Einstein HX Calculation – Developer Manual

The actual Version (18.10.2010) is merged with the Streambranch from the sourceforge git repository (14.10.2010).

1. New Modules for HX

The main Heat exchanger Calculation module is located in einstein/modules/energystreams.

Module	Purpose
CurveCalculation.py	Calculation of the HX Network Curves (CCC, HCC, GCC)
DistributionLineStreamSet.py	Functions for Calculation of Distribution Lines (Former Distribution Lines were saved here) main Distribution Line Functionaliy can be found in StreamGeneration.py class DistLineStreams
EquipmentStreamSet.py	Functions for Calculation of Equipments. Holds Helper Functions to calculate Streams (gets Line per Equipment etc.)
HXCalculation.py	
ProcessStreamSet.py	Calculation Functions for Processes. This file contains the two calculation modes for processes (e.g. batch, continuous)
Stream.py	Collection of Classes with the purpose to store Heat Exchanger and Stream Data at runtime and into the database.
StreamConstants.py	Constants (python Lists) to assign a Stream-Type to a Stream
StreamGeneration.py	The StreamGeneration Classes create all Streams, get the data from the database and calculate them.
StreamSet.py	StreamSet contains calculation methods that are shared by all streams.
WasteHeatElectricalStreamSet.py	Only minimal functionality is used of this class. Soon to be moved.

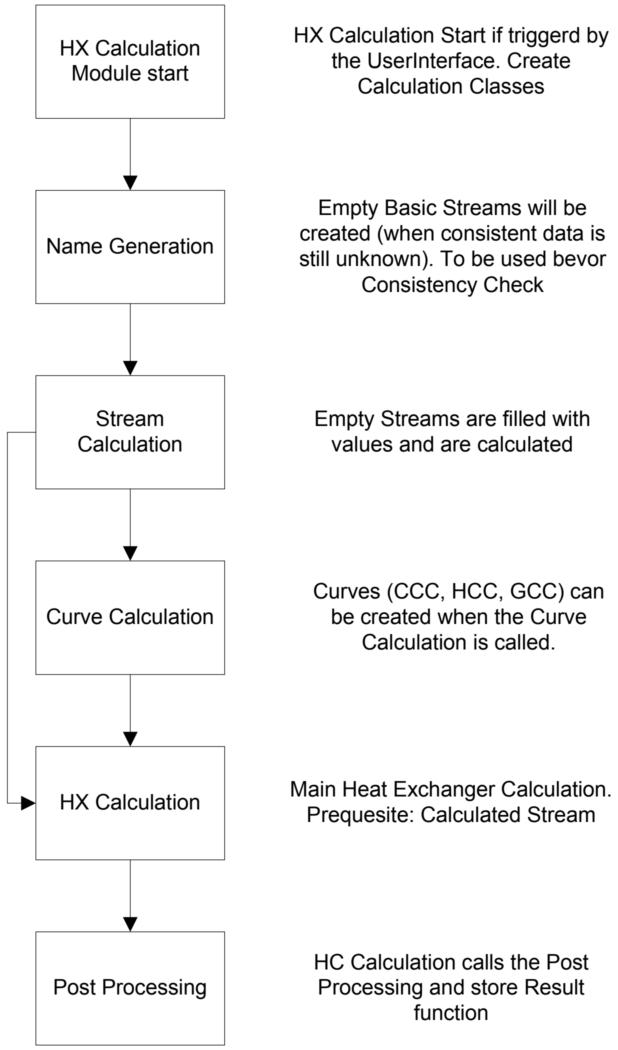
All HX Calculation Files that are not listed in this table are outdated and/or not in use anymore.

2. *Changes on other modules*

The following modules needed to be changed in order for the new HX module to work accordingly:

Module	Changes
dataHR.py	New Function storeHXData to store the calculated Heat Exchanger in the Database
interfaces.py	Function calcQ_Tt to create the Matrix needed for Post-Processing. Variables to store new Schedules.
moduleHR.py	Function doHXPostProcessing created to simulate the original Post Processind and call storeResults
processes.py	Create custom Schedules (UPH_m_t,etc.) in createAggregateDemand
schedules.py	Stores intermediate Step in schedule.fav calculation
panelHR.py	Initialization of the new Heat Exchanger module
panelQ6.py	User Interface adapted to the new needs of the Heat Exchanger Modules

3. General Program flow


HX Calculation Module start
HX Calculation Start if triggerd by the UserInterface. Create Calculation Classes
Name Generation
Empty Basic Streams will be created (when consistent data is still unknown). To be used bevor Consistency Check
Stream Calculation
Empty Streams are filled with values and are calculated
Curve Calculation
Curves (CCC, HCC, GCC) can be created when the Curve Calculation is called.
HX Calculation
Main Heat Exchanger Calculation. Prequesite: Calculated Stream
Post Processing
HC Calculation calls the Post Processing and store Result function

4. Detailed Module Description

5. Database Changes and Additions

According to the Filechanges a couple of Database Additions were needed.

New Tables:

pinchstream

Variable	Type	Description
id	int(11)	Primary Key
name	varchar(255)	Every Stream has a distinct name
Hot_Cold	varchar(6)	Stream is Hot or Cold
Type	varchar(8)	Startup, Circulation, Exhaust gas, etc.
source_id	int(11)	Database ID to link to the data origin
source_type	varchar(64)	Process, Equipment, WHEE, etc.
medium_id	int(11)	Database ID to link to the origin of the medium
StartTemp	double	Stream Start Temperature
EndTemp	double	Stream End Temperature
StreamType	varchar(64)	Sensible or latent
HeatCapacity	double	Heat Capacity
MassFlowNom	double	Nominal Mass Flow Rate
SpecHeatCapacity	double	Specific Heat Capacity
SpecEnthalpy	double	Specific Enthalpy
EnthalpyNom	double	Nominal Enthalpy
HeatTransferCoeff	double	Heat Transfer Coefficient

Heatexchanger_pinchstream

Variable	Type	Description
id	int(11)	Primary Key
qheatexchanger_ Id	int(11)	Foreign Key into qheatexchanger
pinchstream_id	int(11)	Foreign Key into pinchstream
inletTemp	double	Stream Inlet Temperature
outletTemp	double	Stream Outlet Temperature
outletOfHX_id	int(11)	Key to outlet of a Heat Exchanger
inletOfHX_id	int(11)	Key to inlet of a Heat Exchanger
HeatFlowPercent	int(11)	Used heat flow in Percent

6. Other Changes

Module	Changes
HelperClass.py	Path of configfile changed to os.path.join(sys.path[0], ConfigFile)
importHR.py	Bugfix Function getPoints
dialogDatabase.py	Path of Einstein.ini changed to inifile = os.path.join(sys.path[0], 'einstein.ini')