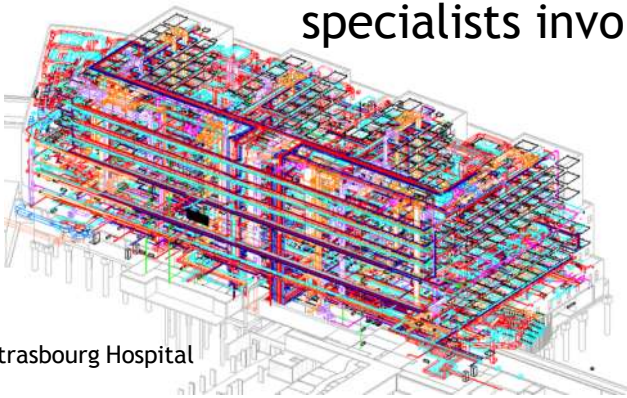


Architect: Jean Nouvel



BIM

BIM is a convenient tool allowing good coordination between the different specialists involved on a project.



Strasbourg Hospital



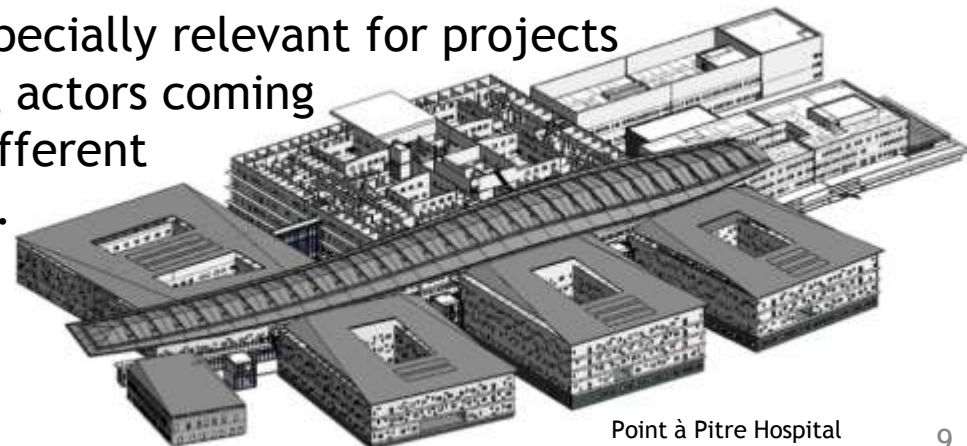
New Geneva Airport

Even if INGEROP is usually able to mobilise relevant experts in all the fields of activity, it is mandatory to be familiar with BIM tools.

This is especially relevant for projects involving actors coming from different countries.



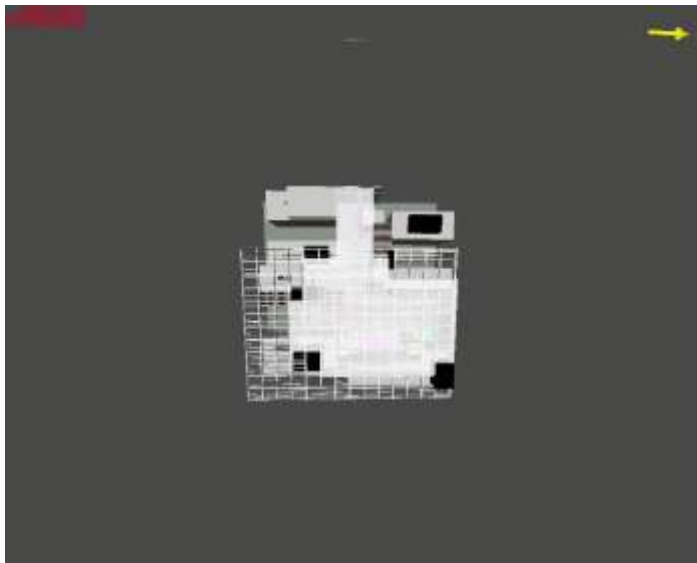
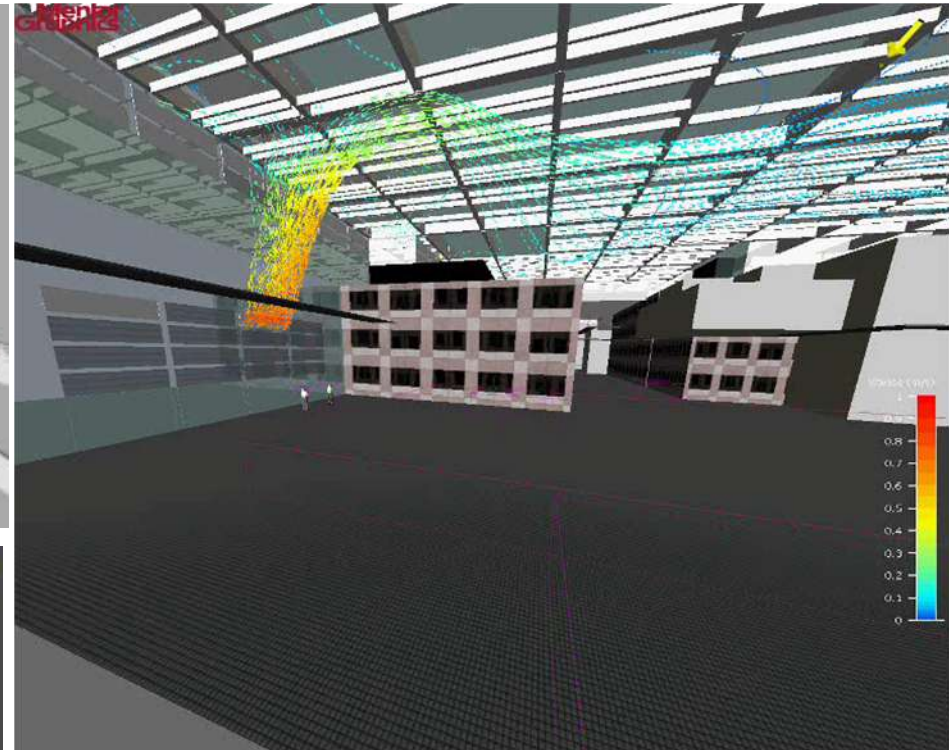
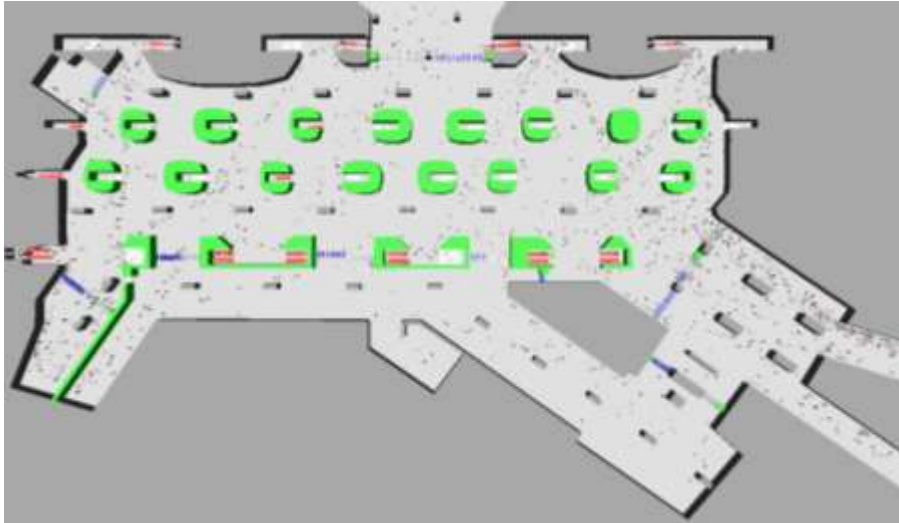
New Paris Courthouse



Point à Pitre Hospital



Various applications of numerical models.



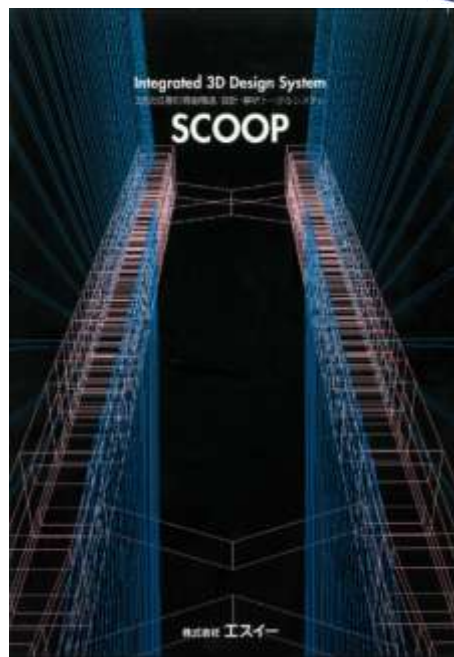
The 3D numerical models have various utilities:

Synthesis, geometry, visual aspect...

...but also : air-conditioning dimensioning, passenger flow simulation, step by step structural analysis...

An in-house 3D calculation program taking into account the construction steps has been developed for the last 40 years in INGEROP.

Since 1992, this program has been improved and adapted to the Japanese standard together with ININGÉROSEC



3次元任意形骨組構造
設計・解析トータルシステム。

「SCOOP」は、橋梁および一般構造物の3次元・高設計解析トータルシステムです。設計・シミュレーション、本格的な任意形構造体について、施工段階を考慮した解析が可能です。特に、PC鋼管橋や桁梁も架設、貫通、架設など、各種の架設方法によるツングラット構造体について、架設順序から構造体まで統一した設計を行うことができます。設計情報、架設情報、応答シミュレーション、自由空間計算からBIM情報も行うことができます。200年・300年の構造体、PCケーブルの配線図やコンピューターグラフィックスを描くことができます。

通用型構造形式

- PC 鋼 自由形構造
- シンチレーン工法によるPC連続構造
- 押し出し工法によるPC連続構造
- 引張工法によるPC連続構造
- 架設上の架設工法を組み合わせたPC連続構造
- ケーブル橋
- など

ポンテラ橋梁



広範囲な分野への、高度な適用。



(株)エスイーは、ソフト開発部に"SC00P"を導入し、構造物設計のあらゆるニーズにお応えする体制を確立しました。基本設計に基づく、施工方法にマッチした実施設計をはじめ、"SC00P"の得意とする複合構造斜張橋などの分野は勿論、任意の構造形式の橋梁の検討段階から、詳細な構造解析にいたるまで、各ステップでの計算書、図面、コンピュータグラフィックスなど、さまざまな設計図書類を出力提示し、常に設計支援いたします。

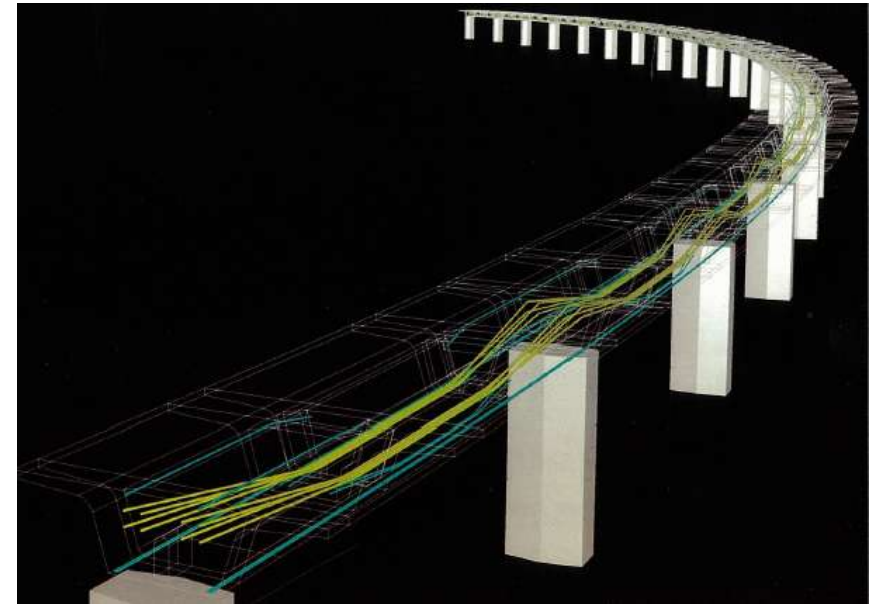


CIM

Interest of CIM.

For complex structures dimensioning, the 3D step by step calculation is accurate, safer, easier to check and cheaper.

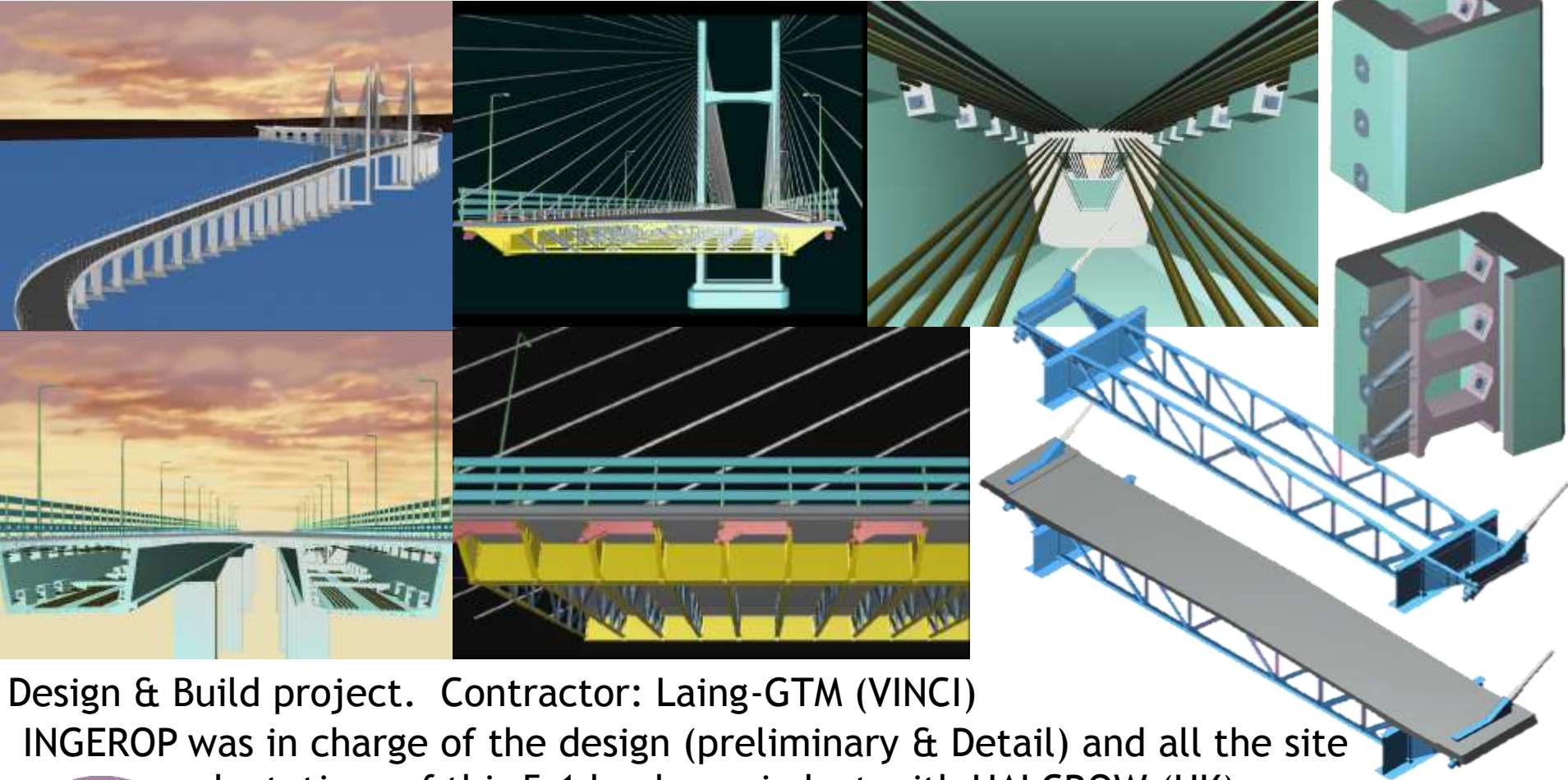
- Accurate and safer: the 3D stress redistribution cannot be properly addressed with 2D approach. The shear analysis and torsional analysis will be performed on an accurate and proper manner.
- Easier to check: the 3D models allow the check of geometrical interactions, various modelling mistakes... The consequences of these mistakes will be of less importance because they will be corrected on an early stage.
- Cheaper: Step by step analysis will allow a comparative dimensioning of different erection methodologies. A structure analysed with 3D computation will be more optimised than with a 2D calculation + fixed increase of stresses.
- The dynamic analysis can be performed in 3D for each construction step.



3D structural models in INGEROP,
a few examples of projects.

CIM

2nd Severn crossing (England - Wales), Designed 1990-1995



Design & Build project. Contractor: Laing-GTM (VINCI)
INGEROP was in charge of the design (preliminary & Detail) and all the site adaptations of this 5,1 km long viaduct with HALCROW (UK).



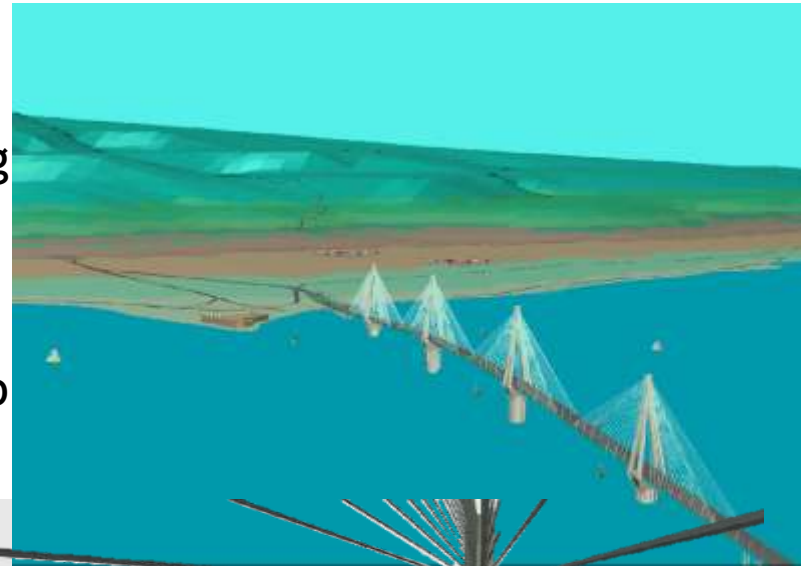
3D structural models in INGEROP,
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CIM

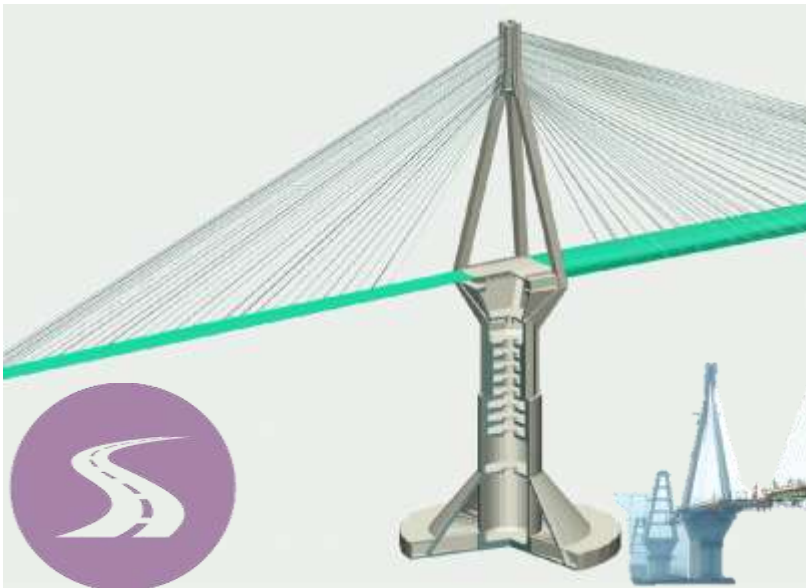
Rion - Antirion Bridge (Greece), Designed 1990-2004. VINCI Design & Build project



2252 m long
viaduct with
three 560m long
spans.
Superficial
foundations
under 63m deep
water.



The bridge is located in an extreme seismic area.

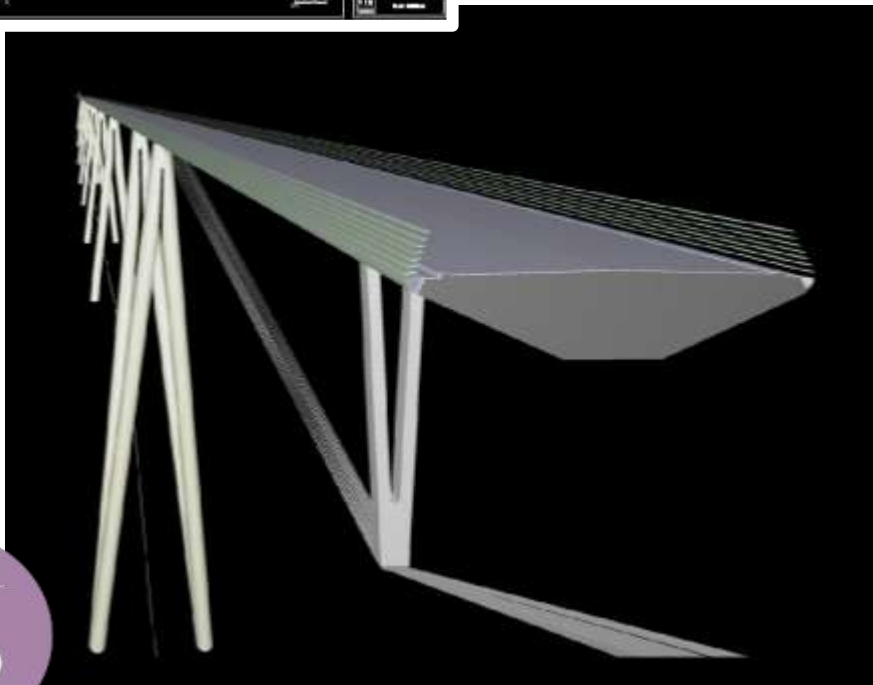
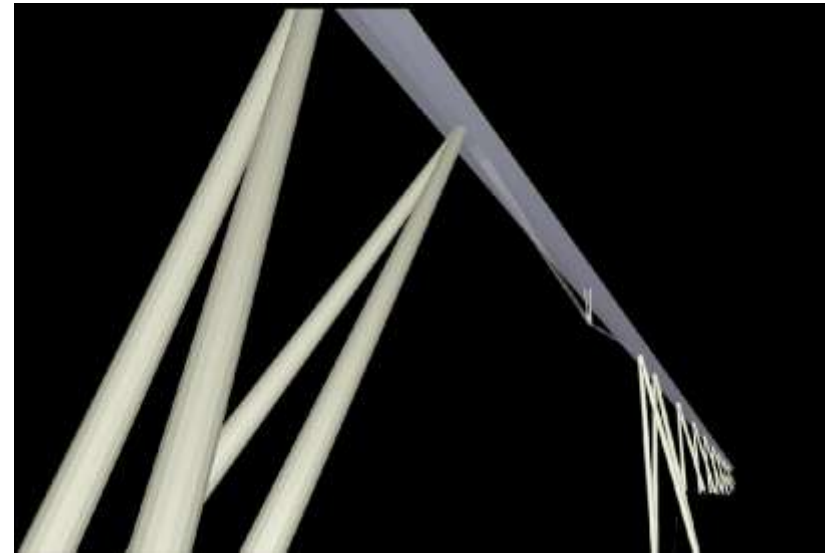


3D structural models in INGEROP, a few examples of projects.

CIM

Millau viaduct.
INGEROP tender
solution.

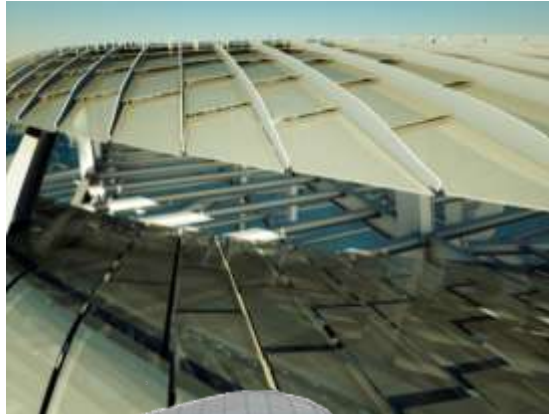
External prestress
located under the
deck level.



3D structural models in INGEROP, a few examples of projects.

BIM... and CIM

“La CANOPEE”



Five level Railway interchange station
in the centre of Paris.



3D Structural Model
taking into account the
construction steps.

The numerical model allows optimised interface with the
architect in order to define the complex shape of the roof.



100m
span roof
designed
with steel
and glass.

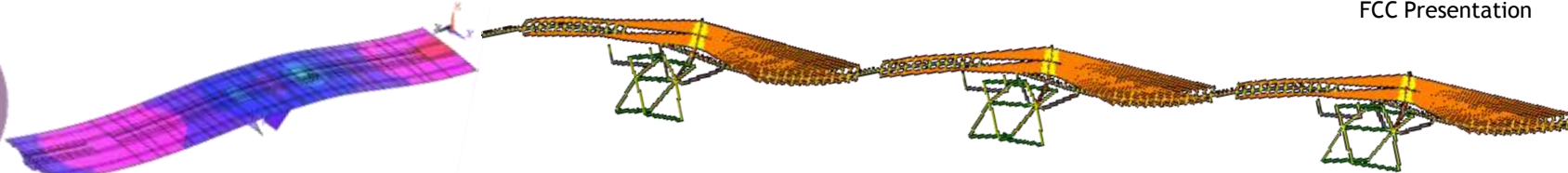


CIM

The “New Europe Bridge” (Bulgaria - Romania). Design & Build Project

1791m long
prestressed
concrete
viaduct.

The
navigable
part of the
Danube river
is crossed
with three
180m long
extradosed
spans.





Design &
Build

Nuclear
waste
storage
facility.

