

# IUT GIM Eole project



IUT Louis Pasteur trains bachelor-level students.

# IUT GIM Eole project

Student choose from 4 specialities:

- **GB:** *Bioengineering*
- **GEA:** *Business and Administrative Management*
- **GIM:** *Industrial Engineering and Maintenance*
- **MP:** *Physical Measurement*

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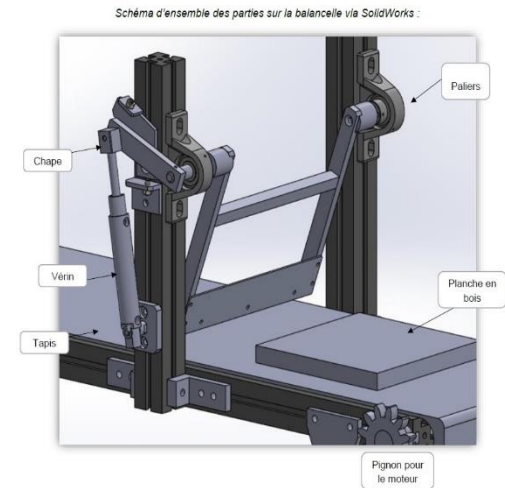
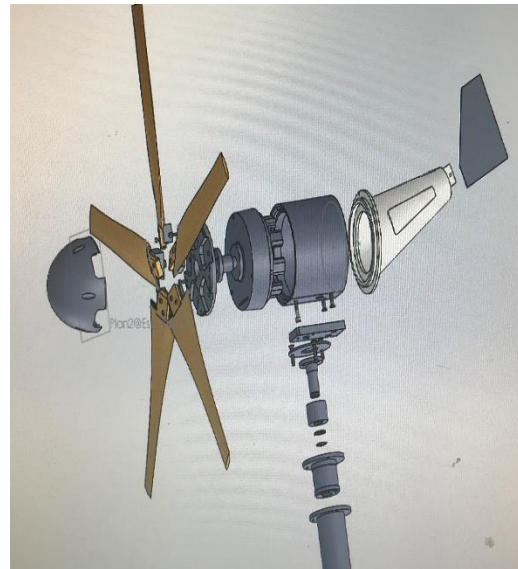
The Industrial and Maintenance Engineering departement trains students in:

- *Industrial Engineering*
- *Industrial Maintenance*

A wide variety of projects constitute an important part of the course.

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Some student projects...



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Objectives of the GIM project :

- *Respect specifications*
- *Plan the project: Gantt chart, etc...*
- *Acquire technical skills*

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- *Take relevant initiatives*
- *Learn to be more independant*
- *Manage a budget*
- *Communicate within the group but also with one's reference teacher.*

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For several years a unifying theme has been chosen :

## ***GIM Eole project***

*Why?*

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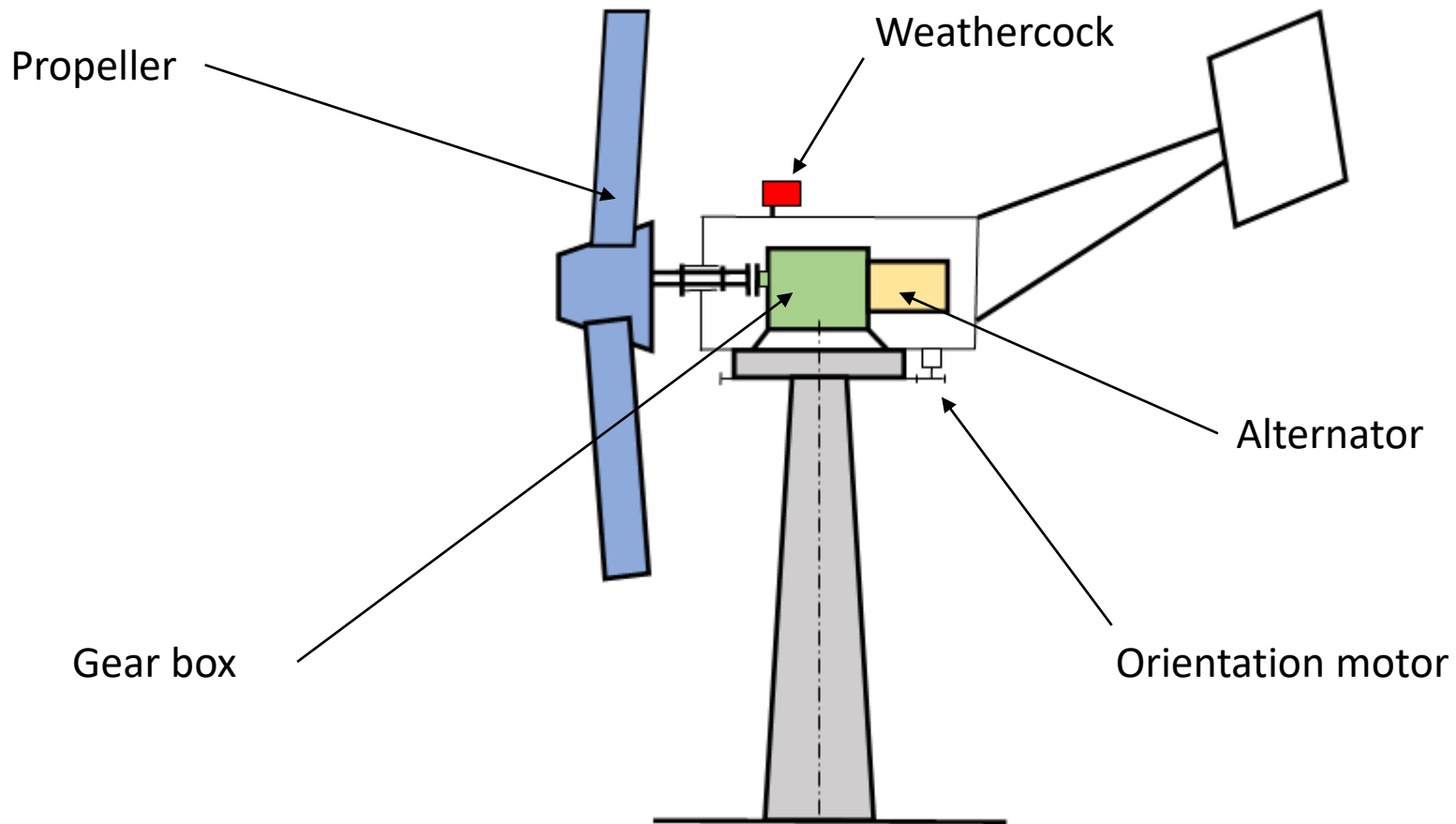
For several reasons:

- *A wind turbine is a pluri-technical system which covers all the specialities the students will encounter during their training.*
- *Energy and ecology problems being current, it seems important for students in Industrial Engineering to be aware of them.*



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## Wind turbine: a multi-technical system



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Different areas of the GIM course can be found in this project:

- ***Mechanical construction:*** *design of different mechanical elements / structural calculations / fluid mechanics /...*
- ***Electrical engineering:*** *choice of alternators / card design / wiring of the different elements / tests /...*

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**Industrial automation:** different speed and position regulation systems (orientation of the nacelle) can be used.

**Industrial computing:** real-time knowledge of machine power / wind speed / energy supplied / rotation speed/...

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Has an aspect been forgotten?

**Yes: industrial maintenance.** Indeed, wind turbines are machines that produce energy and as such, they must be monitored.

We therefore find all the usual maintenance techniques:

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- Preventative maintenance and related plans
- Condition-based maintenance: vibration monitoring / temperature monitoring / ...
- Curative maintenance when everything has failed

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## What is GIM Eole?

- A national inter-department meeting, manufacturing wind turbines.
  1. **ULTIMATE category**: *all the elements of the wind turbine are designed and manufactured by the students.*
  2. **OPEN category** : *some elements can be purchased: alternator / regulation card / blades.*

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GIM Eole being above all a competition, there is a ranking in each category. This ranking will depend on certain criteria:

- *Power supplied - coefficient 2*
- *Energy supplied - coefficient 4*
- *Wind grip speed - coefficient 3*

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- *Reliability – coefficient 4*
- *Innovation – coefficient 2*
- *Design / Integration into the landscape - coefficient 1*
- *Other criteria: maintenance / CO<sub>2</sub> equivalency...*



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## GIM Eole in figures ...

- *The department has been participating since 2010.*
- *Each year, around 25 to 30 wind turbines compete.*
- *On the competition site, this represents about 250 students in a fun event.*

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Some student achievements ...



*Double Savonius*  
 $P_{maxi} = 30 W !$



*Savonius Alu*  
 $P_{maxi} = 435 W$

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*Savonius 'wood'*  
 $P_{maxi} = 240 W$



*Savonius 'shield'*  
 $P_{maxi} = 490 W$

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But especially a lot of joy in the students' achievements ...



→ Aluminium turbine welding



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*Sometimes a lot of success ...*



*Second in the  
general ranking  
2013*

*And sometimes less....*



$U = 0 \text{ V} ; I = 0 \text{ A}$   
 $P_{\text{maxi}} = 0 \text{ W} !!$