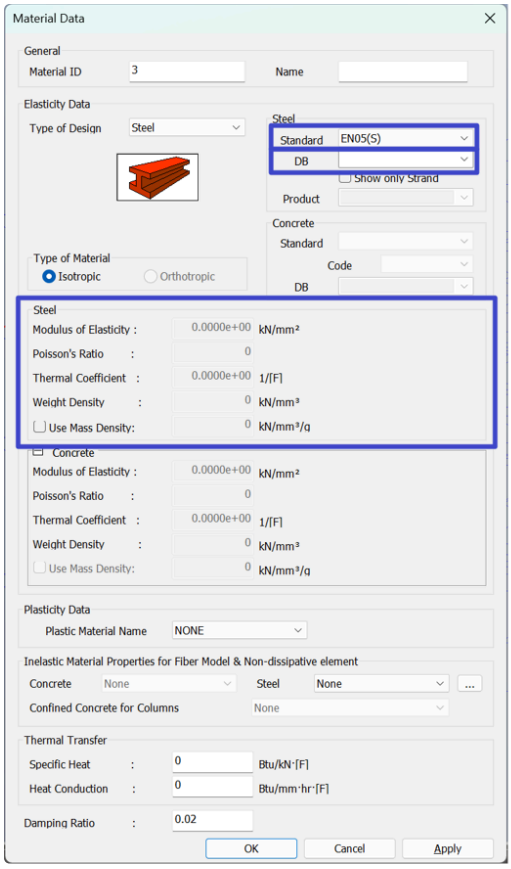
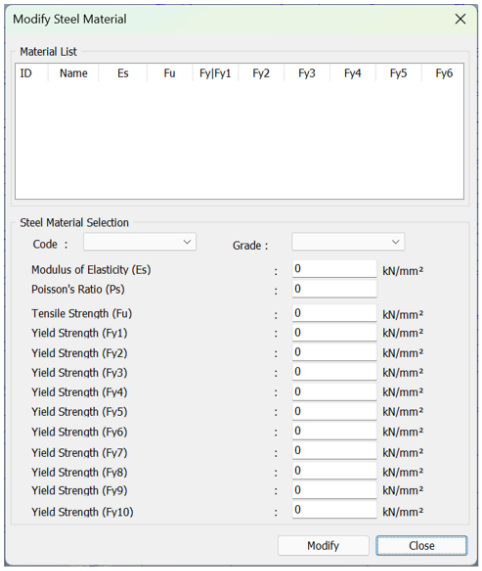
[25/09/09] Gen/Civil 철골 DB 추가 작업

요청 사항 (재질 기획 format)

- **Standard** : 국가별 표준 재질 code name
- **DB :** 국가별 표준 code name에 속한 강종 DB list
- **Data Unit** : 물성치를 정의하는 단위계.
  - length : mm, cm, m, in, ft
  - force : N, kN, kgf, tonf, lbf, kips
- **Data format**
  - Modulus of elasticity : E [unit : stress]
  - Poisson's ratio : nu [unit : none]
  - Thermal coefficient : alpha [unit : none]
  - Weight density : W[unit : density]
  - Tensile strength : Fu [unit : stress]
  - Yield strength : Fy [unit : stress]
  - Yield strength by thickness, Fy1~10 : code에서 제시하는 두께별 항복강도 (강종 별로 두께 범위에 따른 항복강도가 다름)
- **Standard의 default DB name 명시**
  - 예) KS22(S)의 default 값은 S275

- **Gen UI : Material Data**





- **Spec example** (Steel Material DB (RU)_REV0.xlsx)
  - Standart : SP 16_2017 (t.B3)
  - DB : C235 / C245 / C255 / C345K / C355 / C355-1; / C355-K / C355П / C390; / C390-1 / C440 / C550 / C590 / C690
  - Data unit : Length = mm, Force = N
  - Data format

DB	Es modulus of elasticity	nu possion's ratio	alpha thermal coefficient	W weight density	Fu* tensile strength	Fy* yield strength
UNIT	stress = F/L^2	none	none	density = F/L^3	stress = F/L^2	stress = F/L^2
C235	2.06E+05	0.3	1.20E-05	76.982		
C245	2.06E+05	0.3	1.20E-05	76.982		

C255	2.06E+05	0.3	1.20E-05	76.982		
C345K	2.06E+05	0.3	1.20E-05	76.982		
C355	2.06E+05	0.3	1.20E-05	76.982		
C355-1	2.06E+05	0.3	1.20E-05	76.982		
C355-K	2.06E+05	0.3	1.20E-05	76.982		
C355П	2.06E+05	0.3	1.20E-05	76.982		
C390	2.06E+05	0.3	1.20E-05	76.982		
C390-1	2.06E+05	0.3	1.20E-05	76.982		
C440	2.06E+05	0.3	1.20E-05	76.982		
C550	2.06E+05	0.3	1.20E-05	76.982		
C590	2.06E+05	0.3	1.20E-05	76.982		
C690	2.06E+05	0.3	1.20E-05	76.982		

C235	Fy1 / Fu1
Scope for t	$2 < t \leq 4$
Fy	230
Fu	350

C245	Fy1 / Fu1
Scope for t	2 < t ≤ 20
Fy	240
Fu	360

C255	Fy1 / Fu1	Fy2 / Fu2	Fy3 / Fu3	Fy4 / Fu4
Scope for t	2 < t ≤ 3,9	4 < t ≤ 10	10 < t ≤ 20	20 < t ≤ 40
Fy	250	240	240	230
Fu	370	370	360	360

구현 to-do list

- **재질 code name 등록**
  - wg_db>DBCodeDef.h

```
#define MATLCODE_STL_SP16_2017_TB3 _T("SP16.2017t.B3(S)")
```

  - code name과 match되는 enum 추가
    - build configuration 별로 요청된 위치에 enum add하는 방식

```
void CMatlDB::MakeMatlData_MatlType()
{
    enum
    {
        is_KS = 0, is_KS08, is_KS09, is_KS08_CIVIL, is_KS_CIVIL,
        is_ASTM, is_ASTM09, is_JIS, is_JIS_CIVIL, is_BS,
        is_DIN, is_EN, is_UNI, is_GB03, is_GB,
        is_JGJ, is_JTJ, is_JTG04, is_CSA, is_IS,
        is_CNS, is_CNS06, is_BS04, is_EN05, is_TB05,
        is_GOST_SP, is_KR_LRFD11, is_KS10_CIVIL, is_EN05P, is_EN05SW,
        is_GB12, is_GOST_SNIP, is_BC1_12_ASTM, is_BC1_12_BSEN, is_BC1_12_JIS,
        is_BC1_12_GB, is_BC1_12_CLASS2, is_BC1_12_CLASS3, is_JTG3362_18, is_EN10326,
        is_EN10149_2, is_EN10149_3, is_KS16, is_JTG_D64_2015, is_GB_50917_13,
        is_GB50018_02, is_JGJ2015, is_KS18, is_GB50017_17, is_TB10092_17,
        is_TB10091_17, is_ASNZS3678_17, is_ASNZS3679_17, is_ASNZS4672_17, is_GB19,
        is_QCR9300_18, is_CJJ11_2019, is_KS22, is_JTJ023_85, is_TIS1228_2018,
        is_SP16_2017_tB3, is_SP16_2017_tB4, is_SP16_2017_tB5, is_NR_GN_CIV_025,

        is_ASTM_A416, is_GB_T_5224, is_ETC, is_KS_D_7002, is_EN_10138_3,

        ic_KS19, ic_KS01, ic_KS, ic_KS01_CIVIL, ic_KS_CIVIL,
        ic_ASTM, ic_JIS, ic_JIS_CIVIL, ic_BS, ic_EN,
        ic_UNI, ic_GB, ic_GB_CIVIL, ic_JTG04, ic_CSA,
```

```
        ic_IS, ic_CNS, ic_EN04, ic_TB05, ic_GOST_SP,
        ic_CNS560, ic_KR_LRFD11, ic_GB10, ic_NTC08, ic_NTC12,
        ic_GOST_SNIP, ic_JTG3362_18, ic_GB_50917_13, ic_NTC18, ic_SS,
        ic_TB10092_17, ic_AS_17, ic_IRC, ic_IRS, ic_GB19,
        ic_QCR9300_18, ic_CJJ11_2019, ic_US_CUST_US, ic_US_CUST_SI, ic_PNS49,
        ic_ASTM19, ic_CNS560_18, ic_SNI, ic_TIS, ic_TIS_MKS,
        ic_NMX_NTC2017, ic_TMH7, ic_JTJ023_85, ic_SP63_2018, ic_NMX_NTC2023,
        ic_NMX_NTC2023_MKS, ic_TS,

        ir_REBAR_USER,

        ia_AA_US, ia_GB50429_07, ia_EC2023,

        it_EN338, it_EN14080,

        im_COUNT
    };

    const int nDC = im_COUNT;
    CString DesignCode[nDC] =
    {
        MATLCODE_STL_KS             , MATLCODE_STL_KS08         , MATLCODE_STL_KS09
        MATLCODE_STL_ASTM           , MATLCODE_STL_ASTM09       , MATLCODE_STL_JIS
        MATLCODE_STL_DIN            , MATLCODE_STL_EN           , MATLCODE_STL_UNI
        MATLCODE_STL_JGJ            , MATLCODE_STL_JTJ          , MATLCODE_STL_JTG04
        MATLCODE_STL_CNS            , MATLCODE_STL_CNS06        , MATLCODE_STL_BS04
        MATLCODE_STL_GOST_SP        , MATLCODE_STL_KSCE_LSD15   , MATLCODE_STL_KS10_CI
        MATLCODE_STL_GB12           , MATLCODE_STL_GOST_SNIP    , MATLCODE_STL_BC1_12_
        MATLCODE_STL_BC1_12_GB      , MATLCODE_STL_BC1_12_CLASS2, MATLCODE_STL_BC1_12_
        MATLCODE_STL_EN10149_2      , MATLCODE_STL_EN10149_3    , MATLCODE_STL_KS16
        MATLCODE_STL_GB50018_02     , MATLCODE_STL_JGJ2015      , MATLCODE_STL_KS18
        MATLCODE_STL_TB10091_17     , MATLCODE_STL_AS_NZS_3678  , MATLCODE_STL_AS_NZS_
        MATLCODE_STL_Q_CR9300_18    , MATLCODE_STL_CJJ11_2019   , MATLCODE_STL_KS22
        MATLCODE_STL_SP16_2017_TB3  , MATLCODE_STL_SP16_2017_TB4, MATLCODE_STL_SP16_20

        // Strand
        MATLCODE_STL_ASTM_A416, MATLCODE_STL_GB_T_5224, MATLCODE_STL_ETC, MATLCODE_STL

        // RC 코드 추가시 콘크리트 및 철근 관련 코드도 함께 추가해야 함
        MATLCODE_CON_KS19           , MATLCODE_CON_KS01      , MATLCODE_CON_KS
        MATLCODE_CON_ASTM           , MATLCODE_CON_JIS       , MATLCODE_CON_JIS_CIVIL
        MATLCODE_CON_UNI            , MATLCODE_CON_GB        , MATLCODE_CON_GB_CIVIL
        MATLCODE_CON_IS             , MATLCODE_CON_CNS       , MATLCODE_CON_EN04
        MATLCODE_CON_CNS560         , MATLCODE_CON_KSCE_LSD15, MATLCODE_CON_GB10
        MATLCODE_CON_GOST_SNIP      , MATLCODE_CON_JTG3362_18, MATLCODE_CON_GB50917_13
        MATLCODE_CON_TB10092_17     , MATLCODE_CON_AS17      , MATLCODE_CON_IRC
        MATLCODE_CON_Q_CR9300_18    , MATLCODE_CON_CJJ11_2019, MATLCODE_CON_USC_US
        MATLCODE_CON_ASTM19         , MATLCODE_CON_CNS560_18 , MATLCODE_CON_SNI
        MATLCODE_CON_NMX_NTC2017    , MATLCODE_CON_TMH7      , MATLCODE_CON_JTJ023_85
        MATLCODE_CON_NMX_NTC2023_MKS, MATLCODE_CON_TS        ,
        // User
        MATLCODE_REBAR_USER,

        // Aluminum
        MATLCODE_ALU_AA             , MATLCODE_ALU_GB50429_07, MATLCODE_ALU_EC2023
        // Timber
        MATLCODE_TIMBER_EN338       , MATLCODE_TIMBER_EN14080,
    };
```

```
82
83      //(...)
84  }
```

- **재질 code 및 강종 list 추가**
  - T_MATL_LIST_STEEL 정보 구성하는 함수 추가
    - BOOL CMatlDB::GetSteelList_[name]

```
1   BOOL CMatlDB::GetSteelList_SP16_2017_tB3(T_UNIT_INDEX UnitIndex, OUT T_MATL_LIST_STEE
2   {
3       struct STL_MATL_SPtB3
4       {
5           CString csName;
6           double dFu;
7           double dFy1;
8           double dFy2;
9           double dFy3;
10          double dFy4;
11          double dFy5;
12          double dFy6;
13          double dFy7;
14          double dFy8;
15          double dFy9;
16          double dFy10;
17
18          STL_MATL_SPtB3() {}
19          STL_MATL_SPtB3(const CString& Name, double Fu, double Fy1, double Fy2, double
20              double Fy6, double Fy7, double Fy8, double Fy9, double Fy10)
21          {
22              csName = Name;
23              dFu = Fu;
24              dFy1 = Fy1;
25              dFy2 = Fy2;
26              dFy3 = Fy3;
27              dFy4 = Fy4;
28              dFy5 = Fy5;
29              dFy6 = Fy6;
30              dFy7 = Fy7;
31              dFy8 = Fy8;
32              dFy9 = Fy9;
33              dFy10 = Fy10;
34          }
35
36          STL_MATL_SPtB3(const CString& Name, double Fu, double Fy1)
37          {
38              csName = Name;
39              dFu = Fu;
40              dFy1 = Fy1;
41              dFy2 = Fy1;
42              dFy3 = Fy1;
43              dFy4 = Fy1;
44              dFy5 = Fy1;
45              dFy6 = Fy1;
46              dFy7 = Fy1;
47              dFy8 = Fy1;
```

```
            dFy9 = Fy1;
            dFy10 = Fy1;
        }

        STL_MATL_SPtB3(const CString& Name, double Fu, double Fy1, double Fy2)
        {
            csName = Name;
            dFu = Fu;
            dFy1 = Fy1;
            dFy2 = Fy2;
            dFy3 = Fy2;
            dFy4 = Fy2;
            dFy5 = Fy2;
            dFy6 = Fy2;
            dFy7 = Fy2;
            dFy8 = Fy2;
            dFy9 = Fy2;
            dFy10 = Fy2;
        }

        STL_MATL_SPtB3(const CString& Name, double Fu, double Fy1, double Fy2, double
        {
            csName = Name;
            dFu = Fu;
            dFy1 = Fy1;
            dFy2 = Fy2;
            dFy3 = Fy3;
            dFy4 = Fy4;
            dFy5 = Fy4;
            dFy6 = Fy4;
            dFy7 = Fy4;
            dFy8 = Fy4;
            dFy9 = Fy4;
            dFy10 = Fy4;
        }
    };

    std::vector<STL_MATL_SPtB3> vMatl;
    vMatl.emplace_back(STL_MATL_SPtB3(_LS(IDS_DB_MATLDB_SP16_2017_tB3_C235), 350.0, 2
    vMatl.emplace_back(STL_MATL_SPtB3(_LS(IDS_DB_MATLDB_SP16_2017_tB3_C245), 360.0, 2
    vMatl.emplace_back(STL_MATL_SPtB3(_LS(IDS_DB_MATLDB_SP16_2017_tB3_C255), 370.0, 2
    vMatl.emplace_back(STL_MATL_SPtB3(_LS(IDS_DB_MATLDB_SP16_2017_tB3_C345K), 460.0,
    vMatl.emplace_back(STL_MATL_SPtB3(_LS(IDS_DB_MATLDB_SP16_2017_tB3_C355), 480.0, 3
    vMatl.emplace_back(STL_MATL_SPtB3(_LS(IDS_DB_MATLDB_SP16_2017_tB3_C355_1), 480.0,
    vMatl.emplace_back(STL_MATL_SPtB3(_LS(IDS_DB_MATLDB_SP16_2017_tB3_C355_K), 480.0,
    vMatl.emplace_back(STL_MATL_SPtB3(_LS(IDS_DB_MATLDB_SP16_2017_tB3_C355P), 480.0,
    vMatl.emplace_back(STL_MATL_SPtB3(_LS(IDS_DB_MATLDB_SP16_2017_tB3_C390), 505.0, 3
    vMatl.emplace_back(STL_MATL_SPtB3(_LS(IDS_DB_MATLDB_SP16_2017_tB3_C390_1), 505.0,
    vMatl.emplace_back(STL_MATL_SPtB3(_LS(IDS_DB_MATLDB_SP16_2017_tB3_C440), 525.0, 4
    vMatl.emplace_back(STL_MATL_SPtB3(_LS(IDS_DB_MATLDB_SP16_2017_tB3_C550), 625.0, 5
    vMatl.emplace_back(STL_MATL_SPtB3(_LS(IDS_DB_MATLDB_SP16_2017_tB3_C590), 670.0, 5

    T_MATL_LIST_STEEL SteelList;
    SteelList.Initialize();
    SteelList.CodeName = MATLCODE_STL_SP16_2017_TB3;

    UnitIndex.nBase_Length = D_UNITSYS_LENGTH_INDEX_MM;
    UnitIndex.nBase_Force  = D_UNITSYS_FORCE_INDEX_N;
```

```
    UnitIndex.nBase_Temper = D_UNITSYS_TEMPER_INDEX_C;
    m_pUnitCtrl->SetUnitIndexCurrentNew(UnitIndex);

    for (const STL_MATL_SPtB3& Cur : vMatl)
    {
        SteelList.MatlName = Cur.csName;
        SteelList.Steel.Elast = 206000.0;
        SteelList.Steel.Poisson = 0.3;
        SteelList.Steel.Thermal = 1.2E-5;
        SteelList.Steel.Density = 7.6982E-5;
        SteelList.Steel.MassDensity = SteelList.Steel.Density / Get_g(UnitIndex.nBase
        SteelList.Steel.S_Fu = Cur.dFu;
        SteelList.Steel.S_Fy1 = Cur.dFy1;
        SteelList.Steel.S_Fy2 = Cur.dFy2;
        SteelList.Steel.S_Fy3 = Cur.dFy3;
        SteelList.Steel.S_Fy4 = Cur.dFy4;
        SteelList.Steel.S_Fy5 = Cur.dFy5;
        SteelList.Steel.S_Fy6 = Cur.dFy6;
        SteelList.Steel.S_Fy7 = Cur.dFy7;
        SteelList.Steel.S_Fy8 = Cur.dFy8;
        SteelList.Steel.S_Fy9 = Cur.dFy9;
        SteelList.Steel.S_Fy10 = Cur.dFy10;
        m_pUnitCtrl->ConvertUnitMatlSteelIn(SteelList.Steel);
        raSteelList.Add(SteelList);
    }

    return TRUE;
}
```

- 추가한 재질 code 등록 : 위에서 정의한 함수 호출.
  - BOOL CMatlDB::MakeMatlData()

- **재질 code별 default DB 설정**
  - 재질 code 별 기본값 정의
    - CDBLib::GetDefaultStlMatl(...)

```
void CDBLib::GetDefaultStlMatl(CString& strMatlDB, CString& strMatlNa)
{
    CDBDoc* pDoc = CDBDoc::GetDocPoint();
    ASSERT(pDoc);
    if (strMatlDB == _T(""))
    {
        T_PREFERENCE rPref;
        rPref.Initialize();
        pDoc->m_pInitCtrl->GetPreference(rPref);
        strMatlDB = rPref.Property.SteelMaterialDBName;
    }
    strMatlNa = _T("");
    if (strMatlDB == MATLCODE_STL_KS_CIVIL)             strMatlNa = _T("SS400");
    else if (strMatlDB == MATLCODE_STL_KS10_CIVIL)  strMatlNa = _T("SS400");
    else if (strMatlDB == MATLCODE_STL_KS)              strMatlNa = _T("SS400");
    else if (strMatlDB == MATLCODE_STL_KS08)        strMatlNa = _T("SS400");
    else if (strMatlDB == MATLCODE_STL_KS09)       strMatlNa = _T("SS400"); // Add by
    else if (strMatlDB == MATLCODE_STL_KS16)       strMatlNa = _T("SS400");
    else if (strMatlDB == MATLCODE_STL_KS18)       strMatlNa = _T("SS275");
    else if (strMatlDB == MATLCODE_STL_KS22)      strMatlNa = _T("SS275");
```

```
    else if (strMatlDB == MATLCODE_STL_ASTM09)     strMatlNa = _T("A36");   // Add by
    else if (strMatlDB == MATLCODE_STL_ASTM)            strMatlNa = _T("A36");
    else if (strMatlDB == MATLCODE_STL_JIS)             strMatlNa = _T("SS400");
    else if (strMatlDB == MATLCODE_STL_JIS_CIVIL)  strMatlNa = _T("SS400");
    else if (strMatlDB == MATLCODE_STL_DIN)             strMatlNa = _T("St37-2");
    else if (strMatlDB == MATLCODE_STL_BS04)            strMatlNa = _T("S275"); // ado
    else if (strMatlDB == MATLCODE_STL_BS)              strMatlNa = _T("43A");
    else if (strMatlDB == MATLCODE_STL_EN05)            strMatlNa = _T("S235");
    else if (strMatlDB == MATLCODE_STL_EN05_PS)         strMatlNa = _T("S235");
    else if (strMatlDB == MATLCODE_STL_EN05_SW)         strMatlNa = _T("S315MC");
    else if (strMatlDB == MATLCODE_STL_EN)              strMatlNa = _T("S235");
    else if (strMatlDB == MATLCODE_STL_UNI)             strMatlNa = _T("Fe360");
    else if (strMatlDB == MATLCODE_STL_GB50917_13)strMatlNa = _T("Q235");
    else if (strMatlDB == MATLCODE_STL_GB12)            strMatlNa = _T("Q235");
    else if (strMatlDB == MATLCODE_STL_GB50017_17)      strMatlNa = _T("Q235");
    else if (strMatlDB == MATLCODE_STL_JGJ2015)         strMatlNa = _T("Q235");
    else if (strMatlDB == MATLCODE_STL_GB03)            strMatlNa = _T("Q235");
    else if (strMatlDB == MATLCODE_STL_GB)              strMatlNa = _T("Grade3");
    else if (strMatlDB == MATLCODE_STL_GB50018_02) strMatlDB = _T("Q235");
    else if (strMatlDB == MATLCODE_STL_JGJ)             strMatlNa = _T("Q235");
    else if (strMatlDB == MATLCODE_STL_JTJ023_85)       strMatlNa = _T("ColdDrawR450")
    else if (strMatlDB == MATLCODE_STL_JTJ)             strMatlNa = _T("A3");
    else if (strMatlDB == MATLCODE_STL_JTG_D64_2015)strMatlNa = _T("Q235");
    else if (strMatlDB == MATLCODE_STL_JTG04)           strMatlNa = _T("Strand1470");
    else if (strMatlDB == MATLCODE_STL_TB05)            strMatlNa = _T("Strand1470");
    else if (strMatlDB == MATLCODE_STL_CSA)             strMatlNa = _T("300W");
    else if (strMatlDB == MATLCODE_STL_IS)              strMatlNa = _T("Fe440");
    else if (strMatlDB == MATLCODE_STL_CNS)             strMatlNa = _T("SS400");
    else if (strMatlDB == MATLCODE_STL_CNS06)           strMatlNa = _T("SS400"); // Ad
    else if (strMatlDB == MATLCODE_STL_KS08_CIVIL) strMatlNa = _T("SS400");
    else if (strMatlDB == MATLCODE_STL_KSCE_LSD15) strMatlNa = _T("SS400");
    else if (strMatlDB == MATLCODE_STL_GOST_SP)         strMatlNa = _LS(IDS_DB_MATLDB_
    else if (strMatlDB == MATLCODE_STL_GOST_SNIP)   strMatlNa = _LS(IDS_DB_MATLDB_GOST
    else if (strMatlDB == MATLCODE_STL_AS_NZS_3678)     strMatlNa = _T("200");
    else if (strMatlDB == MATLCODE_STL_AS_NZS_3679_1)   strMatlNa = _T("300");
    else if (strMatlDB == MATLCODE_STL_AS_NZS_4672_1)   strMatlNa = _T("1030");
    else if (strMatlDB == MATLCODE_STL_TIS1228_2018) strMatlNa = _T("SSCS400");
    else if (strMatlDB == MATLCODE_STL_SP16_2017_TB3) strMatlNa = _T("C355");
    else if (strMatlDB == MATLCODE_STL_SP16_2017_TB4) strMatlNa = _T("C355B");
    else if (strMatlDB == MATLCODE_STL_SP16_2017_TB5) strMatlNa = _T("C355");
    else if (strMatlDB == MATLCODE_STL_NR_GN_CIV_025) strMatlNa = _T("Wrought Iron");
    else  ASSERT(0);
}
```

- **두께에 따른 항복 강도 계산**
  - 재질 code 별 두께 범위에 따른 항복 강도를 찾는 함수 추가
    - double CDgnDataCtrl::Get_FyByThick_[name]

```
double CDgnDataCtrl::Get_FyByThick_SP16_2017_tB3(const CString& strMatlNa, double dThk
{
    const double dFyZero = UnitParam.GetCurZeroStress();
    if (strMatlNa == _LS(IDS_DB_MATLDB_SP16_2017_tB3_C235))
    {
        return UnitParam.IsLE(dThkMax, 4.0) ? adFy[EN_FY_THK_1] : dFyZero;
    }
    if (strMatlNa == _LS(IDS_DB_MATLDB_SP16_2017_tB3_C245))
    {
```

```
        return UnitParam.IsLE(dThkMax, 20.0) ? adFy[EN_FY_THK_1] : dFyZero;
    }
    if (strMatlNa == _LS(IDS_DB_MATLDB_SP16_2017_tB3_C255))
    {
        if (UnitParam.IsLE(dThkMax,  4.0)) { return adFy[EN_FY_THK_1]; }
        if (UnitParam.IsLE(dThkMax, 10.0)) { return adFy[EN_FY_THK_2]; }
        if (UnitParam.IsLE(dThkMax, 20.0)) { return adFy[EN_FY_THK_3]; }
        if (UnitParam.IsLE(dThkMax, 40.0)) { return adFy[EN_FY_THK_4]; }
        return dFyZero;
    }
    if (strMatlNa == _LS(IDS_DB_MATLDB_SP16_2017_tB3_C345K))
    {
        return UnitParam.IsLE(dThkMax, 10.0) ? adFy[EN_FY_THK_1] : dFyZero;
    }
    if (strMatlNa == _LS(IDS_DB_MATLDB_SP16_2017_tB3_C355))
    {
        if (UnitParam.IsLE(dThkMax, 16.0)) { return adFy[EN_FY_THK_1]; }
        if (UnitParam.IsLE(dThkMax, 40.0)) { return adFy[EN_FY_THK_2]; }
        if (UnitParam.IsLE(dThkMax, 60.0)) { return adFy[EN_FY_THK_3]; }
        if (UnitParam.IsLE(dThkMax, 80.0)) { return adFy[EN_FY_THK_4]; }
        if (UnitParam.IsLE(dThkMax, 100.0)) { return adFy[EN_FY_THK_5]; }
        if (UnitParam.IsLE(dThkMax, 160.0)) { return adFy[EN_FY_THK_6]; }
        if (UnitParam.IsLE(dThkMax, 200.0)) { return adFy[EN_FY_THK_7]; }
        if (UnitParam.IsLE(dThkMax, 260.0)) { return adFy[EN_FY_THK_8]; }
        if (UnitParam.IsLE(dThkMax, 300.0)) { return adFy[EN_FY_THK_9]; }
        if (UnitParam.IsLE(dThkMax, 360.0)) { return adFy[EN_FY_THK_10]; }
        return dFyZero;
    }
    if (strMatlNa == _LS(IDS_DB_MATLDB_SP16_2017_tB3_C355_1) || strMatlNa == _LS(IDS_D
    {
        return UnitParam.IsLE(dThkMax, 16.0) ? adFy[EN_FY_THK_1] : dFyZero;
    }
    if (strMatlNa == _LS(IDS_DB_MATLDB_SP16_2017_tB3_C355_K))
    {
        if (UnitParam.IsLE(dThkMax, 40.0)) { return adFy[EN_FY_THK_1]; }
        if (UnitParam.IsLE(dThkMax, 50.0)) { return adFy[EN_FY_THK_2]; }
        return dFyZero;
    }
    if (strMatlNa == _LS(IDS_DB_MATLDB_SP16_2017_tB3_C355P))
    {
        if (UnitParam.IsLE(dThkMax, 16.0)) { return adFy[EN_FY_THK_1]; }
        if (UnitParam.IsLE(dThkMax, 40.0)) { return adFy[EN_FY_THK_2]; }
        return dFyZero;
    }
    if (strMatlNa == _LS(IDS_DB_MATLDB_SP16_2017_tB3_C390_1))
    {
        if (UnitParam.IsLE(dThkMax, 40.0)) { return adFy[EN_FY_THK_1]; }
        if (UnitParam.IsLE(dThkMax, 60.0)) { return adFy[EN_FY_THK_2]; }
        if (UnitParam.IsLE(dThkMax, 80.0)) { return adFy[EN_FY_THK_3]; }
        if (UnitParam.IsLE(dThkMax, 100.0)) { return adFy[EN_FY_THK_4]; }
        if (UnitParam.IsLE(dThkMax, 160.0)) { return adFy[EN_FY_THK_5]; }
        return dFyZero;
    }
    if (strMatlNa == _LS(IDS_DB_MATLDB_SP16_2017_tB3_C440))
    {
        if (UnitParam.IsLE(dThkMax, 16.0)) { return adFy[EN_FY_THK_1]; }
        if (UnitParam.IsLE(dThkMax, 40.0)) { return adFy[EN_FY_THK_2]; }
        if (UnitParam.IsLE(dThkMax, 60.0)) { return adFy[EN_FY_THK_3]; }
```

```
        if (UnitParam.IsLE(dThkMax, 80.0)) { return adFy[EN_FY_THK_4]; }
        if (UnitParam.IsLE(dThkMax, 100.0)) { return adFy[EN_FY_THK_5]; }
        if (UnitParam.IsLE(dThkMax, 160.0)) { return adFy[EN_FY_THK_6]; }
        return dFyZero;
    }
    if (strMatlNa == _LS(IDS_DB_MATLDB_SP16_2017_tB3_C550) || strMatlNa == _LS(IDS_DB_
    {
        return UnitParam.IsLE(dThkMax, 50.0) ? adFy[EN_FY_THK_1]: dFyZero;
    }

    ASSERT(0);
    return dFyZero;
}
```

- 추가한 code별 계산함수 호출
  - doule CDgnDataCtrl::Get_FyByThick_Code(...)
- code별 두께별 항복강도 입력 control의 Enable/Disable을 위한 판단 함수
  - int CDgnDataCtrl::GetChkKindStlMatl(const CString& strStlMatlCode)

```
int CDgnDataCtrl::GetChkKindStlMatl(const CString& strStlMatlCode)
{
    if (strStlMatlCode == MATLCODE_STL_KS_CIVIL)        return 3;
    if (strStlMatlCode == MATLCODE_STL_KS08_CIVIL)      return 3;
    if (strStlMatlCode == MATLCODE_STL_KS22)            return 5;
    if (strStlMatlCode == MATLCODE_STL_KS18)            return 5; // Add by psg0604.
    if (strStlMatlCode == MATLCODE_STL_KS16)            return 3; // Add by GAY. PMS:5
    if (strStlMatlCode == MATLCODE_STL_KS08)            return 3; // Add by ZINU.('08.
    if (strStlMatlCode == MATLCODE_STL_KS09)            return 2; // Add by GAY. PMS:4
    if (strStlMatlCode == MATLCODE_STL_KS)              return 2;
    if (strStlMatlCode == MATLCODE_STL_ASTM09)          return 1; // Add by GAY. PMS:4
    if (strStlMatlCode == MATLCODE_STL_ASTM)            return 1;
    if (strStlMatlCode == MATLCODE_STL_JIS)             return 2;
    if (strStlMatlCode == MATLCODE_STL_JIS_CIVIL)       return 2;
    if (strStlMatlCode == MATLCODE_STL_BS04)            return 6;
    if (strStlMatlCode == MATLCODE_STL_BS)              return 4; // Modify by GAY. MN
    if (strStlMatlCode == MATLCODE_STL_DIN)             return 2;
    if (strStlMatlCode == MATLCODE_STL_EN05)            return 2;
    if (strStlMatlCode == MATLCODE_STL_EN05_PS)         return 6;
    if (strStlMatlCode == MATLCODE_STL_EN05_SW)         return 1;
    if (strStlMatlCode == MATLCODE_STL_EN)              return 2;
    if (strStlMatlCode == MATLCODE_STL_UNI)             return 2;
    if (strStlMatlCode == MATLCODE_STL_GB12)            return 6;
    if (strStlMatlCode == MATLCODE_STL_GB03)            return 4;
    if (strStlMatlCode == MATLCODE_STL_GB)              return 3;
    if (strStlMatlCode == MATLCODE_STL_GB50018_02)      return 1;
    if (strStlMatlCode == MATLCODE_STL_JGJ)             return 4;
    if (strStlMatlCode == MATLCODE_STL_JTJ023_85)       return 4;
    if (strStlMatlCode == MATLCODE_STL_JTJ)             return 4;
    if (strStlMatlCode == MATLCODE_STL_JTG04)           return 1;   // Only Strand, Wi
    if (strStlMatlCode == MATLCODE_STL_TB05)            return 1;   // Only Strand, Wi
    if (strStlMatlCode == MATLCODE_STL_CNS)             return 2;
    if (strStlMatlCode == MATLCODE_STL_CNS06)           return 2; // Add by GAY. PMS:4
    if (strStlMatlCode == MATLCODE_STL_GOST_SP)         return 4;
    if (strStlMatlCode == MATLCODE_STL_GOST_SNIP)       return 4;
    if (strStlMatlCode == MATLCODE_STL_BC1_12_ASTM)     return 5;
    if (strStlMatlCode == MATLCODE_STL_BC1_12_BSEN)     return 6;
```

```
    if (strStlMatlCode == MATLCODE_STL_BC1_12_JIS)      return 6;
    if (strStlMatlCode == MATLCODE_STL_BC1_12_GB)       return 5;
    if (strStlMatlCode == MATLCODE_STL_BC1_12_CLASS2)   return 6; // by GAY. PMS:5007.
    if (strStlMatlCode == MATLCODE_STL_BC1_12_CLASS3)   return 6; // by GAY. PMS:5007.
    if (strStlMatlCode == MATLCODE_STL_JGJ2015)         return 5; // by xuezc (2017/9/
    if (strStlMatlCode == MATLCODE_STL_GB50017_17)      return 5; // by xuezc (2018/2/
    if (strStlMatlCode == MATLCODE_STL_TB10092_17)      return 1;
    if (strStlMatlCode == MATLCODE_STL_TB10091_17)      return 2;
    if (strStlMatlCode == MATLCODE_STL_CSA)             return 3;
    if (strStlMatlCode == MATLCODE_STL_IS)              return 3;
    if (strStlMatlCode == MATLCODE_STL_KSCE_LSD15)      return 3;
    if (strStlMatlCode == MATLCODE_STL_KS10_CIVIL)      return 3;
    if (strStlMatlCode == MATLCODE_STL_JTG3362_18)      return 1;
    if (strStlMatlCode == MATLCODE_STL_EN10326)         return 1; //#if defined(_US) □
    if (strStlMatlCode == MATLCODE_STL_EN10149_2)       return 1; //#if defined(_US) □
    if (strStlMatlCode == MATLCODE_STL_EN10149_3)       return 1; //#if defined(_US) □
    if (strStlMatlCode == MATLCODE_STL_JTG_D64_2015)    return 5; //占쏙옙占쏙옙占쏙옙 GC
    if (strStlMatlCode == MATLCODE_STL_GB50917_13)      return 1;
    if (strStlMatlCode == MATLCODE_STL_AS_NZS_3678)     return 6;
    if (strStlMatlCode == MATLCODE_STL_AS_NZS_3679_1)   return 3;
    if (strStlMatlCode == MATLCODE_STL_AS_NZS_4672_1)   return 1;
    if (strStlMatlCode == MATLCODE_STL_TIS1228_2018)    return 1;
    if (strStlMatlCode == MATLCODE_STL_SP16_2017_TB3)   return 10;
    if (strStlMatlCode == MATLCODE_STL_SP16_2017_TB4)   return 6;
    if (strStlMatlCode == MATLCODE_STL_SP16_2017_TB5)   return 4;
    if (strStlMatlCode == MATLCODE_STL_NR_GN_CIV_025)   return 5;
    return 1;
}
```

검증 to-do list

- Properties > Material Property 대화상자에서 데이터가 제대로 정의되었는지 확인
  - spec 대로 재질 이름과 물성치가 정의되었는가?
  - UI에서 직접 확인하거나, 내부적으로 DB 추가 → mgt export 로 동작하여 검증 가능.
- Design > Modify Steel Material 대화상자에서 데이터가 제대로 정의되었는지 확인
  - spec 대로 재질 이름과 물성치가 정의되었는가?
  - UI에서 직접 확인하거나, 내부적으로 DB 추가 → mgt export 로 동작하여 검증 가능.
- Design > Modify SRC Material 대화상자에서 데이터가 제대로 정의되었는지 확인
  - spec 대로 재질 이름과 물성치가 정의되었는가?
  - UI에서 직접 확인하거나, 내부적으로 DB 추가 → mgt export 로 동작하여 검증 가능.
- CIVIL 전용 Design > Modify Composite Material 대화상자에서 데이터가 제대로 정의되었는지 확인
  - spec 대로 재질 이름과 물성치가 정의되었는가?
  - UI에서 직접 확인하거나, 내부적으로 DB 추가 → mgt export 로 동작하여 검증 가능.
- Preference 추가 내용 확인.

확장이 필요한 사항

- family 제품(특히, Gen/Civil과 연동되는 제품)에서도 재질 추가가 필요함.
  - DgnEngine 의 재질 관련 구현 활용 가능성.
  - 연동 제품 : Design+, UMD, GSD
  - 비연동 제품 : nGen, eGenKR, ADS, SDS

참고문서

[COM] 설계 재질 DB Format

GEN-9491: [재질 DB] RU 철골 DB 추가 : SP 16 2017-t.B3, SP 16 2017-t.B4, SP 16 2017-t.B5

DONE