Georgia Institute of Technology

Collaborative Distributed Design of the gtMotorsports mini-Formula racecar

by Tord Dennis - tdennis@cad.gatech.edu

Overview

In the summer of 2000, we organized nine student teams in ME4041 to build the gtMotorsports mini-Formula racecar using the I-DEAS CAD/CAM/CAE package in a distributed environment utilizing dissimilar computer operating systems (UNIX & NT). The project began on 6/20/2000 and concluded on 7/25/2000. The project was divided into the following subsystems:

 ➢ Engine
 ➢ Intake system
 ➢ Exhaust system
 ➢ Chassis
 ➢ Front suspension
 ➢ Front brakes
 ➢ Rear suspension
 ➢ Drivetrain
 ➢ Steering and pedals

Although the designs were based on an actual physical car, the car was in England from 6/26 to 7/21 forcing the students to rely on photographs, spare parts, non I-DEAS CAD drawings/models and dimensions gathered by other team members.
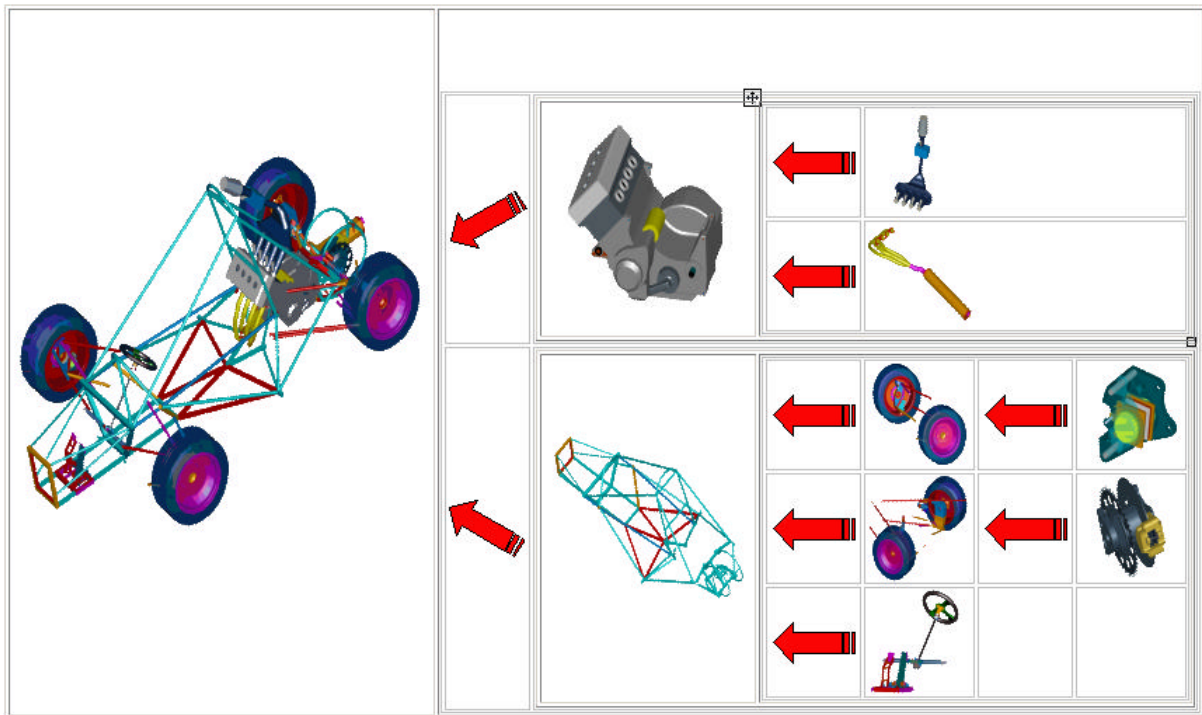
Another major problem to overcome was the task of interfacing the subsystems and understanding the interdependencies between teams:

 i.e. the Intake team relied on port dimensions from the Engine team who fed the Chassis team with their mounting points.
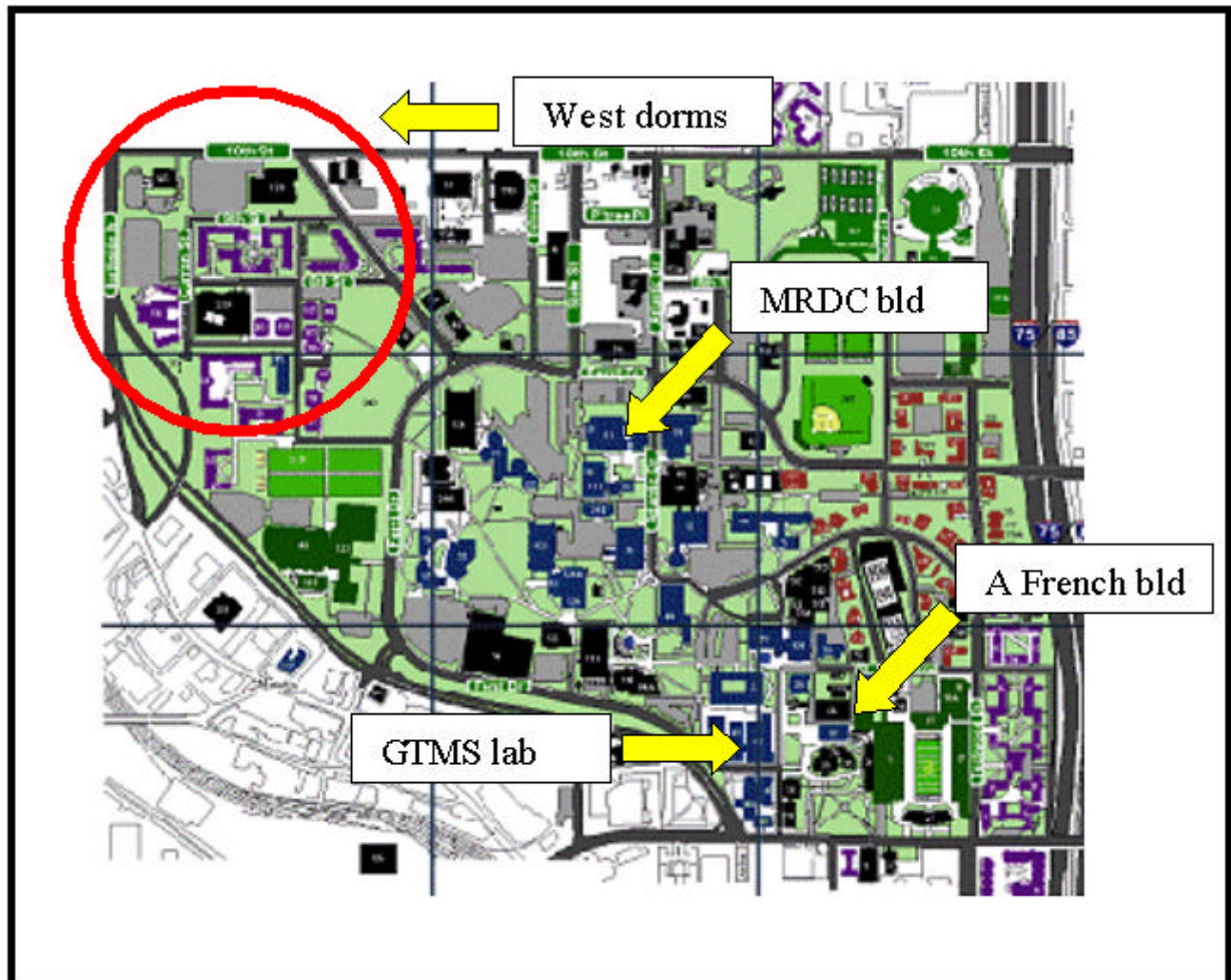
All of the model data developed was exchanged between engineers using the I-DEAS Team Data Management (TDM) system.

A part numbering schema was also instituted to keep consistency in naming convetion.

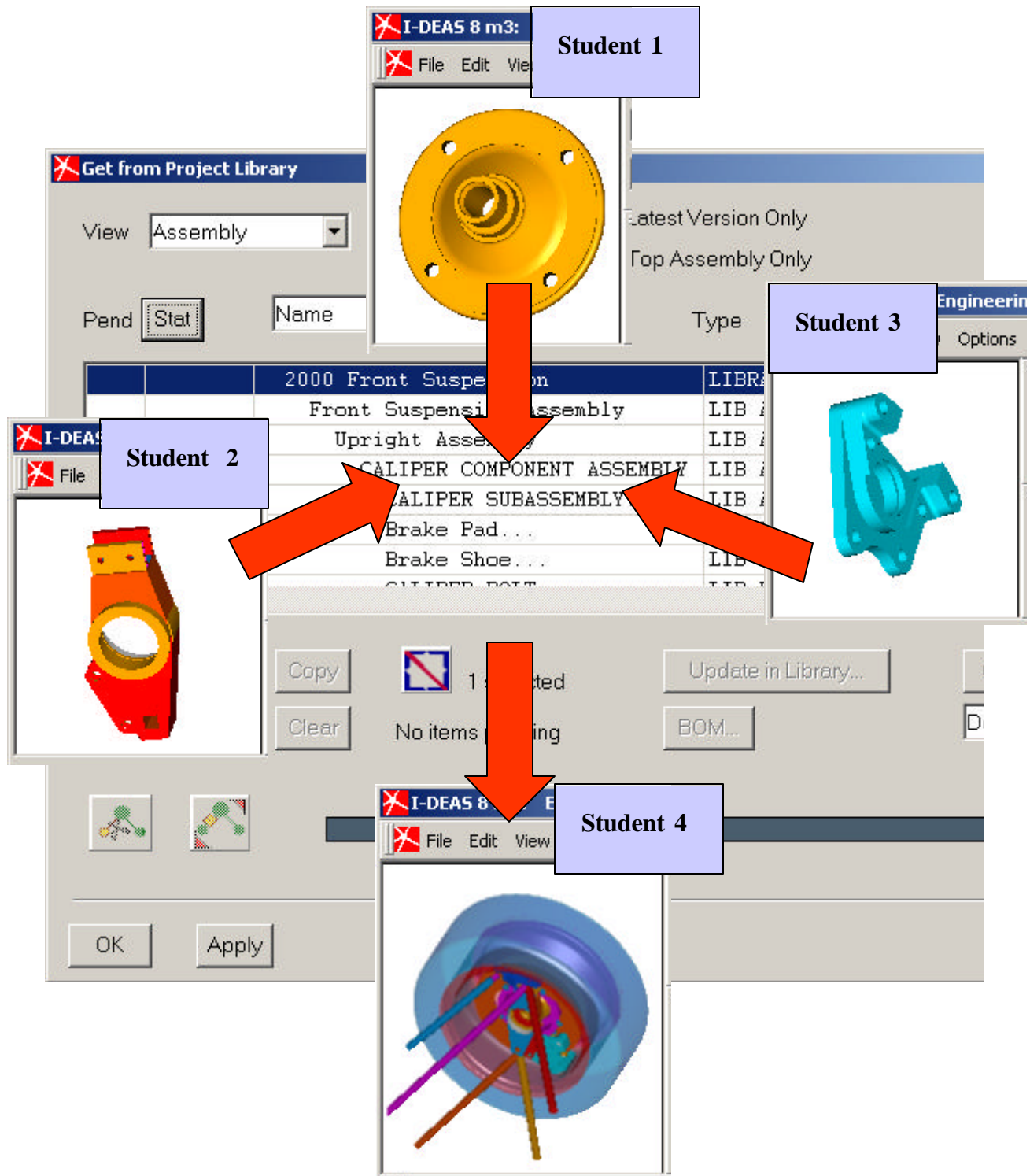# ME4041/gtMotorsports subsystems

GT Distributed environment

West dorms

MRDC bld

A French bld

GTMS lab

The TDM data exchange

Georgia Institute of Technology

GT Lab setup

UNIX Lab
    * Hardware
- 10 seats - SUN Ultra 10 (Solaris 7)
- 16 seats - SGI Octane (IRIX 6.5)
- 1 instructional machine (SGI O2)
- 1 SUN Ultra 60 server (Solaris 7)
- overhead projector
- 100 Mbit switched ethernet

    * Software - Solaris 7 and Samba 2.0.5a
- NFS v2 mounted user home
- NFS v3 mounted UNIX team directory

    * Software - I-DEAS MS 7m1
- A502 package loaded locally
- SFAM2
- configured projects

NT Lab
    * Hardware
- 16 seats - Pentium III
- 1 instructional machine
- 1 server
- overhead projector
- 100 Mbit switched ethernet

    * Software - Windows NT 4.0 Service Pack 6a w/ hot fixes
- mapped user home
- mapped UNIX team directory
- policies
- quotas

    * Software - I-DEAS MS 7m1 & I-DEAS Student Edition 1
- A502 package loaded locally
- SFAM2
- configured projects

Part Numbering Schema

All CAD entities (parts & assemblies) will have part numbers. The numbering scheme will follow the pattern: XXXX-YYY-ZZZ

XXXX		Car Model Year
YYY		Subcomponent
	000	Entire Assembly
	100	Engine Assembly
	200	Intake System Assembly
	300	Exhaust System Assembly
	400	Rear Suspension Assembly
	500	Drivetrain & Brakes Assembly
	600	Fronts Suspension Assembly
	700	Brakes Assembly
	800	Steering & Pedals Assembly
	900	Frame Assembly

YYY		Subcomponent
	110	Engine Parts
	210	Intake System Parts
	310	Exhaust System Parts
	410	Rear Suspension Parts
	510	Drivetrain & Brakes Parts
	610	Fronts Suspension Parts
	710	Brakes Parts
	810	Steering & Pedals Parts
	910	Frame Parts

ZZZ   Instance number

Example: 2000-100-000 is the top level engine assembly of the 2000 model year car.
2000-100-001 is a sublevel engine assembly (i.e., head assembly).
2000-110-001 is a part in the engine.

ME4041/gtMotorsports Directed Graph

Engine

Frame

Exhaust

Rear Suspension

Steering & Pedals

Intake & Fuel

Front Suspension

Drivetrain & Rear Brakes

Brakes