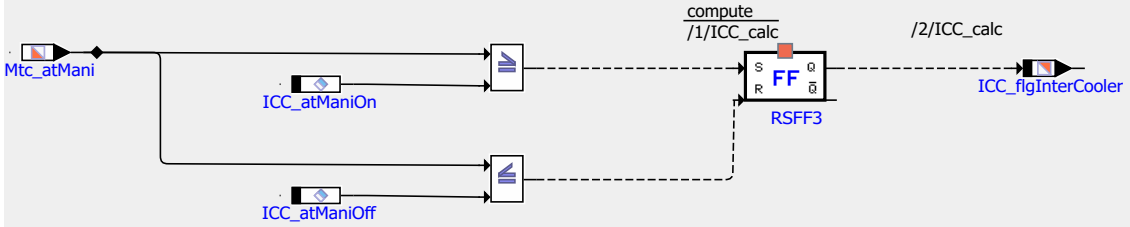
Icc - Inter Cooler Calculation

1 [Inter Cooler Calculation]

1.1 [Overview]

Figure 1: [Icc Function Overview]

Figure 2: [InterCoolerControl.Main]



1.2 Steuerung des Ladeluftkühlers [Steuerung des Ladeluftkühlers]

Der Ladeluftkühler hat die Aufgabe die Luft nach dem Verdichten durch den Turbolader abzukühlen. Je kälter die Luft, desto höher ist die Luftdichte. Dadurch wird eine höhere Luftfüllung im Brennraum erreicht. Außerdem wird die Klopfneigung des Motors reduziert.

Die Steuerung des Ladeluftkühlers sorgt dafür, dass ab einer bestimmten Ansaugtemperatur der Lüfter angeschaltet wird. Die Temperatur wird mit dem Saugrohrtemperatursensor (in K) gemessen. Die Einschalttemperatur wird im Parameter ICC_atManiOn und die Ausschalttemperatur im Parameter ICC_atManiOff vorgegeben. Durch Vorgabe einer höheren Einschalttemperatur als die Ausschalttemperatur entsteht eine Hysterese, so dass der Lüfter nicht zu oft ein- und ausgeschaltet wird. Die Variable ICC_flgInterCooler aktiviert den Ladeluftkühler.

2 [C-Code Source]

2.1 [Code Listing]

```
/* BEGIN: ASCET REGION "Generation Information" */
/*****************************************************************************
 * BEGIN: Generation Information
 *----------------------------------------------------------------------------
 * Component:.............Module
 * Name:..................."InterCoolerControl"
 * Implementation:........."Impl"
 * Dataset:................"Data"
 * Specification:.........Block Diagram
 * Version:...............<empty String>
 * Library Path:..........."smartm160\Project_SmartM160\Function_Modules"
 *----------------------------------------------------------------------------
 * Project Name:..........."FlexECU_M160"
 * Project Library Path:....."smartm160\Project_SmartM160\"
 *----------------------------------------------------------------------------
 * Generation Date:.......03.12.2014
 * Generation Time:.......13:41:34
 *----------------------------------------------------------------------------
 * ASCET Version:.........V6.1.4 RB-DGS 2.3
 * ASCET-MD Version:......V6.1.4
 * ASCET-RP Version:......V6.1.4
 * ASCET-SE Version:......V6.1.4.28.19 CID[610]
 *----------------------------------------------------------------------------
 * END: Generation Information
 *****************************************************************************/
/* END: ASCET REGION "Generation Information" */

/* BEGIN: ASCET REGION "Project Options" */
/*****************************************************************************
 * BEGIN: Project Options "Build"/"Code"
 *----------------------------------------------------------------------------
 *    Build
 *----------------------------------------------------------------------------
```

```
 * Code Generator:...........Object Based Controller Implementation
 * Compiler:................Microsoft Visual C++ 2008
 * Operating System:.........GENERIC_OSEK
 * Target:..................ANSI-C
 *-----------------------------------------------------------------------------
 *    Code
 *-----------------------------------------------------------------------------
 * Add Comment with Generation Information for each Component [true]: true
 * Add Comment with Implementation Information for each Assignment Statement [true]: true
 * Add Comment with Specification Source for each Statement [true]:..true
 * Add parenthesis for readability [false]:.........................false
 * Casting [MISRA]:................................................MISRA
 * Force Parenthesis for Binary Logical Operators [false]:..........false
 * Generate Define Directives for Enum Values [false]:..............false
 * Prefix for Component Names [<empty String>]:.....................<empty String>
 * Protected against division by zero [true]:.......................true
 * Protected Division against Signed Overflow [true]:...............true
 * Protected Vector Indices [true]:.................................true
 *-----------------------------------------------------------------------------
 *    Code.Compiler
 *-----------------------------------------------------------------------------
 * Division truncation direction [Zero (T-division)]:...............Zero (T-division)
 * Inline directive [__inline]:.....................................__inline
 * Integer Bit Size [32]:...........................................32
 * Private directive [static]:......................................static
 * Public directive [<empty String>]:...............................<empty String>
 *-----------------------------------------------------------------------------
 *    Code.FixedPoint
 *-----------------------------------------------------------------------------
 * Allow Double bit Size for Division Numerators [true]:............true
 * Allow Limit Service for Assignment Limitation [true]:............true
 * Arithmetic Service Set [<None>]:.................................<None>
 * Generate Limiters (may be changed locally) [true]:...............true
 * Generate Round Operation on float to integer Assignment [true]:...true
 * Maximum bit Length (float) [64]:.................................64
 * Maximum bit Length (int) [32]:...................................32
 * Result on Division by Zero [numerator]:..........................numerator
 * Temp Vars always 32 bit (integer) [false]:.......................false
 * Use power of 2 approximations of literals [false]:...............false
 * Use SHIFT Operation on Signed Values instead of DIV Operation [true]: true
 * Use SHIFT Operation on Signed Values instead of MUL Operation [true]: true
 *-----------------------------------------------------------------------------
 *    Code.Optimizations
 *-----------------------------------------------------------------------------
 * Auto-inline private methods (Smaller code-size - may be changed locally) [false]: false
 * Generate well-formed switch [false]:.............................false
 * Hierarchical Code-Generation (may be changed locally) [false]:....false
 * Initialise history variable with zero [false]:...................false
 * Optimize Direct Access Methods (Multiple Levels) [false]:........false
 * Optimize Direct Access Methods (One Level) [false]:..............false
 * Optimize Static Actions (Restricted Modelling) [false]:..........false
 * Outline Generated Methods (may be changed locally) [false]:.....false
 *-----------------------------------------------------------------------------
 *    Code.Production
 *-----------------------------------------------------------------------------
 * Add Implementation Definitions [true]:...........................true
 * Generate Access Macros for [(variables, messages)]:..............(variables, messages)
 * Generate Access Methods for dT (Alternative: use OS dT directly) [true]: true
 * Generate Data Structures [USELOCAL]:.............................USELOCAL
 * Generate Map File [true]:........................................true
 * Generate OS Configuration [true]:................................true
 *-----------------------------------------------------------------------------
 *    Station.Build
 *-----------------------------------------------------------------------------
 * Use Customized Data Type Names [false]:..........................false
 *-----------------------------------------------------------------------------
 * END: Project Options "Build"/"Code"
 ******************************************************************************/
/* END: ASCET REGION "Project Options" */
/* BEGIN: ASCET REGION "ASCET-SE AddOn Options" */
/*****************************************************************************
 * BEGIN: ASCET-SE AddOn Options
 * ---------------------------------------------------------------------------
 *     Code
 * ---------------------------------------------------------------------------
 * checkMemSectionVolatility [true]:................................false
 * checkMultipleSend [false]:.......................................false
 * distribVarMemClass ["DISTRRAM"]:.................................."RAM"
 * genAlwaysInitValues [false]:.....................................true
 * genLogicElementsAs [PACKED_BITFIELD]:............................PACKED_BITFIELD
 * genObjList [false]:..............................................false
 * implInfoComments [true]:.........................................true
 * initTaskMemClass ["ASD_INIT_TASK_MEM"]:..........................."ASD_INIT_TASK_MEM"
 * isrMemClass ["ASD_ISR_MEM"]:......................................"ASD_ISR_MEM"
 * mainMemClass ["ASD_EXT_CODE_MEM"]:..............................."ASD_EXT_CODE_MEM"
```

```
 * optimizeUnusedCode [true]:.....................................true
 * paramAsSysConst [false]:.......................................false
 * pragmaMemClassAtDecl [false]:..................................false
 * pragmaMemClassEnabled [true]:..................................false
 * referenceMemClass ["REFRAM"]:..................................."RAM"
 * shortNames [false]:............................................false
 * taskMemClass ["ASD_TASK_MEM"]:................................."ASD_TASK_MEM"
 * virtualParameterMemClass ["VIRT_PARAM"]:......................."VIRT_PARAM"
 * ---------------------------------------------------------------------------
 *     Code.Appearance
 * ---------------------------------------------------------------------------
 * braceLineFeed [true]:..........................................true
 * genDate [<undef>]:.............................................<undef>
 * genTime [<undef>]:.............................................<undef>
 * generateSignatureDecorationComments [true]:....................true
 * lineFeedPosition [LEFT]:.......................................LEFT
 * maxIdentLength [0]:............................................40
 * maxRightLength [60]:...........................................60
 * minLeftLength [8]:.............................................8
 * preventIndentStructInit [true]:................................true
 * ---------------------------------------------------------------------------
 *     OS
 * ---------------------------------------------------------------------------
 * Os-Config-C_gen_declaration_alarms [false]:....................false
 * Os-Config-C_gen_declaration_appmodes [false]:..................false
 * Os-Config-C_gen_dt_calc [false]:...............................true
 * Os-Config-C_gen_initCOM [false]:...............................false
 * Os-Config-C_gen_inittask [false]:..............................true
 * Os-Config-C_gen_main [false]:..................................false
 * Os-Config-C_gen_process_container [false]:.....................true
 * Os-Config-C_gen_startuphook [false]:...........................false
 * asd_exclusive_area ["ASD_EXCLUSIVE_AREA"]:......................"ASCET_exclusive_area"
 * messageDoInit [false]:.........................................false
 * messageExternalMessageCopies [false]:..........................false
 * messageGenOSEKDeclarations [true]:.............................false
 * messageIgnoreUsageInInitTask [false]:..........................false
 * messageOverloadInitValues [<undef>]:...........................<undef>
 * messageUsageVariant [OPT_COPY]:................................NON_OPT_COPY
 * modularMessageUse [false]:.....................................false
 * osAppModePattern ["%name%"]:...................................."appmode_%name%"
 * osStartupFunction [<undef>]:...................................<undef>
 * ---------------------------------------------------------------------------
 *     OS.OIL
 * ---------------------------------------------------------------------------
 * OIL-COOP-RESOURCE-name ["ASD_Cooperative_Res"]:................."ASD_Cooperative_Res"
 * OIL-outputFile ["temp.oil"]:...................................."temp.oil"
 * ---------------------------------------------------------------------------
 *     SERAP
 * ---------------------------------------------------------------------------
 * SERAPRefPageMemoryClass ["SERAP_REF"]:........................."SERAP_REF"
 * SERAPWorkPageMemoryClass ["SERAP_WORK"]:......................."SERAP_WORK"
 * serap [false]:.................................................false
 * serapEmbedded [true]:..........................................true
 * ---------------------------------------------------------------------------
 *     Virtual Address Tables
 * ---------------------------------------------------------------------------
 * addressTable [true]:...........................................false
 * addressTableMemoryClass ["VATROM"]:............................."VATROM"
 * ---------------------------------------------------------------------------
 * END: ASCET-SE AddOn Options
 ******************************************************************************/

/* END: ASCET REGION "ASCET-SE AddOn Options" */
/* BEGIN: ASCET REGION "Module Data Definitions" */

/*****************************************************************************
 * BEGIN: DEFINITION OF SUBSTRUCT VARIABLE 'ICC_1_RAM'
 * ---------------------------------------------------------------------------
 * memory class:..............................'RAM'
 * model name:................................'ICC_1'
 * data set:..................................'INTERCOOLERCONTROL_IMPL_Data'
 * ---------------------------------------------------------------------------*/
struct INTERCOOLERCONTROL_IMPL_RAM_SUBSTRUCT ICC_1_RAM = {
   /* substruct: ICC_1_RAM.RSFF3 (modeled as:'RSFF3.ICC_1') */
   {
      /* struct element:'ICC_1_RAM.RSFF3.status' (modeled as:'status.RSFF3.ICC_1') */
      false
   }
};
/* ---------------------------------------------------------------------------
 * END: DEFINITION OF SUBSTRUCT VARIABLE 'ICC_1_RAM'
 ******************************************************************************/

/*****************************************************************************
 * BEGIN: DEFINITION OF COMPONENT VARIABLE 'ICC_1'
```

```
 * ------------------------------------------------------------------------
 * memory class:..............................'ROM'
 * model name:................................'ICC_1'
 * data set:..................................'INTERCOOLERCONTROL_IMPL_Data'
 * ------------------------------------------------------------------------*/
const struct INTERCOOLERCONTROL_IMPL ICC_1 = {
   /* substruct: ICC_1.RSFF3 (modeled as:'RSFF3.ICC_1') */
   {
      /* type descriptor pointer 'RSFF_IMPL_RAM' for memory class substruct for 'RAM' */
      &ICC_1_RAM.RSFF3
   }
};
/* ------------------------------------------------------------------------
 * END: DEFINITION OF COMPONENT VARIABLE 'ICC_1'
 ************************************************************************/

/* END: ASCET REGION "Module Data Definitions" */

/* BEGIN: ASCET REGION "Exported Data Definitions" */

/************************************************************************
 * BEGIN: DEFINITION OF VARIABLE 'ICC_atManiOff'
 * ------------------------------------------------------------------------*/
const uint16 ICC_atManiOff = 40064;
   /* min=0.0078125, max=511.9921875, fac_128, limit=yes */
/* ------------------------------------------------------------------------
 * END: DEFINITION OF VARIABLE 'ICC_atManiOff'
 ************************************************************************/


/************************************************************************
 * BEGIN: DEFINITION OF VARIABLE 'ICC_atManiOn'
 * ------------------------------------------------------------------------*/
const uint16 ICC_atManiOn = 40704;
   /* min=0.0078125, max=511.9921875, fac_128, limit=yes */
/* ------------------------------------------------------------------------
 * END: DEFINITION OF VARIABLE 'ICC_atManiOn'
 ************************************************************************/

/* END: ASCET REGION "Exported Data Definitions" */

/************************************************************************
 * BEGIN: DEFINITION OF MESSAGES
 * ------------------------------------------------------------------------
 * Total size is [bytes]:.....................1
 * ------------------------------------------------------------------------*/
/* messages of memory class:.....................................'RAM' */
/* messages of size [bytes]:.....................................1 */
/* modelled as 'ICC_flgInterCooler' */
uint8 ICC_flgInterCooler;
/* ------------------------------------------------------------------------
 * END: DEFINITION OF MESSAGES
 ************************************************************************/

#define _ICC_atManiOff ICC_atManiOff
#define _ICC_atManiOn ICC_atManiOn
#define _RSFF3 ICC_1.RSFF3
#define _RSFF3_REF_ (&(ICC_1.RSFF3))

/* BEGIN: ASCET REGION "Component Functions" */
/************************************************************************
 * BEGIN: FUNCTIONS OF COMPONENT
 ************************************************************************/

/* BEGIN: ASCET REGION "Process Definition 'ICC_calc'" */
/************************************************************************
 * BEGIN: DEFINITION OF PROCESS 'INTERCOOLERCONTROL_IMPL_ICC_calc'
 * ------------------------------------------------------------------------
 * model name:................................'ICC_calc'
 * memory class:..............................'CODE'
 * ------------------------------------------------------------------------*/
//#if defined(COMPILE_UNUSED_CODE) || defined(COMPILE_UNUSED__INTERCOOLERCONTROL_IMPL_ICC_calc)
/* messages used by this process */

/* public ICC_calc []  */

void INTERCOOLERCONTROL_IMPL_ICC_calc (void)
{
   /* define local message copies */
   uint8 ICC_flgInterCooler__INTERCOOLERCONTROL_IMPL_ICC_calc;
   uint16 Mtc_atMani__INTERCOOLERCONTROL_IMPL_ICC_calc;
   /* receive messages implicitly */
   {
      DisableAllInterrupts();
      ICC_flgInterCooler__INTERCOOLERCONTROL_IMPL_ICC_calc = ICC_flgInterCooler;
```

```
      Mtc_atMani__INTERCOOLERCONTROL_IMPL_ICC_calc = Mtc_atMani;
      EnableAllInterrupts();
   }
   /* ICC_calc: sequence call #1  */
   RSFF_IMPL_compute(_RSFF3_REF_, Mtc_atMani__INTERCOOLERCONTROL_IMPL_ICC_calc <= _ICC_atManiOff,
 Mtc_atMani__INTERCOOLERCONTROL_IMPL_ICC_calc >= _ICC_atManiOn);
   /* ICC_calc: sequence call #2  */
   ICC_flgInterCooler__INTERCOOLERCONTROL_IMPL_ICC_calc = RSFF_IMPL_q(_RSFF3_REF_);
   /* send messages implicitly */
   {
      ICC_flgInterCooler = ICC_flgInterCooler__INTERCOOLERCONTROL_IMPL_ICC_calc;
   }
}
/* ---------------------------------------------------------------------------
 * END: DEFINITION OF PROCESS 'INTERCOOLERCONTROL_IMPL_ICC_calc'
 ***************************************************************************/
#endif
/* END: ASCET REGION "Process Definition 'ICC_calc'" */


/* ***************************************************************************
 * END: FUNCTIONS OF COMPONENT
 ***************************************************************************/
/* END: ASCET REGION "Component Functions" */
```