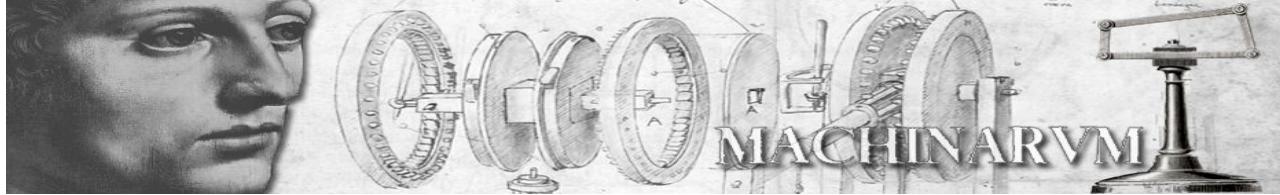


thinkMOTION is funded by :

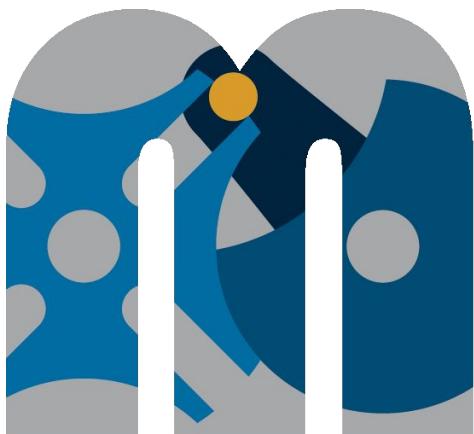


GDR Robotique -  
GT6 Conception innovante et mécatronique  
27 Juin 2011, ISIR  
Journée Prototypage de robots



Robotique et bibliothèques numériques de mécanismes :

# Le projet européen **thinkMotion** au service du GDR Robotique



**thinkMOTION**

[Jean-Christophe.FAUROUX@ifma.fr](mailto:Jean-Christophe.FAUROUX@ifma.fr)

Clermont Université

Institut Français de Mécanique Avancée (**IFMA**)

EA3867, FR TIMS / CNRS 2856

Laboratoire de Mécanique et Ingénieries (**LaMI**)

BP 10448, F-63000

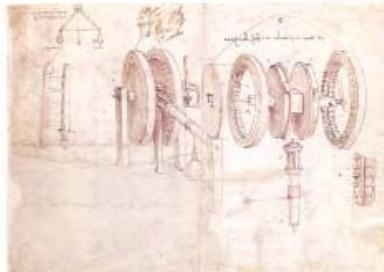


# Présentation du Projet EU thinkMotion

## Présentation



## Bibliothèque européenne de machines et mécanismes

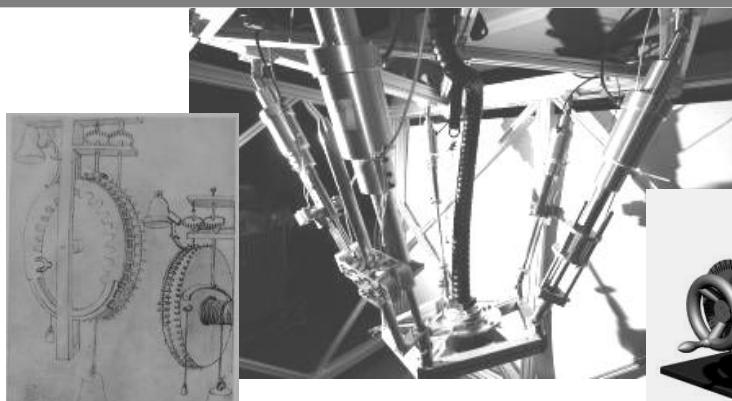


## Problématique

- La plus grande bibliothèque numérique libre du monde dans le domaine des machines et mécanismes
- Héritage technique et historique européen
- Numérisation de documents très hétérogènes (textes, photos, vidéos, animations, dessins techniques, notes de calcul, modèles CAO, modèles multi-corps, etc.)
- Archivage multi-lingue et association de métadonnées (réseau sémantique)
- Accès interactif pour tous depuis la bibliothèque numérique [www.europeana.eu](http://www.europeana.eu)

## Partenaires

- Ilmenau University of Technology
- University of the Basque Country
- Politehnica University of Timisoara
- RWTH Aachen University
- IFMA
- University of Cassino



# Structuration du Projet EU thinkMotion

## Présentation

Juillet 2010 - Juillet 2013 → 3 ans  
Digital Mechanism and Gear Library goes Europeana

## Structure

- WP1 Coordination, project management and quality Assurance
- WP2 Adaptation of interfaces to Europeana
- WP3 Locating and providing relevant sources and clarification of rights of use
- WP4 Digitising heterogeneous input content
- WP5 Processing of digitised content and integration into DMG-Lib
- WP6 Entering metadata for content
- WP7 Collection and systematisation of information about important persons in mechanism science
- WP8 Multilingual translation of metadata
- WP9 Sustainability and exploitation
- WP10 Dissemination, awareness activities and staff development

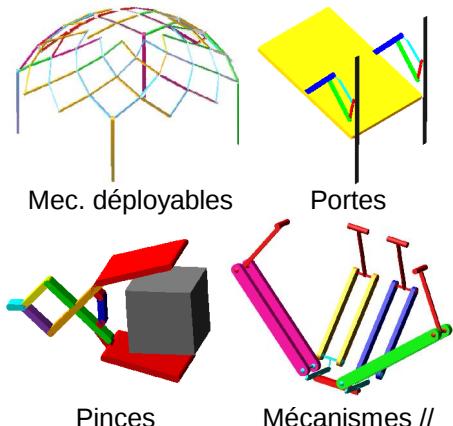


Da Vinci



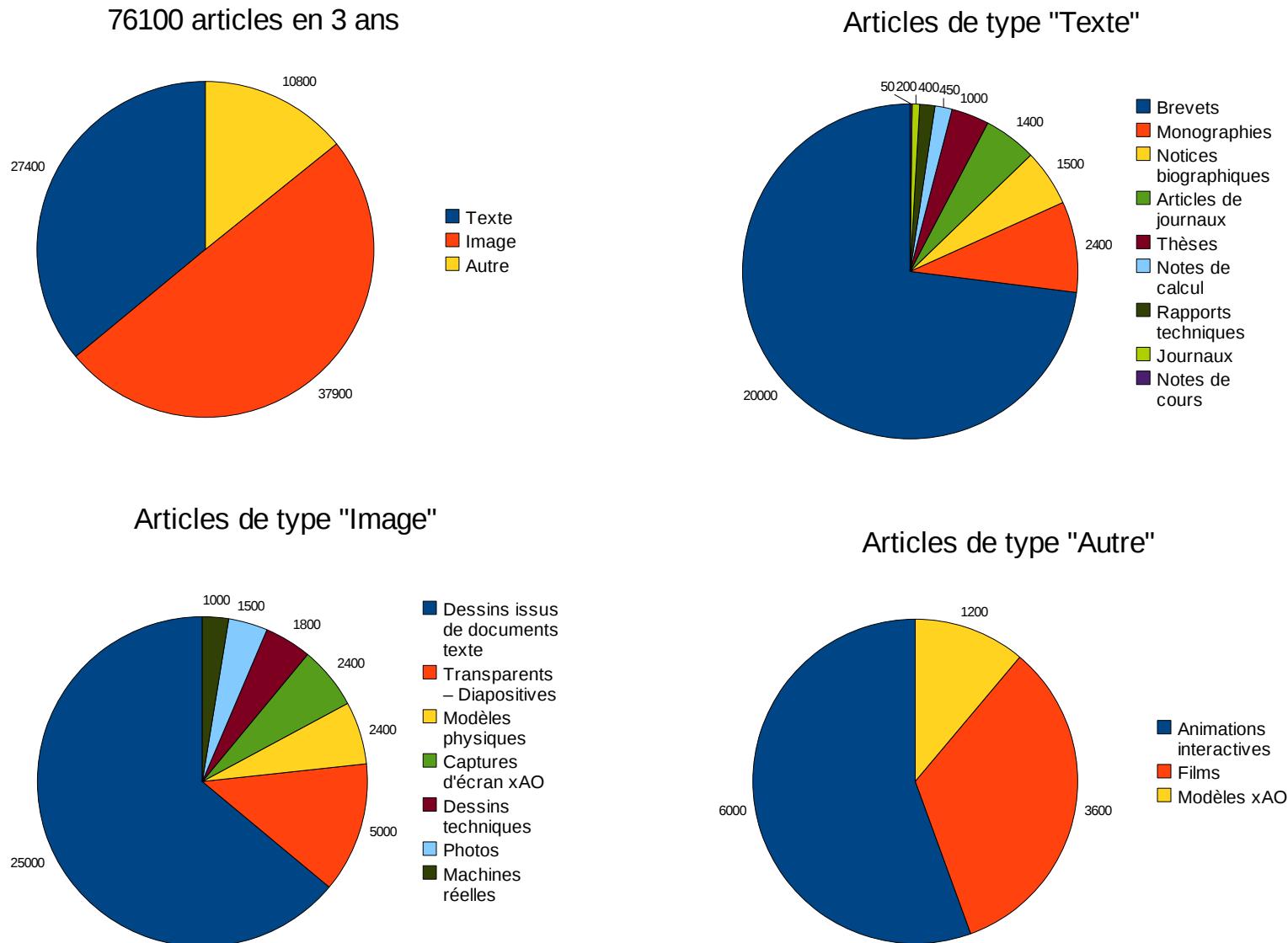
D'Alembert

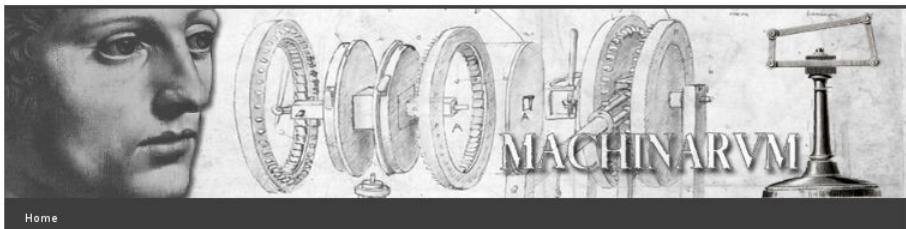
## Contribution FR



- Numérisation de contenu (WP4), intégration dans la base (WP5), saisie de métadonnées (WP6) Ouvert à vos contributions
- Intégration et structuration de la base de mécanismes thématique MMS (plus 200 modèles CAO et multi-corps)
- Responsable du WP8 sur la traduction multi-lingue et contribution à l'élaboration d'un réseau sémantique basé sur la terminologie IFToMM
- Réflexion préparatoire sur un format neutre universel de représentation de mécanismes Ouvert à vos contributions

# Données quantitatives





Home

## Home

The thinkMOTION project is providing content for [Europeana](#). The digitised content is part of the [Digital Mechanism and Gear Library](#) (DMG-Lib).

### Content

The thinkMOTION project is specialised on gathering specific content in the field of motion systems. Different kinds of material are considered (e.g. books, journals, drawings, images, physical models) to establish a digital library which connects historical and recent content from different countries. Content providers are spread over Europe and part of consortium.



Documents

Physical models

Biographies

DMG-Lib provides a collection of different content in the field of motion systems



[www.dmg-lib.org](http://www.dmg-lib.org)



[www.europeana.eu](http://www.europeana.eu)



### Support programme

thinkMOTION is funded under the [Information and Communication Technologies Policy Support Programme](#)

Area: CIP-ICT-PSP.2009.2.3 – Digital Libraries: European Digital Library Digitising content for Europeana  
Funding period: 01.06.2010 – 31.05.2013

### Project

- Objectives
- Workpackages
- Consortium
- Downloads

thinkMOTION is funded by:



Only for consortium  
Intranet



- ✓ Site web juste créé [www.thinkmotion.eu](http://www.thinkmotion.eu)
  - ✓ Intranet pour documents administratif et base de mécanismes
  - ✓ Première réunion du comité de direction à Ilmenau les 7-8-9 septembre 2010 (Bouzgarrou, Fauroux, Turner)
  - ✓ Prochaine réunion prévue : conférence nationale AIP PRIMECA organisée par l'IFMA au Mont-Dore 30 mars – 1er avril 2011
- <http://www.ifma.fr/aip-primeca/colloque2011>



Eichier Édition Affichage Aller à Marque-pages Outils Fenêtre Aide

Précédent Suivant Actualiser Arrêter Rechercher Imprimer

<http://www.europeana.eu/portal/>

Europeana - Homepage

My Europeana About us Communities Partners Thought lab Choose a language

**béta**

This is Europeana - a place for inspiration and ideas. Search through the cultural collections of Europe, connect to other user pathways and share your discoveries. [Find out more](#)

Advanced search Search

europeana ajattele kulttuuria

Share your ideas: People are currently thinking about: Timeline navigator: New content:

- share → Berlin
- jugendstil
- dodis →
- Browse through time.
- From our partner museums, archives, libraries and audio-visual collections

Using Europeana Accessibility Sitemap Terms and conditions Privacy Language policy Contacts | Send us feedback co-financed by the European Union

Eichier Édition Affichage Aller à Marque-pages Outils Fenêtre Aide

Précédent Suivant Actualiser Arrêter Rechercher Imprimer

<http://www.europeana.eu/portal/brief-doc.htm?start=1&view=table&>

mechanism - Europeana Search

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**béta**

mechanism

Refine your search: By provider By language By country By date By type Actions: Save this search Login | Register

No image? Click through the colour block to see the item. We are still loading...

Matches for: mechanism

All Texts (252) Images (1,519) Videos (8) Sounds (2)

Results 1 - 12 of 1,781 Page: 1 2 3 4 5 6 7 8 9 10 → share

Image	Title	Provider	Date
	The human mechanism; Hugh Theodore, 1918	BHL Europe	1918
	Timing Mechanism	Orkney Islands Council Scrann	2003
	LOCKING MECHANISM	CultureGrid	2005
	LOCKING MECHANISM	WALKER, Liz - Portals Antiquities Scheme	2005
	Fowler Steam Engine, Mechanism	CultureGrid	
	Fowler Steam Engine, Mechanism	CultureGrid	
	The mechanism of Mendelian heredity, Morgan, Thomas Hunt, 1922	BHL Europe	1922
	Grand Arcade, Clock Mechanism	CultureGrid	
	Bothwell Castle Mechanism	Historic Scotland	1250
	Fowler Steam Engine, Mechanism	CultureGrid	

Item details

Plastron à mécanisme

Title: Plastron à mécanisme

Date: 0, 15e siècle,

Description: Crée vers 1495. Ce plastron avait pour effet de projeter en l'air une pièce de métal lorsqu'il était touché par la lance de l'adversaire fer (métal), cuivre (métal).

Format: 0.0000000000, Hauteur 0.3500000000 m.; Longueur 0.3000000000 m.; Profondeur 0.0000000000 m.

Source: Paris, musée de l'Armée

Rights: (C) Paris - Musée de l'Armée, Dist. RMN - Pascal Segrette

Provider: Culture.fr/collections ; France

More

View in original context

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Eichier Édition Affichage Aller à Marque-pages Outils Fenêtre Aide

Précédent Suivant Actualiser Arrêter Rechercher Imprimer

<http://www.europeana.eu/portal/brief-doc.htm?start=1&view=table&>

mechanism - Europeana Search

My Europeana About us Communities Partners Thought lab Choose a language

**béta**

mechanism

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	Grand Arcade, Clock Mechanism	CultureGrid	
	Bothwell Castle Mechanism	Historic Scotland	1250
	Fowler Steam Engine, Mechanism	CultureGrid	

- ✓ Europeana est la bibliothèque numérique en ligne gratuite européenne (novembre 2008)
- ✓ Enjeux forts pour l'Europe en terme de rayonnement culturel et scientifique (contrer Google)
- ✓ Objectif : 10 millions de documents libres en 2010
- ✓ Nombreux liens vers 25 bibliothèques nationales
- ✓ Contenu technique déjà présent mais peu détaillé

**Digital Mechanism and Gear Library**

Your Access to Scientific Information

**Literature**

- Technical books, journal articles, research reports
- Teaching material, gear catalogues
- 4514 documents, with 1601 fulltext documents

Please visit the collection on [Kurt Hain \(1908 - 1995\)](#)

**Mechanism descriptions**

- Functional models
- Machines
- 1456 Mechanism descriptions

Browse the [category linkage](#) or use [Mechanism Search](#)

**Interactive animations**

- Interactive books with animated figures
- Animations of physical models
- 564 interactive animations

For example browse the interactive book "[Getriebetechnik: Grundlagen](#)" of Johannes Volmer

**Persons**

- Biographies of people in the domain of mechanism and machine science
- Timeline "Mechanisms and machines by the course of time"
- 287 Persons

Browse the [List of all biographies](#) or visit the [timeline](#)

**Innovation and Future**

**Project DMG-Lib**

- Learn more about the [Project DMG-Lib](#), the project group and point of contact.
- In the long term the development of the DMG-Lib is ensured by the [Gesellschaft zur Förderung der Digitalen Mechanismen- und Getriebelibbibliothek e.V. \(Association for supporting the digital mechanism and gear library\)](#).

**Ehrenkolloquium**

Anlässlich des 80. Geburtstages von Prof. Johannes Volmer fand am 12. Februar in Chemnitz ein Ehrenkolloquium statt.

**Getriebe im Alltag**

In unserem interaktiven Hypervideo "Getriebe im Alltag" können Sie Mechanismen und Getriebe in Alltagsgegenständen entdecken.

**Neu im Bestand**

Reuleaux-Modelle der Leibniz Universität Hannover

Derzeit werden Modelle der Leibniz Universität Hannover in die DMG-Lib aufgenommen. Unter ihnen befinden sich auch einige historisch wertvolle Reuleaux-Modelle. Wir danken dem Institut für Getriebetechnik für die Bereitstellung der Modelle.

**Getriebetechnik : Grundlagen**

**General information**

**Author** Volmer, Johannes (Ed.); Brock, Reimar ; Hammerschmidt, Christian ; Jacobi, Peter ; Müller, Wolfgang ; Neßler, Walter ; Raths, Waldemar ; Schönher, Jürgen

**Published** Verl. Technik GmbH, Berlin - München, 1992

**Edition** 1. Auflage

**Extend** XII, 352 S. 1 Falzblatt (in 2 Teilen)

**ISBN** 3-341-00934-5

**Additional information**

Führungsgetriebe für 3 Punktlagen Seite: 247 [Interaktive Animation starten](#)

Waagerechtstoßmaschine (Schlitzenantrieb) Seite: 225 [Interaktive Animation starten](#)

Lösungsvariante 10 zur Struktursynthese-Aufgabe durch Kombinieren der Gelenkkarten der Grundbaufom in Bild 3.39b Seite: 62 [Interaktive Animation starten](#)

Koppelgetriebe, 6-gliedriges Seite: 204 [Interaktive Animation starten](#)

Lösungsvariante 9 zur Struktursynthese-Aufgabe durch Kombinieren der Gelenkkarten der Grundbaufom in Bild 3.39b Seite: 62 [Interaktive Animation starten](#)

**Page d'accueil**

**Livres animés**

- ✓ DMG-Lib est la base de données de machines et mechanisms (« getriebe ») des universités d'Ilmenau, Aachen, Dresden.
- ✓ Contenu varié : ouvrages techniques (dont certains interactifs), animations, descriptions de mécanismes, biographies scientifiques...
- ✓ Langue principalement allemande

**Fiches mécanismes**

The screenshot shows the DMG-Lib website interface. At the top, there's a navigation bar with links for "DMG-LIB HOME + NEWS", "BROWSE", "SEARCH", "EXPERIENCE DMG-LIB", "ABOUT US", and "HELP". Below the navigation is a search bar with placeholder text "Enter a query" and dropdown menus for "All categories" and "Search". To the right of the search bar are links for "Advanced Search" and "Mechanism Search". The main content area displays a detailed mechanism description for a "3-Wellen-Umlaufrädergetriebe". The description includes sections for "Structure of mechanism", "Function", "Dimension of mechanism", "Number of links", "drive movement", "output movement", "Degree of freedom", "Fundamental mechanism", "Number of inputs", "Number of followers", "Revolution ability", "Revolution ability of input link", "Relative position between drive and output", "Transfer function", and "Application". Each section contains descriptive text and small diagrams. On the left sidebar, there are links for "Literature", "Persons", "Interactive animations", "Mechanism descriptions", "Software", "Submit proposal", and "Whereabout Reuleaux models". There's also a "Subscribe to DMG-Lib newsletter" form with fields for "e-mail address" and a "Send" button. A "Submit a proposal" section encourages users to contribute content. Logos for "IFToMM in Deutschland" and "DFG" are present. At the bottom left, the word "Terminé" is visible.

- ✓ Les nouvelles fiches seront basées sur le format DMG-Lib
- ✓ Format évolutif en fonction des besoins (Ex : convoyeurs pôle SIL)

**Notices biographiques**

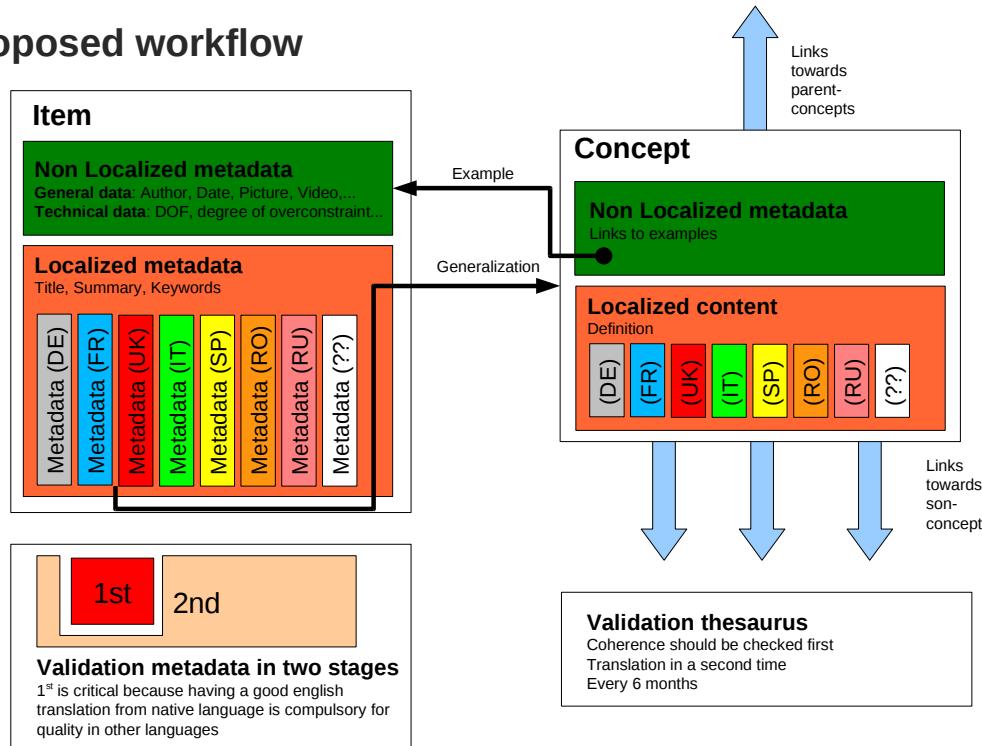
The screenshot shows the DMG-Lib website interface for a biography. At the top, there's a navigation bar with links for "STARTSEITE + AKTUELLES", "STÖBERN", "SUCHE", "DMG-LIB ERLEBEN", "ÜBER UNS", and "HILFE". Below the navigation is a search bar with placeholder text "Suchbegriff eingeben" and dropdown menus for "Alle Kategorien" and "Suchen". To the right of the search bar are links for "Erweiterte Suche" and "Mechanismensuche". The main content area displays a biography for "Kutzbach, Karl (1875 - 1942)". The biography includes a portrait of Karl Kutzbach, his birth date (1875), place of birth (Trier), and his role as an assistant at the Technical University of Berlin. It also mentions his work on gear mechanisms and his contributions to aircraft engine design. Below the biography is a "Lebenslauf" (life timeline) table showing his professional career from 1897 to 1936, including his roles at various universities and institutions. Logos for "IFToMM in Deutschland" and "DFG" are present. At the bottom left, the word "Terminé" is visible.

## Aspects linguistiques

WP8

- ✓ 6 langues : anglais, allemand, espagnol, français, italien, roumain
- ✓ Chaque partenaire trouve dans sa langue...
- ✓ ... puis les ajoute dans la base et les traduit en anglais

### Proposed workflow



- ✓ Gros travail de traduction : S3-Anglais + autres langues
- ✓ Besoin de prestataires extérieurs

# Partenariats

## Partenariats bibliothèques

### ✓ Bibliothèque du CEMAGREF (<http://cemadoc.cemagref.fr>)

- Ouvrages des éditions CEMAGREF
- Patrimoine machines agricoles (N. Bouton)



### ✓ BU Cézeaux

- Equipe bibliothèque numérique (H. Veilhan + 6 personnes)
- Collecte de documents anciens (P. Rocher)
- Achat scanner à plat pour livres A3
- Mise en place flux BU ↔ IFMA
- thinkMotion parmi d'autres projets de numérisation  
(grand herbier Lecoq, littérature jeunesse)



## Partenariats musées

### ✓ Musée des Arts et Métiers ([www.arts-et-metiers.net](http://www.arts-et-metiers.net))

- Intéressés pour une aide à la numérisation
- Disposent d'un fond ancien ([cnum.cnam.fr](http://cnum.cnam.fr))
- RDV jeudi 1er décembre à Paris

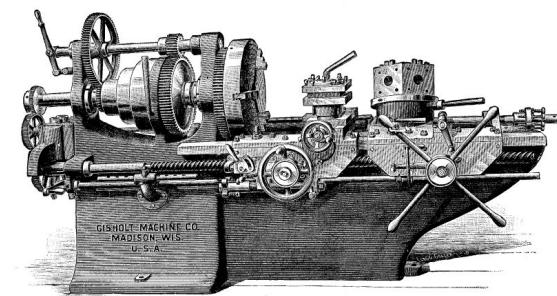


Fig. 230. — Tour à revolver de la Gisholt Machine Company, de Madison (E.-U.).

### ✓ PATSTEC ([www.patstec.fr](http://www.patstec.fr))

- recensement national du patrimoine scientifique et technique
- le musée Lecoq coordonne ce travail en Auvergne

# The French Team in March 2011

## Coordinator FR + Contributor

- IFMA (French Institute for Advanced Mechanics)  
<http://www.ifma.fr>



## Libraries

- BCU Library (Clermont-Communauté Library)  
<http://bibliotheque.clermont-universite.fr>
- CEMAGREF Library  
<http://cemadoc.cemagref.fr>
- ...



## Museums

- PATSTEC Auvergne  
[www.patstec.fr](http://www.patstec.fr)
- ... (other contacts in process)

PATRIMOINE scientifique et technique contemporain

## Universities

- Blaise Pascal University  
[www.univ-bpclermont.fr](http://www.univ-bpclermont.fr)
- ... your university ?

## Labs

- LaMI  
[www.ifma.fr/lami](http://www.ifma.fr/lami)
- ... your lab ?

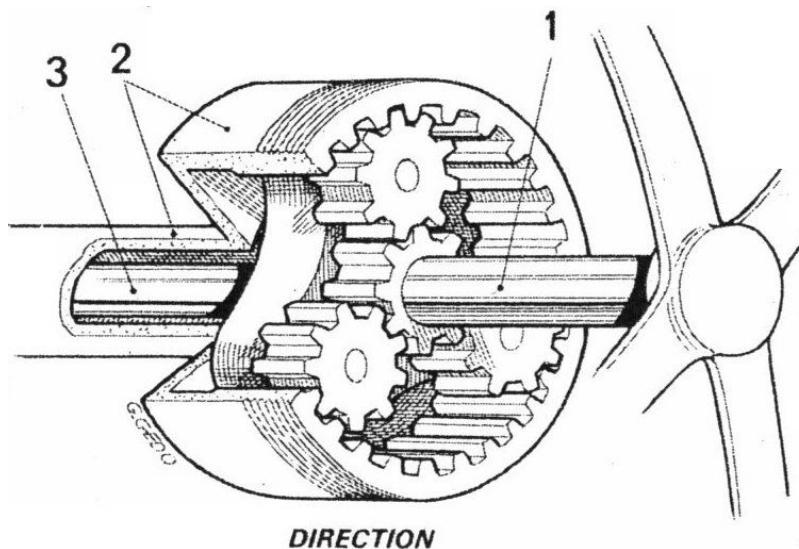


# Contribution from the BCU Library



## People and tasks

- Librarians for selecting books
- A part-time technician for scanning books
- Several projects on digital libraries
- Important collections of old books on mechanical and civil engineering (more than 180000 pages)
- Full text and separate images

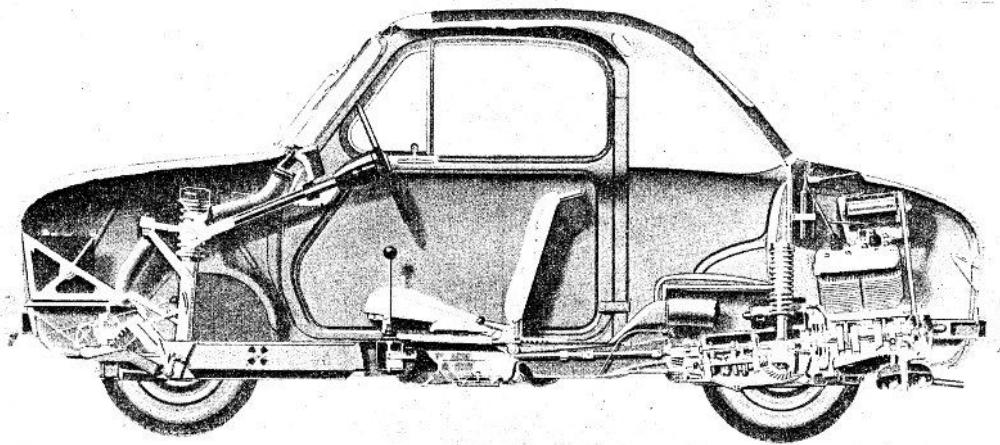
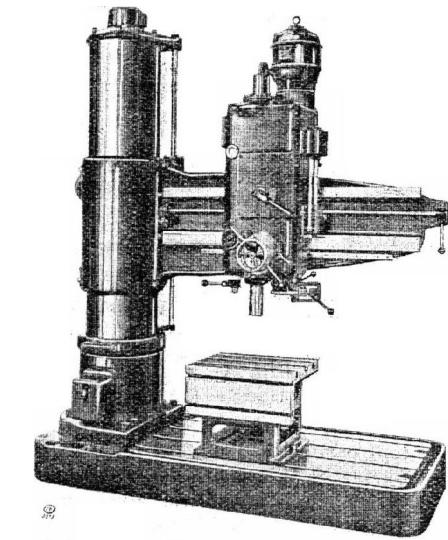
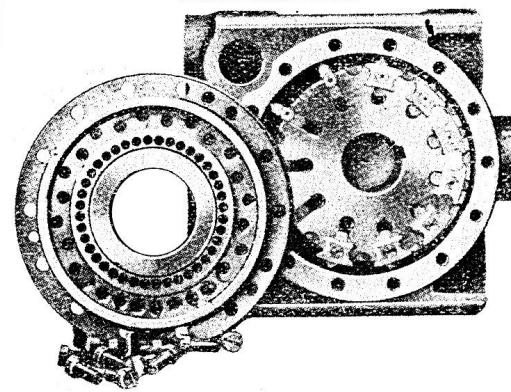
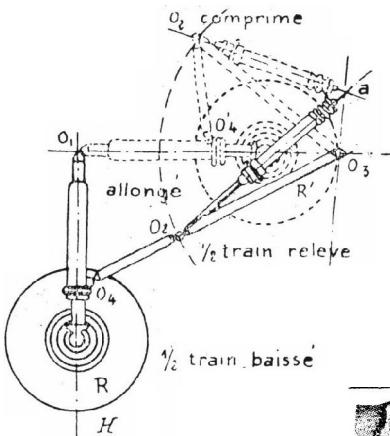
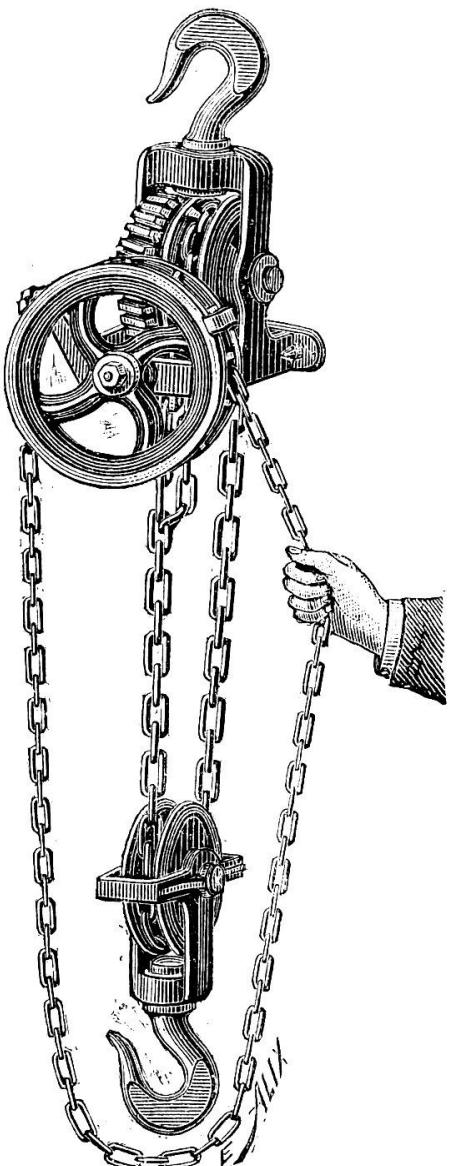


## Hardware

- Book scanner Zeutschel OS12000 HQ
- Flat A2 format,
- 15 seconds for A2 Color 600 DPI
- Thickness / curvature compensation



# Contribution from the BCU Library



# Contribution from the CEMAGREF Library

## People and tasks

- Librarians for selecting books
- Exchanges with the central CEMAGREF library at Anthony
- Books and journals about agricultural machines



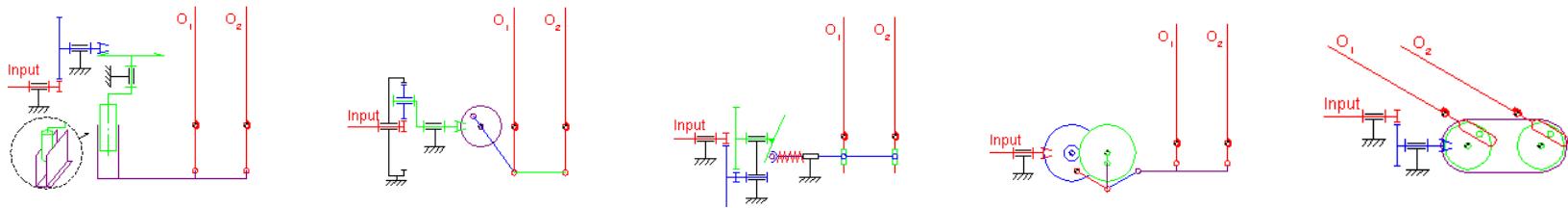
# Contribution from IFMA

## People and tasks

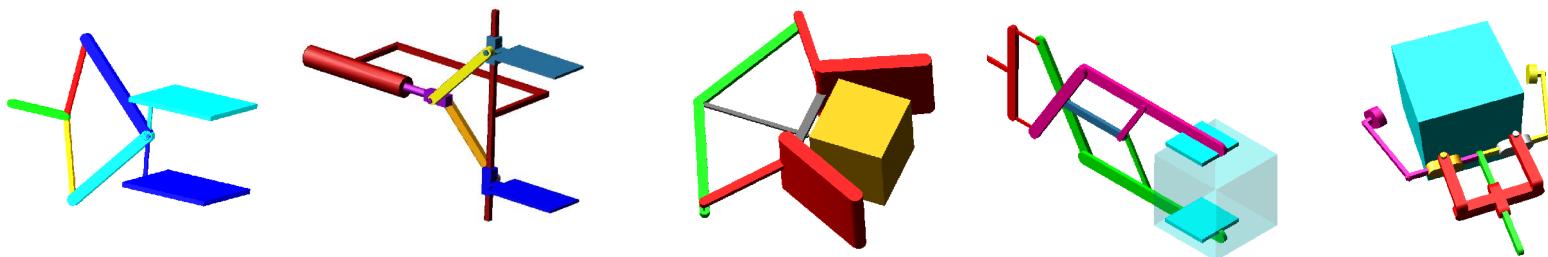
- IFMA, French Institute for Advanced Mechanics (1991)
- Around 180 students per promotion x 4
- 3 departments
  - Materials and Structures (St2M)
  - Machines, Mechanisms and Systems (MMS)
  - Industrial Engineering and Logistics (SIL)
- Already working on educational projects about machines
- Software : Adams and Catia V5



### ● 2003 – Mechanism for a windscreen wiper

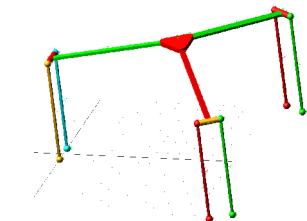
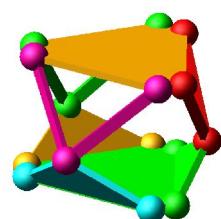
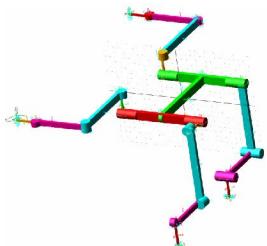


### ● 2004 – Two-finger robot hands

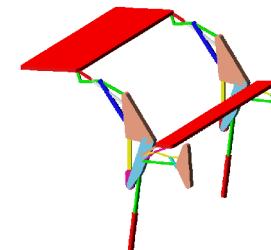
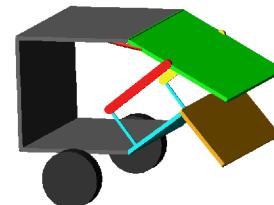
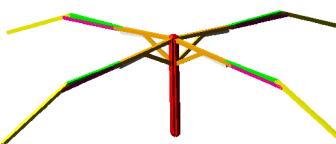


## Contribution from IFMA (cont.)

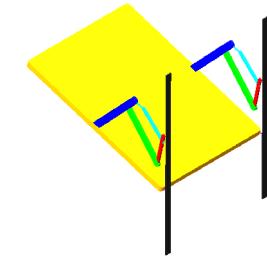
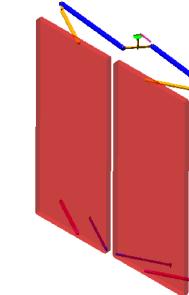
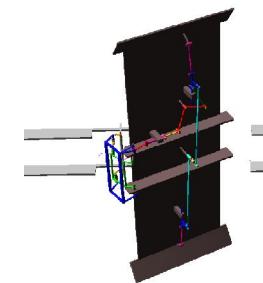
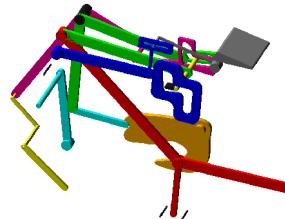
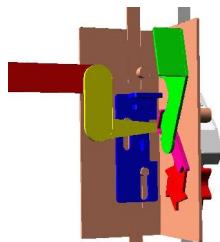
- 2005 – Parallel robots



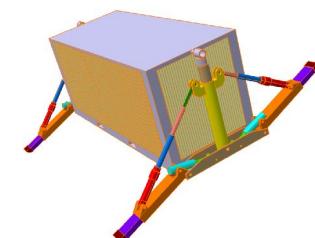
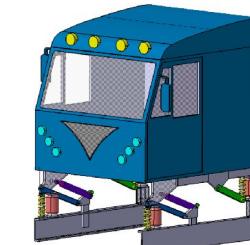
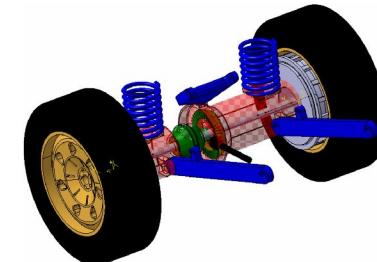
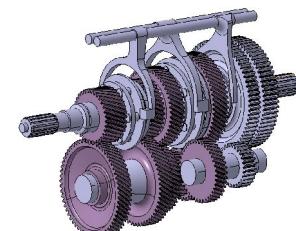
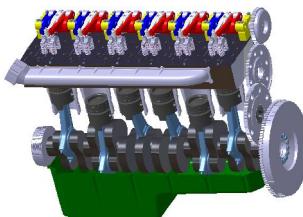
- 2006 – Foldable mechanisms



- 2007 – Doors and latches

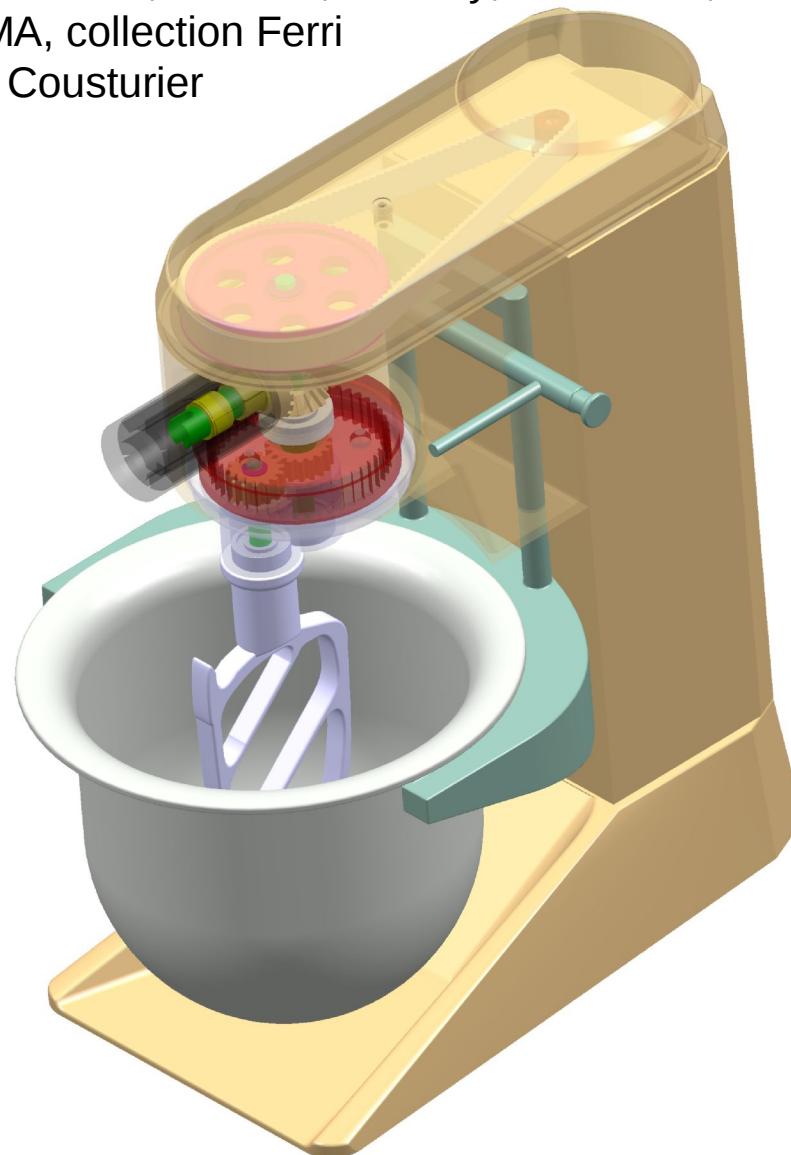


- 2008 – Elements of trucks



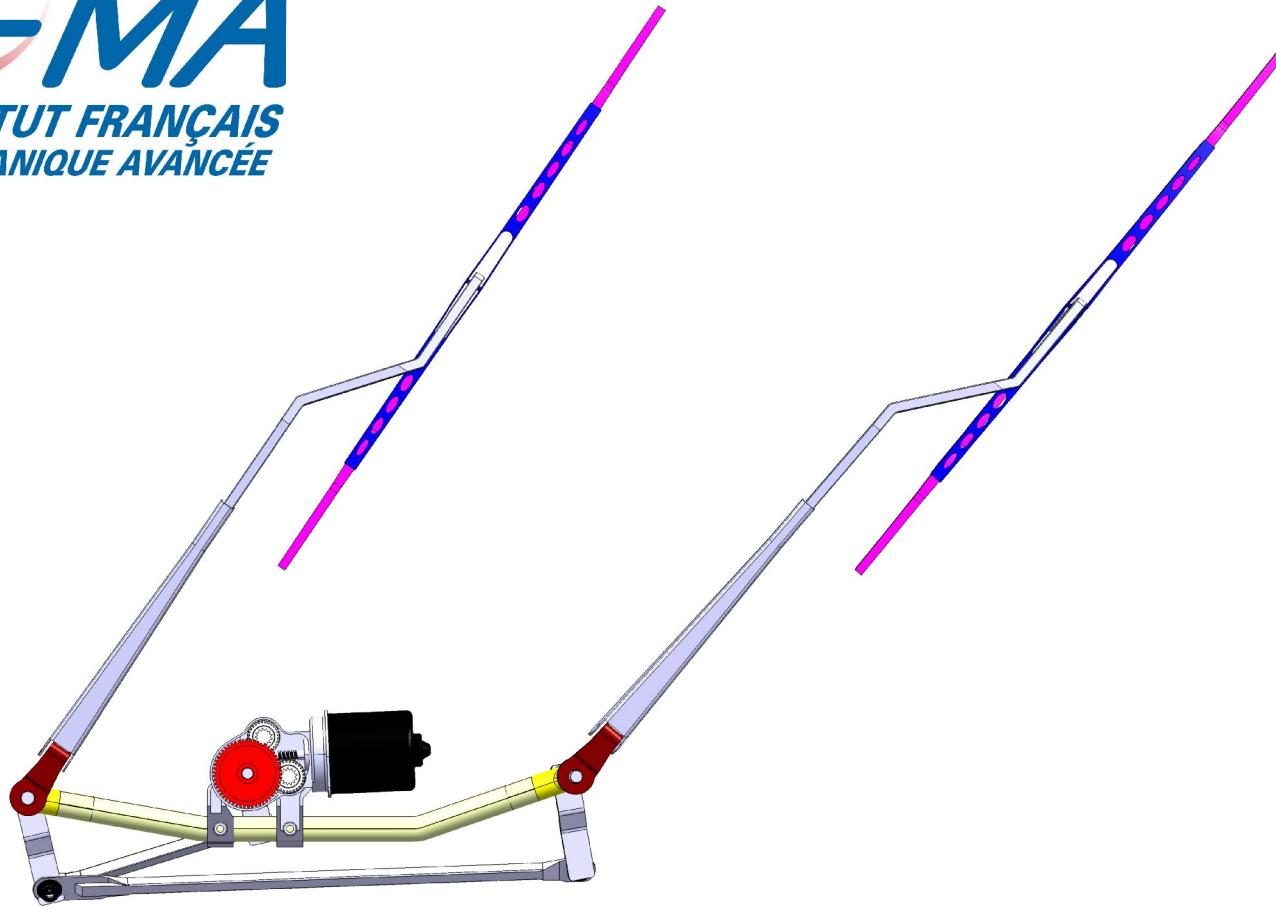
## Exemples : IFMA 2009

- Contribution 2A MMS
- Encadrement : Fauroux, Couden, Rabany, Guillaume, Touzet
- Provenance : IFMA, collection Ferri
- Mise en forme : Cousturier



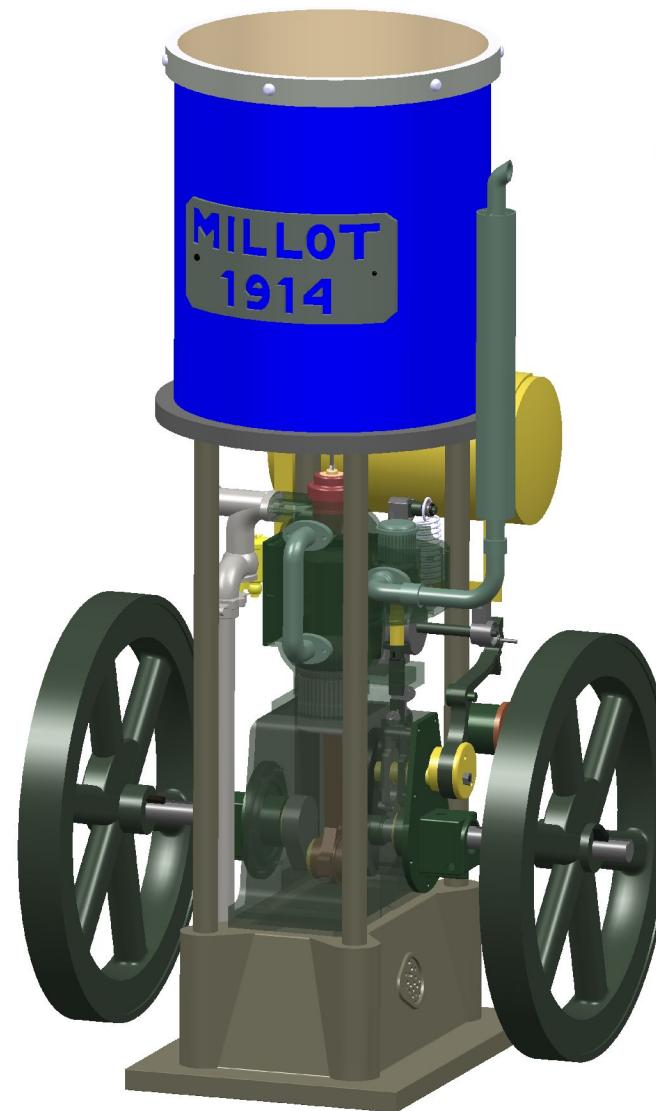
Batteur-mélangeur

## Exemples : IFMA 2009



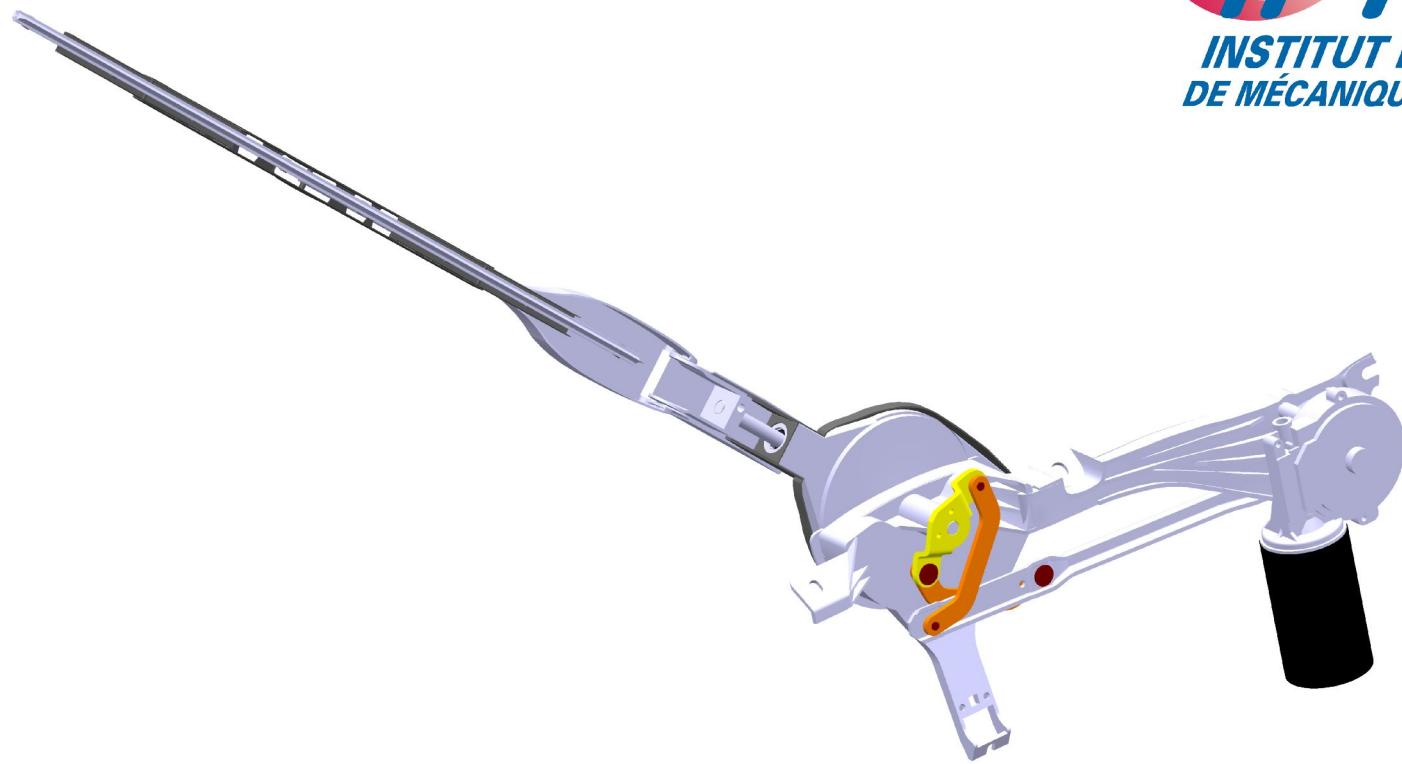
Essuie-glace bi-bras Valeo

## Exemples : IFMA 2009



Moteur à poste fixe mono-cylindre Millot

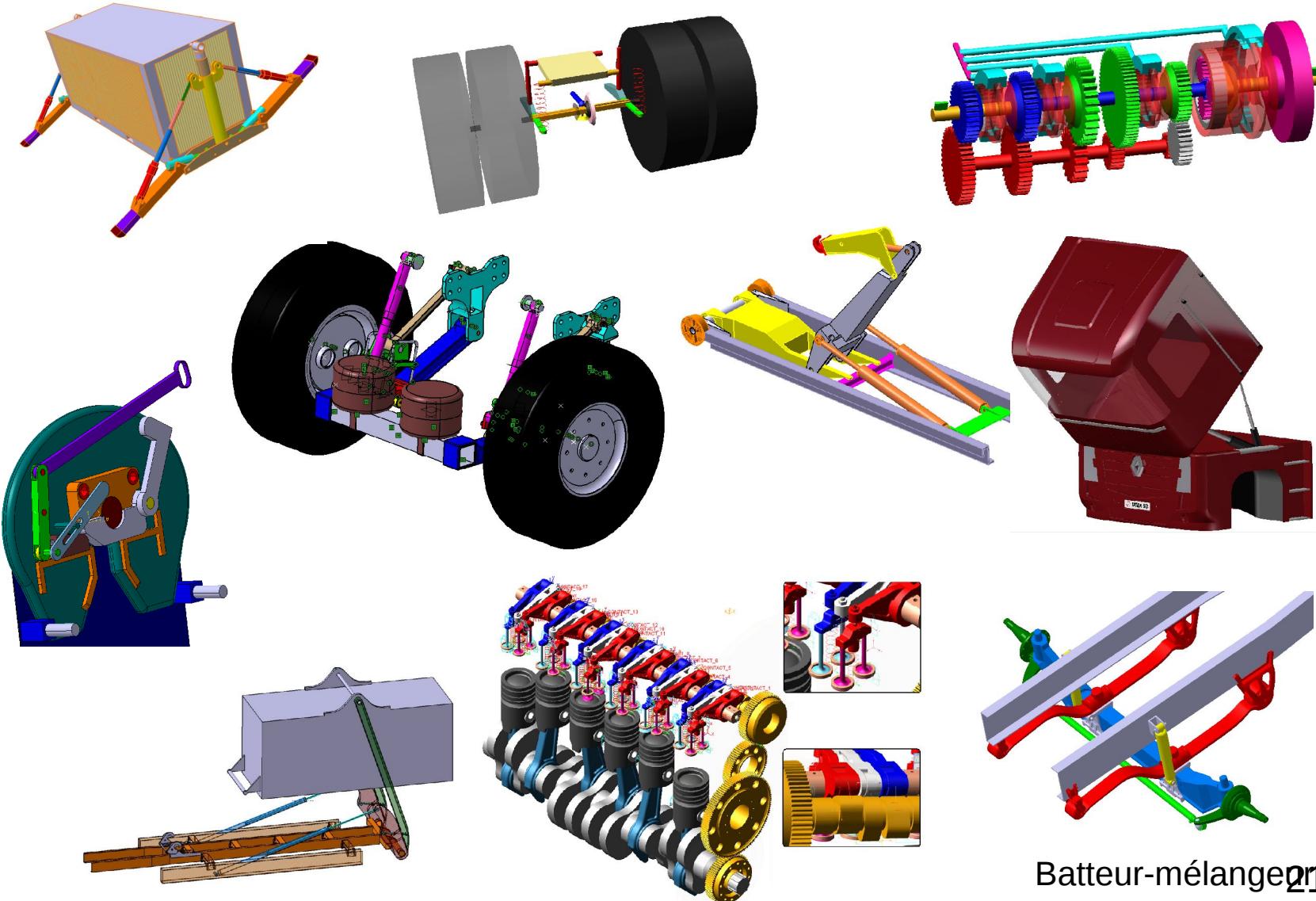
## Exemples : IFMA 2009



Essuie-glace mono-bras Bosch

## Exemples : IFMA 2008

- Contribution 2A MMS + PST
- Encadrement : Fauroux, Dréan, Bouzgarrou, Couden, Gogu

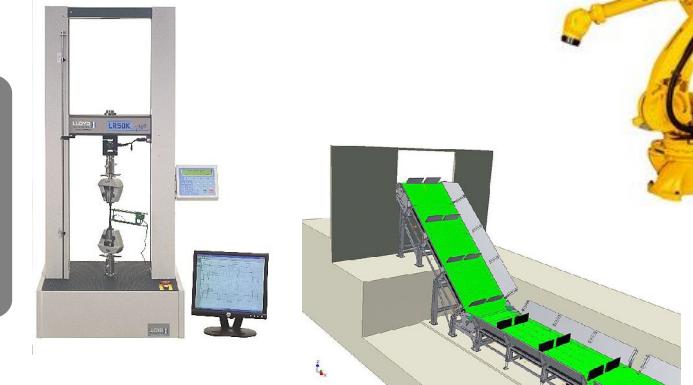


Batteur-mélangeur

# Contribution from IFMA (cont.)

## A federating project at IFMA

- Various contributors
- Adaptation to each type of lecture
- **First** : Educational content
- **Second** : Interest for thinkMOTION

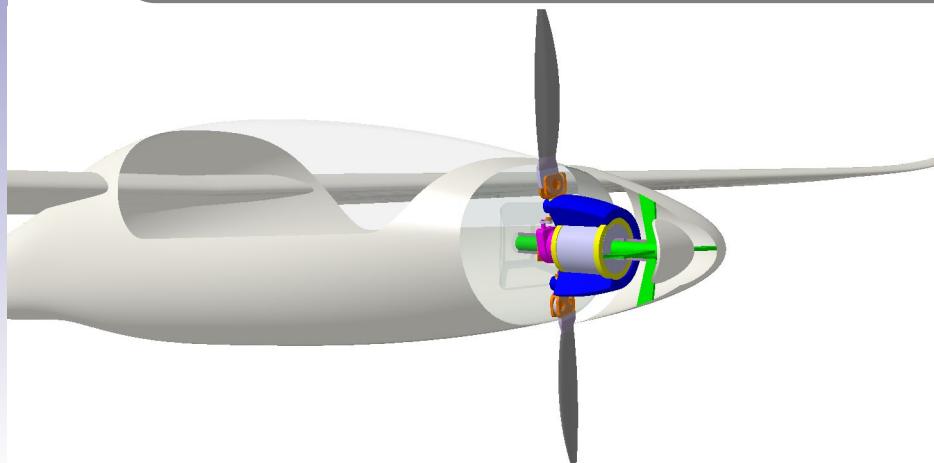


<b>Tous pôles</b>	<b>Flux</b>	<b>Sujet</b>
S3-Conception et Fabrication Assistée par Ordinateur	160 élèves	Dessin/Cinématique
S1-S2-S3-Anglais (CIME)	160 élèves	Traduction (machines, biographies)
Projet 2A	160 élèves	Etat de l'art (cassage noix, joug rugby...)
PIFE	160 élèves	Etat de l'art selon sujet
<b>Pôle ST2M</b>	<b>Flux</b>	<b>Sujet</b>
S4-Dimensionnement des structures et assemblages	24 élèves	Dimensionnement de parapluies
<b>Pôle MMS</b>	<b>Flux</b>	<b>Sujet</b>
S3-Ingénierie Assistée par Ordinateur	72 élèves	MEF / Optimisation de mécanismes
S3-Modélisation des Robots	72 élèves	Robots manipulateurs anthropomorphes
S4-Analyse et Synthèse de Mécanismes	48 élèves	Mécanismes parallèles hyper/isostatiques
S4-Analyse de Brevets	72 élèves	Machines
<b>Pôle SIL</b>	<b>Flux</b>	<b>Sujet</b>
S3-Robotisation et Automatisation	48 élèves	Robots industriels, convoyeurs
S3-Industrialisation et Mise en Production	48 élèves	Transitique

# Creating a CAD exercise for thinkMOTION

## CAD Exercise Rules

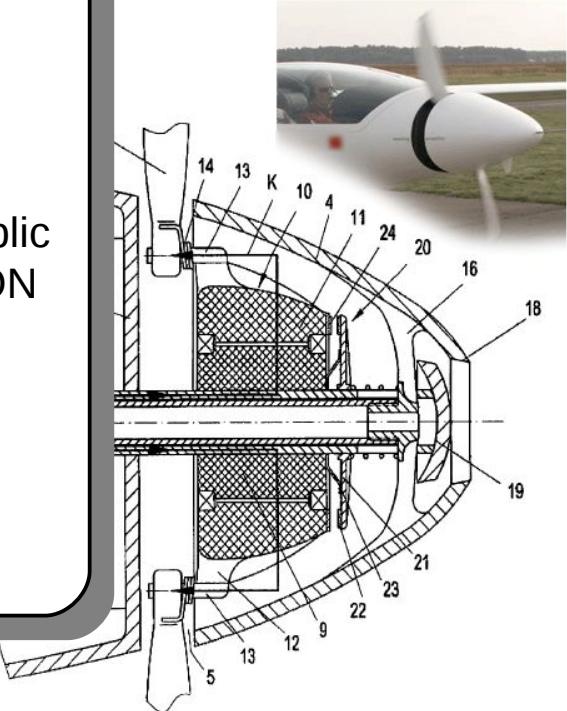
- Choose a patent (patents are free of copyright)
  - Understandable and **interesting**
  - Not too complex ( $\approx$ 10-20 parts)
  - With realistic shapes (for CAD interest)
  - From a European inventor
- One mechanism / One student  $\rightarrow$  uniqueness  $\rightarrow$  public claim on a Moodle forum + checking the thinkMOTION database
- Modeling / Parametrizing / Assembling / Animating
- Output :
  - CAD assembly (.ZIP)
  - Screen capture (.PNG)
  - Video (.AVI)
  - Mechanism description (form)



Re: Forum Travail de TP et projet thinkMotion  
par LOUIS Nicolas, samedi 13 novembre 2010, 10:55

N° Brevet : US6550719B2

drive device for aircraft



[Niveau supérieur](#) | [Modifier](#) | [Supprimer](#) | [Répondre](#)



Re: Forum Travail de TP et projet thinkMotion  
par COUSTURIER Richard, lundi 6 décembre 2010, 16:45  
validé

[Niveau supérieur](#) | [Modifier](#) | [Supprimer](#) | [Répondre](#)



Re: Forum Travail de TP et projet thinkMotion  
par MENAND Alexis, samedi 13 novembre 2010, 18:18

MENAND Alexis, MMS3B

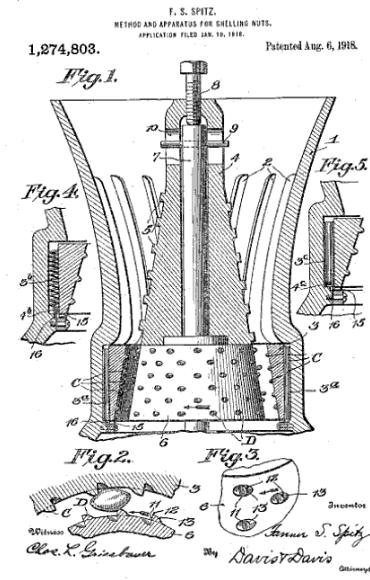
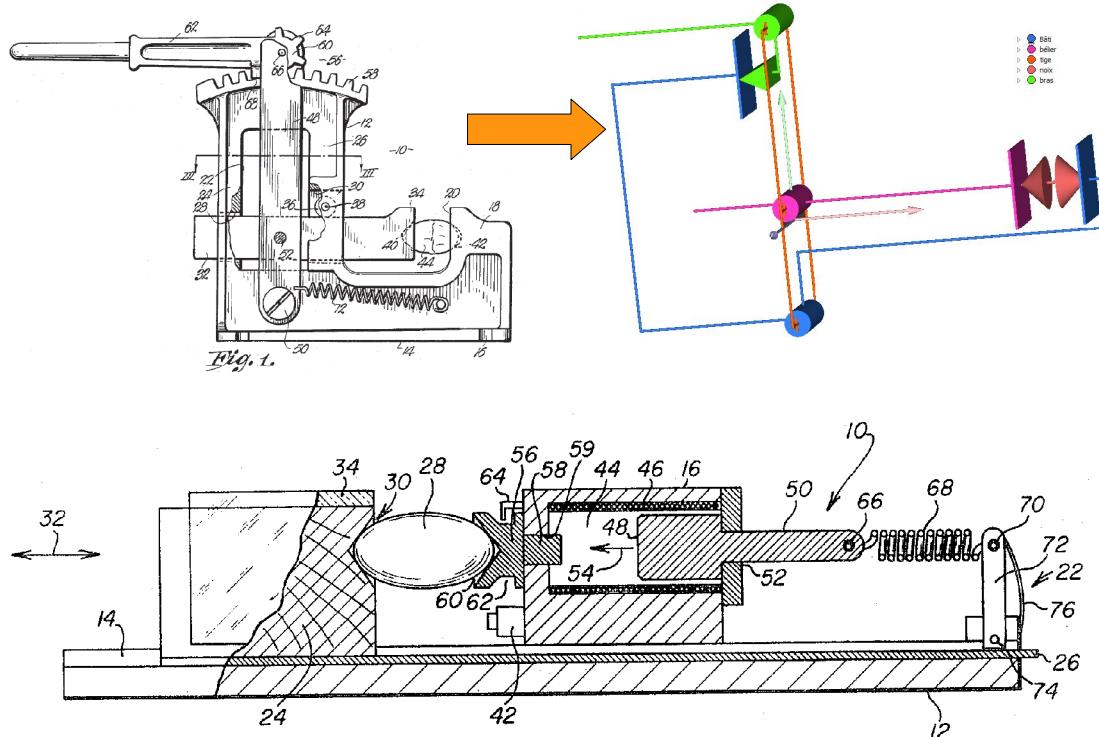
N° Brevet : FR2602474A1

Titre : Windscreen wiper unit for vehicle

# A student design project for thinkMOTION

## Design project

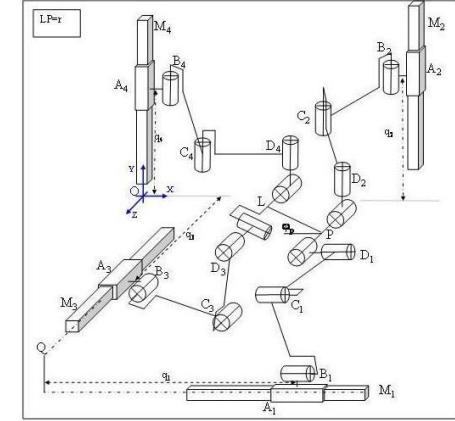
- Ex : design project in 2<sup>nd</sup> year → 12 students  
*“Creating a crushing machine to extract argan nut”* (K. Kouiss)
- Study of **existing crushing machines**
- **Patent research** on nut crackers / Market study
- Output :
  - Picture (.JPG)
  - Kinematic chain (vector format)
  - Mechanism description (form)



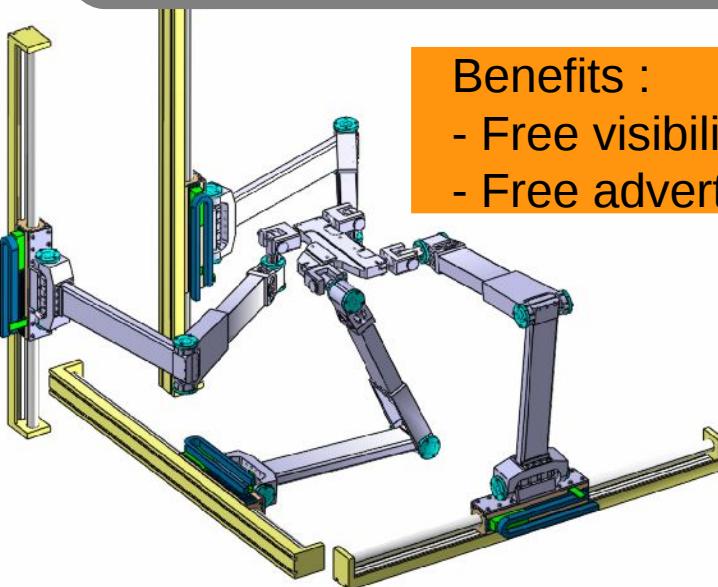
# Contributing as a lab

## Rules

- **Input:**
  - Your prototypes
  - Your machines / mechanisms / robots
  - Your patents
  
- **Output:**
  - Text of patent (.PDF)
  - Mechanism description (form)
  - CAD image (.PNG)
  - CAD video (.AVI)
  - Photo of prototype (.JPG)
  - Video of a real demo (.AVI)

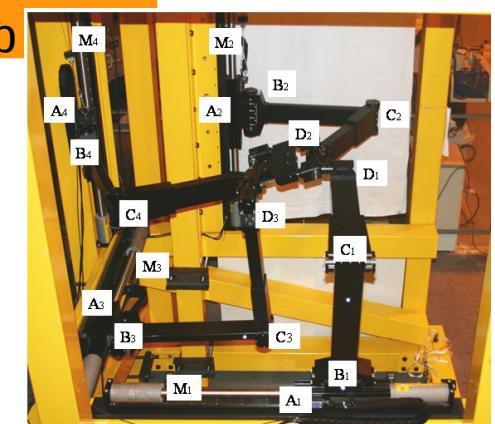


Ex : Isoglide parallel robot  
IFMA/LaMI



## Benefits :

- Free visibility for your research work
- Free advertisement for your lab



# Contributing as a school or university

## Rules

### - Input:

- Patents
- Documents without copyright (old or free)
- Documents with copyright describing machines that you re-model with the students

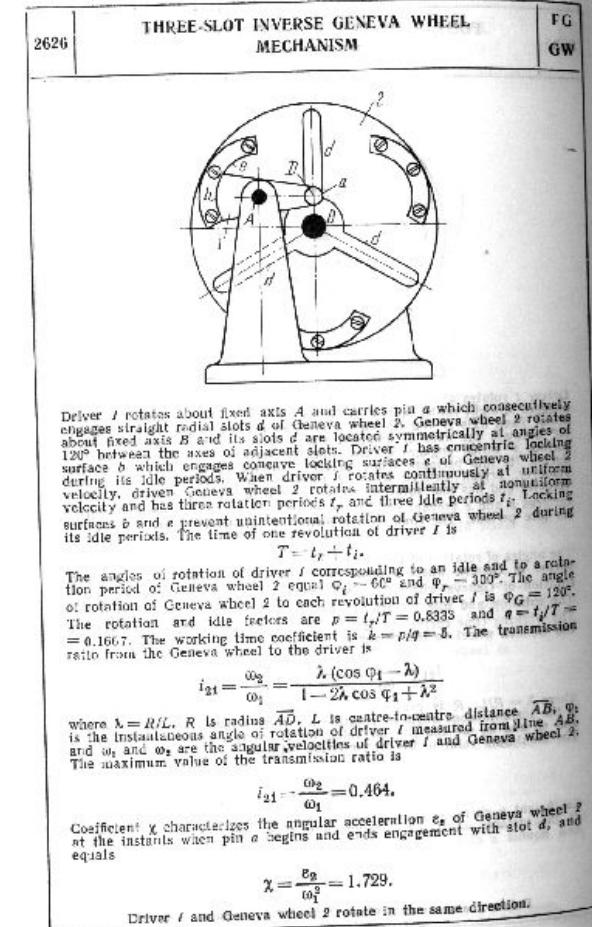
### - Output:

- CAD model
- Mechanism description (form)
- CAD image (.PNG)
- CAD video (.AVI)
- Photo made by you (.JPG)
- Video made by you (.AVI)

## Benefits :

- Mention of each student name → Motivation
- Free advertisement for your university

Ex : Re-modelling all the 6000 mechanisms of the book :  
*I.I. Artobolevski  
 Les mécanismes dans la technique moderne (Mir, 1975, 7 tomes, 5120 pages)*



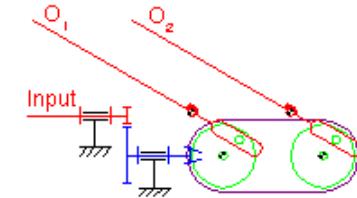
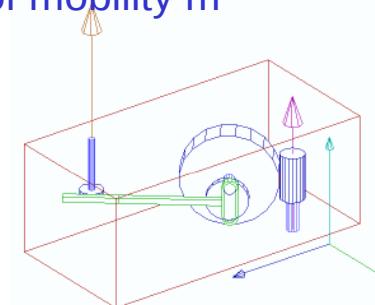
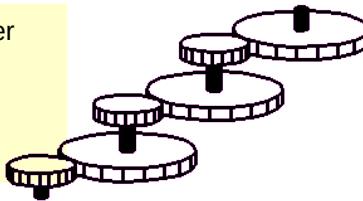
# Future extension to Research

## ● Examples of interesting design methods



**Approach 1:** Serial combination of blocks of mobility m to obtain a mechanism of mobility m

**Example:** adding one after the other several stages for transmission movement, such as in CASYMIIR software [Fauroux99] [Wahl03] [Fauroux Bouzgarrou Gogu 04]



**Approach 2:** Serial connexion of blocks to obtain a higher mobility

**Example:** serially adding  $N \times$  (part with a joint) to generate all the anthropomorphic robot arms of a given DOF. Evolutionist algorithms may be used [Gogu07]



**Approach 3:** Parallel connexion of blocks to obtain a mechanism with smaller (or equal) mobility

**Example:** design of parallel robots of n DOF,  $n \in [2,6]$  by combining legs with  $\text{DOF} \geq n$  [Gogu07]



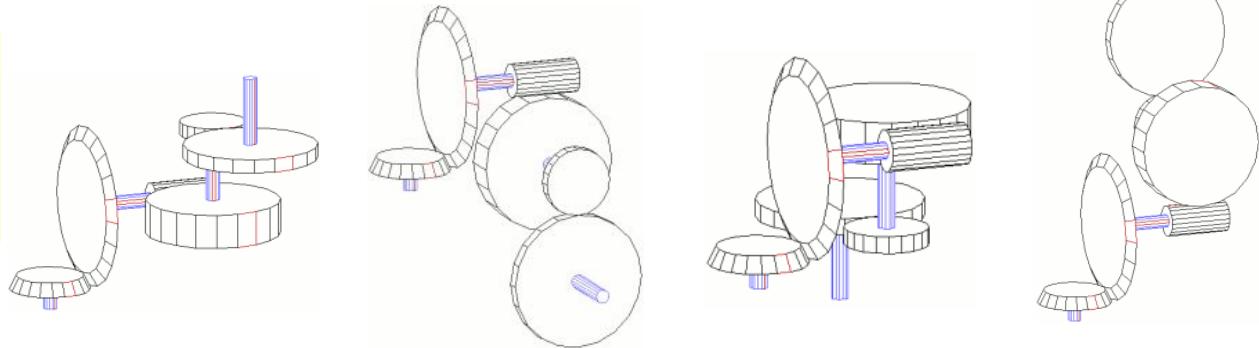
# Future extension to Research

- Examples of interesting design methods (continued)



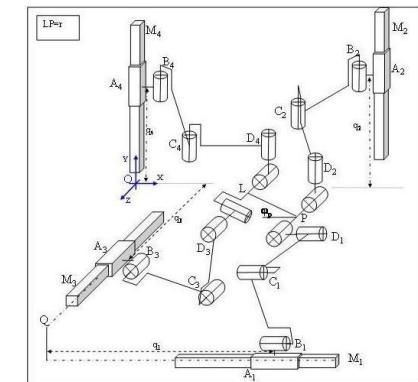
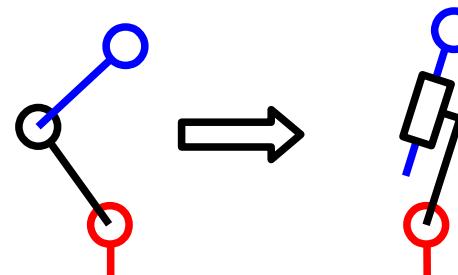
## Approach 4: Modification of a few structural parameters

**Example:** changing the output direction of a transmission mechanism by adjusting only the inter-stage angles [Fauroux 2002]



## Approach 5: Substitution of a part of a mechanism

**Example:** replacing a folding leg by a prismatic leg of the same mobility in a parallel robot of the Isoglide family



## Approach 6: Inference based on existing mechanisms

**Example 1:** from {Mechanism M1 with property P1, Mechanism M2 with property P2}, it is possible to design M3 with both P1 and P2

**Example 2:** from {Mechanism M1 with property P at level L1, Mechanism M2 with property P at level L2}, it is possible to design M3 with property P at level  $L1+k(L2-L1)$  with  $k \in [0,1]$  (level interpolation)



## Approach 7: Changing the input link / output link in a mechanism

# Conclusion : thinkMOTION...

## ...has Educational objectives

- **Digitizing** and **organizing** a huge content on machines and mechanisms
- Technical and cultural **heritage** from Europe
- **Free access** for all from the digital European library [www.europeana.eu](http://www.europeana.eu)



## ...has long term research potential

- Reflection on a **neutral file format** for mechanisms
- **Taxonomy** of machines
- Innovative **design methods** by intelligent re-use of knowledge (methodology and CAD aspects)



think  
MOTION !

## ...needs you !

- As a **teacher**, with your **students**
- As a **researcher**
- Because it is a huge and ambitious goal that requires help from every volunteer and **will be continued** after this project

Every contributor will  
be cited by name/URL