

# **The Future of MEDYNA and its Integration in ADAMS/Rail**

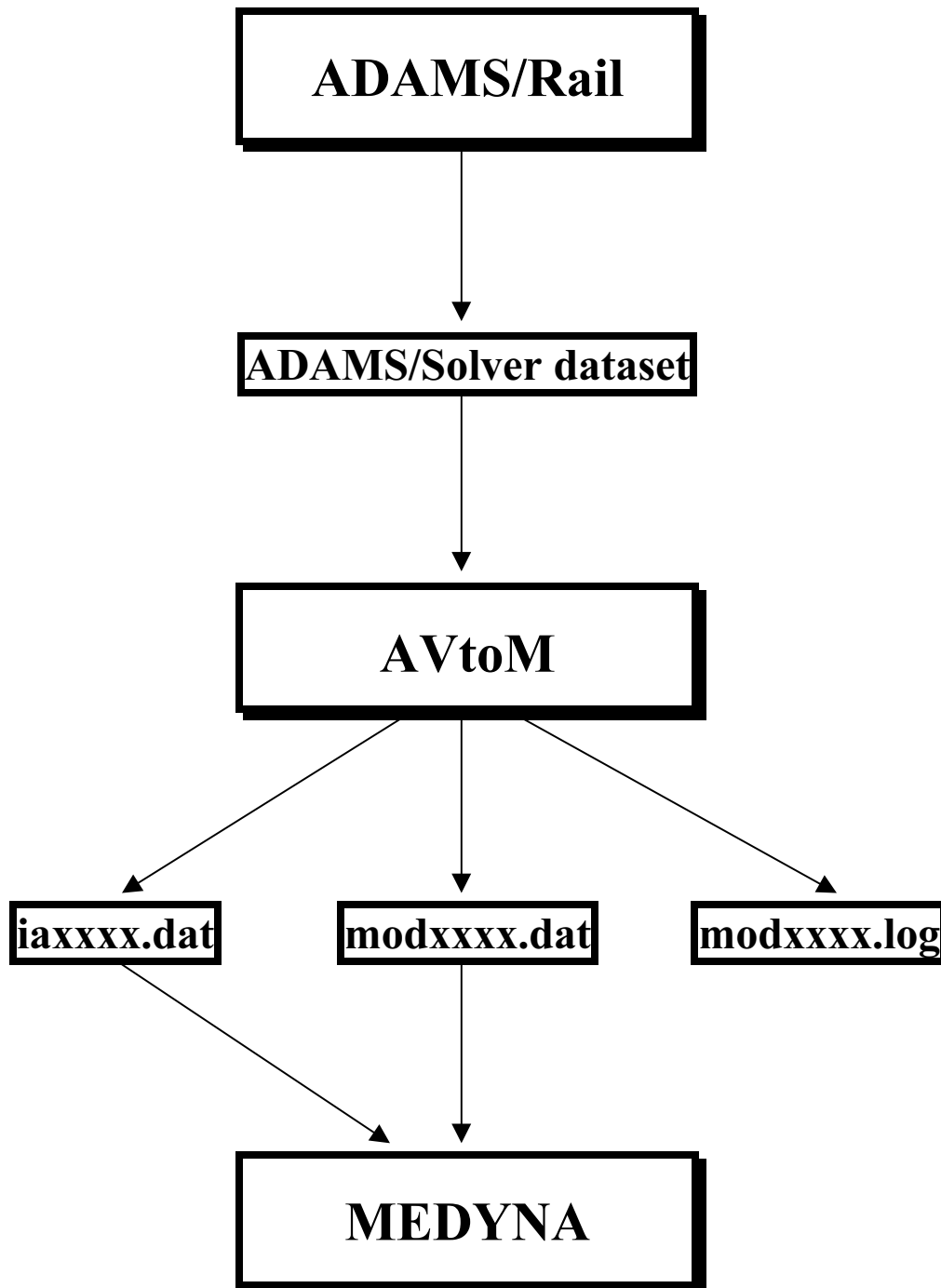
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**ARGECARE**

**Utrecht, April 1999**

## Model data transfer ADAMS/Rail to MEDYNA



## Log file mod0021.log

### AVtoM Logfile

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PART 1: List of not or not completely translated statements  
from ADAMS/Rail to MEDYNA via AVtoM

State = 1 - Statement is unknown to AVtoM  
2 - Statement is known but not translated  
3 - Statement is known but only partly translated  
with correct topology but without force law

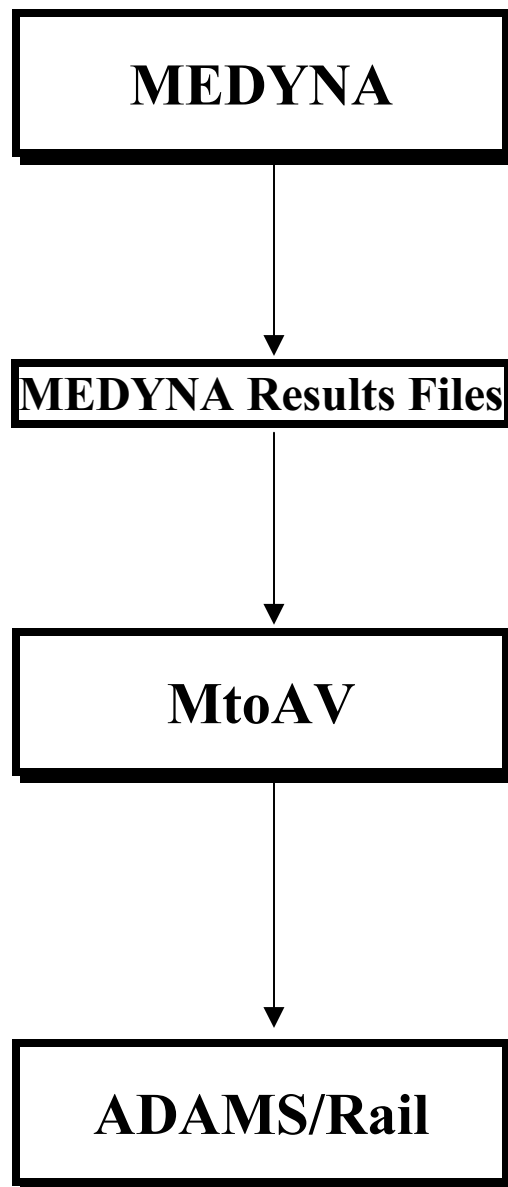
State	Statement	ID	Name
2	GRAPHICS	52	profil_GCU
2	UCON	1	wst_7_trf_ucon
3	SFORCE	1	wst_7_bistop
3	SFORCE	2	wst_6_bistop
3	SFORCE	3	wst_2_bistop
3	SFORCE	4	wst_1_bistop
3	SFORCE	5	wst_7_stfy
3	SFORCE	6	wst_6_stfy
3	SFORCE	7	wst_2_stfy
3	SFORCE	8	wst_1_stfy
3	SFORCE	9	wst_7_stfg
3	GFORCE	1	wst_7_gfo
3	GFORCE	2	wst_6_gfo
3	GFORCE	3	wst_2_gfo
3	GFORCE	4	wst_1_gfo
2	STRING	1	data_file
1	SPLINE	1	track_psd_spline_z
1	SPLINE	2	track_psd_spline_y
1	SPLINE	3	track_psd_spline_g
2	CURVE	1	profil_CUR
2	PTCV	1	wst_7_trf_ptcv1
2	REQUEST	1	reqset_100
2	OUTPUT		
2	RESULTS		

PART 2: Wheel/Rail-Contact

Conditions for nonlinear w/r-contact (KE21) fulfilled  
Conditions for linear w/r-contact (KE22) not fulfilled

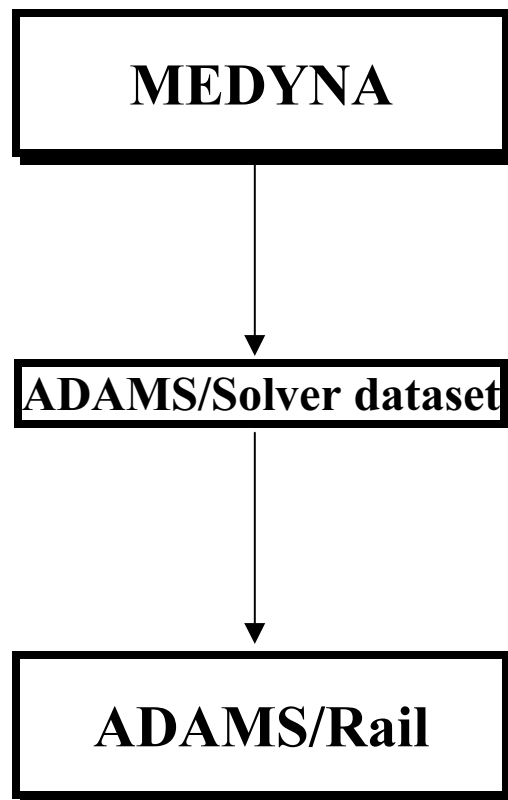
## **Data transfer MEDYNA to ADAMS/Rail**

### **Animation of the MEDYNA-Results**



## **Model data transfer MEDYNA to ADAMS/Rail**

### **Translation of the model data**



## Dialog to define the nonlinear Wheel/Rail connection element (CE21)

The dialog box, titled "Interfaces", contains the following fields and options:

- Export to MEDYNA**:
- Adams file name**: avtom
- Medyna model number**: 1111
- Wheel-rail contact element**: Non linear (KE21)
- Friction coefficient**: 0.4
- Kalker factor**: 1.0
- Young's Modulus**: 8.0E10
- Poisson's Ratio**: 0.28
- Distance contact point rail**: 0.753
- Roll distance**: 0.75
- Inclination**: 0.025
- Wheel**: S1002
- Rail**: UIC60

Buttons: Cancel, OK

## Dialog to define the linear Wheel/Rail connection element (CE22)

**Interfaces**

Export to MEDYNA

Adams file name: avtom

Medyna model number: 2222

Wheel-rail contact element: Linear (KE22)

Friction coefficient: 0.4

Kalker factor: 1.0

Young's Modulus: 8.0E10

Poisson's Ratio: 0.28

Distance contact point rail: 0.753

Roll distance: 0.75

Roll angle par	Conicity	Contact angle par
8e-2	0.13	12.5
f11	f22	f23
1.4e7	1.1e7	2e4

Cancel OK

## Supported Data Statements of ADAMS

### **ACCGRAV**

Defines gravitational forces.

### **BUSHING**

Defines a massless bushing with linear stiffness and damping (MEDYNA: Coupling Element 61).

### **END**

Indicates the end of a dataset.

### **FIELD**

Applies a translational and a rotational action - reaction force between two markers (MEDYNA: Coupling Element 61).

### **JOINT**

Describes a physically recognizable combination of constraints (MEDYNA: Coupling Element 13).

### **JPRIM**

Describes a joint primitive, which constraints one, two or three degrees of translational or rotational freedom (MEDYNA: Coupling Element 13).

### **LIST/NOLIST**

Allows and suppresses output of the input data.

### **MARKER**

Identifies a spatial location and orientation.

### **MATRIX**

Permits the user to input a general matrix of constant.

### **PART**

Defines the inertial properties of a rigid body and its initial position, orientation, and velocity.

### **SPRINGDAMPER**

Applies a linear stiffness and damping force or torque between two markers (MEDYNA: Coupling Elements 41, 42, 44, 45).

### **TITLE**

Describes the dataset.

### **UNITS**

Sets the appropriate units.

## Supported Main Routines of MEDYNA

### MODEL

Designation of a multibody model and the simulation run.

### KONFIG

Geometric configuration of the multibody system (Coordinate systems, number of bodies and body specific data).

### VERBIN

Interconnection data (Body and node numbers, coupling element types and their model parameters).

Realized: Coupling Elements

- 13 - Kinematic constraints,
- 21 - Non-linear wheel-rail coupling element,
- 22 - Quasi-linear wheel-rail coupling element,
- 41 - Linear translational spring,
- 42 - Linear torsional spring,
- 44 - Linear viscous translational damper,
- 45 - Linear viscous torsional damper,
- 46 - Linear translational springs and dampers in a series connection,
- 47 - Linear torsional springs and dampers in a series connection,
- 61 - Linear compact spring-damper.

### REFSYS

Velocity and acceleration of the reference frame.

Realized: Undisturbed straight track.

### ROTOR

Symmetric rotors whose angular momentum should be considered.